Workshop Summary, August 10-14, 2002
Ben Lomond/San Francisco, California

Biodiversity Corridors In Practice

Building From Experience

Conservation Strategies Department
Field Support Division

CONSERVATION INTERNATIONAL

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BIODIVERSITY CORRIDORS IN PRACTICE: BUILDING FROM EXPERIENCE

SUMMARY OF WORKSHOP PRESENTATIONS, LESSONS LEARNED, AND DISCUSSIONS

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BIODIVERSITY CORRIDORS IN PRACTICE: BUILDING FROM EXPERIENCE

AUGUST 10-14, 2002, SEQUOIA SEMINAR
BEN LOMOND/SAN FRANCISCO, CALIFORNIA

SUMMARY OF WORKSHOP PRESENTATIONS, LESSONS LEARNED, AND DISCUSSIONS

INTRODUCTION

Conservation International is pioneering work in biodiversity corridor design and implementation. CI firmly believes that biodiversity corridors are key tools to the achievement of biodiversity conservation in the regions where we work. As CI continues to search for ways to improve its ability to achieve conservation outcomes, it is essential that we build on and share experiences and incorporate them into how we do business.

To this end, the Conservation Strategies Department of the Field Support Division conducted a workshop held near San Francisco in August 2002, to facilitate the exchange of technical expertise and lessons learned in the planning and implementation of biodiversity corridors. Participants included CI corridor managers and directors representing experience in more than 10 corridors, along with technical experts from CABS and FSD.

The workshop and following information exchanges help consolidate the "corridor learning system" that unites the methodologies used for managing and monitoring corridor strategies for CI's USAID-funded corridor projects in Brazil (Pantanal-Cerrado Corridor), the Guianas (Kanuku Mountains Corridor), and the Philippines (Sierra Madre Corridor) under CI's Biodiversity Corridor Planning and Implementation Program (BCPIP) [1]. Prior to the workshop many corridor managers identified the need for a discussion and guidance on monitoring and evaluation at the corridor scale; the workshop provided a forum to begin these discussions.

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[1] CI's Biodiversity Corridor Planning and Implementation Program (BCPIP) is funded in part by the United States Agency for International Development (USAID) under Leader with Associates Cooperative Agreement Award Number LAG-A-00-99-00046-00. It should be noted that although the results of the "Biodiversity Corridors in Practice" workshop will be used to meet the objectives of the BCPIP project, the workshop and this summary are not funded by USAID. The opinions expressed in this summary are those of the authors and do not necessarily reflect the views of USAID.

The workshop succeeded as a forum for discussion between CI's corridor managers and directors and technical experts with a wide variety of topics covered. Issues relating to corridor strategy development and implementation were the focus of the exchange of lessons learned. Specific topics addressed included:

- The refinement of the biodiversity corridor concept;
- Identifying CI's niche in the development and implementation of corridor strategies;
- Managing participation and partnerships;
- CI's changing institutional role and staffing implications;
- Monitoring and evaluation at the corridor scale;
- GIS and remote sensing; and
- Managing donor relations.

The workshop also provided opportunity for training in specific tools relevant to corridor planning and implementation:

- Socio-economic analysis;
- Modeling of future land-use scenarios;
- Corridor spatial planning using TAMARIN; and
- Report writing.

At the close of the workshop discussions were brought together with the outlining of a system to facilitate the ongoing exchange of lessons learned at the corridor scale.

CLARIFYING THE CORRIDOR CONCEPT

The workshop provided a unique opportunity to solicit input into the development of CI's corridor white paper.[2] Corridor managers from all over the field, along with CABS and Field Support technical staff, provided their insights into the underpinnings of the biodiversity corridor concept. They identified fundamental issues that should be addressed in the white paper. These issues can be grouped into three general categories: the articulation of the biodiversity corridor concept, the communication of the purpose and benefits of working at the corridor scale to our partners and stakeholders, and the technical aspects of the biodiversity corridor concept.

Biodiversity corridors incorporate protected areas as their core, and use biological corridors and compatible land uses to create connectivity.

Purpose of Working at the Corridor Scale

As with CI's other conservation outcomes, the creation of biodiversity corridors has the primary objective of conserving biodiversity. Biodiversity

[2] *Biodiversity Corridors: Considerations for Planning, Implementation, and Monitoring of Sustainable Landscapes*, James Sanderson, Carlos Galindo-Leal, Keith Alger, Victor Hugo Inchausty, and Gustavo Fonseca, in development.

corridors incorporate protected areas as their core, and use biological corridors and compatible land uses to create connectivity. The design of a corridor will thus incorporate all types of conservation outcomes in its makeup. In addition, biodiversity corridors are an effective scale at which to plan and manage conservation action. Participants focused their discussion on some of the key characteristics of working at the corridor scale, which make it a particularly useful scale for the conservation of biodiversity.

Planning at the corridor scale allows the flexibility to design a landscape plan that meets both conservation and development objectives.

Working at the corridor or landscape scale allows conservationists to operate on a scale comparable to the scale of the major threats that endanger biodiversity in hotspots and wilderness areas. The maintenance of ecological and evolutionary processes usually requires an area much larger than most individual protected areas provide. Planning at the corridor scale allows the flexibility to design a landscape plan that meets both conservation and development objectives; this is frequently not possible when working at the site level, since sharper conflicts between sectors are more apt to

1 The Importance of Communication: A Case from Guyana

Consultants conducted a preliminary socio-economic assessment for the establishment of a protected area in the Kanuku Mountains. In most cases, no senior CI staff was present with the consultants in the communities during the data collection exercises to answer the numerous questions that were precipitated by the initiative. While the consultants did attempt to provide answers to the communities, such answers were constrained by their own limited background information. Speculation as to the motive of the exercise therefore became rampant and many indigenous representatives came to the conclusion that the exercise was aimed at appropriating lands that were traditionally used by their communities. This concern about the loss of traditional land rights was fueled by the experience in another part of Guyana, where the boundary of the Kaieteur National Park was extended without allowing traditional use of resource within these boundaries by the indigenous peoples living nearby. This misunderstanding of the objective of a protected area in the Kanuku Mountains became a major stumbling block for the project.

High quality planning for new protected areas requires data collection, but this project learned that engagement with stakeholders to manage their expectations about the potential consequences of the research may be necessary even before the research is conducted and its full implications are known. Providing stakeholders with an understanding of nature, purpose and process of the studies about protected area feasibility should come before the collection of preliminary data.

Because some indigenous stakeholder communities were overlooked during the implementation of the preliminary socio-economic survey, these communities' misunderstanding of the objective created rumors and distrust that were difficult to overcome. These communities are now being engaged during the implementation of current projects.

arise when trying to apply those objectives to smaller land areas. The corridor scale also affords us a better measure of our success in preserving biodiversity, since many of the ecological and evolutionary processes that are essential to the health of the biodiversity of a region span very large areas.

Articulation and Communication of the Biodiversity Corridor Concept

Biodiversity Corridors are designed to incorporate a variety of land uses into the landscape

Corridor managers identified a common problem in the perception of the corridor concept outside of the conservation sector. There is a common reluctance among communities and actors to engage in the discussion and planning of conservation corridors because of a perception that corridors are designed to exclude use of the areas for non-conservation purposes. Participants agreed that a clear communication of the concept to communities and other partners is essential to the success of a corridor. To achieve this, participants recognized the need for a clear articulation of the concept within CI, so that it can be used in turn as an effective tool to engage partners and to increase the integration of conservation projects and objectives into development planning and implementation.

Participants also offered some illustrative definitions of a biodiversity corridor, which may help CI and its partners to articulate the concept to stakeholders:

- A system of protected areas and associated land uses that is managed as a unit to maintain ecological integrity.
- A landscape designed to meet the fundamental needs of all the populations of species it supports, both human and non human.

Technical Aspects of Biodiversity Corridors

Biodiversity corridors are a tool for achieving conservation and not an end in themselves

Considerable progress was made in achieving a common understanding of the biodiversity corridor concept. It was emphasized that corridors are a means to achieve biodiversity conservation and should not be viewed as an end in themselves. Participants engaged in substantial discussion about the criteria used to delineate a corridor. While participants did not settle on hard and fast rules to be used to delineate the corridor, they did agree on some key aspects of corridors.

A biodiversity corridor encompasses a closely linked set of priority biodiversity areas (determined by the presence of key populations of threatened species, the level of endemism, and existing and potential threats) within a tropical wilderness area or hotspot; these areas require coordinated management to achieve species conservation through a connective network of newly created and existing protected areas.

Related aspects that were articulated include:

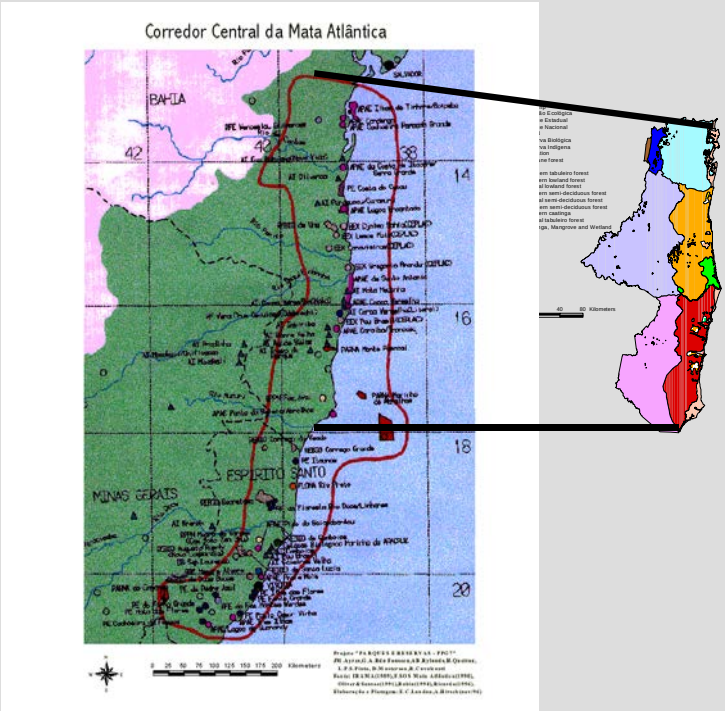
- Biodiversity corridors may contain areas where no connectivity is warranted or desired (see Figure 2).

- Designing biodiversity corridors should be primarily based on biodiversity criteria, but with a flexibility to adapt them to effectively address development concerns.

- In hotspots and wilderness areas, the approach to designing biodiversity corridors will vary depending on the level of fragmentation of the landscape. Restoring connectivity requires a different approach and tools than maintaining connectivity.

- The scale of the corridor should facilitate effective management and the ability to address threats and opportunities to the conservation of biodiversity in the region.

2 Delineation of Biodiversity Corridors: The Inclusion of Areas Where No Connectivity is Desired



Corridors may be delineated, as on the leftmost map, to include clusters of endemic and threatened species within a hotspot, but also broadly enough to include regional threats and policy-making arenas.

Surprisingly, this does not mean that the desired outcome is to "connect all habitats in the corridor." As shown in the inset, the corridor may contain a number of distinct areas where speciation is based on natural riverine and climactic barriers.

CORRIDOR STRATEGY DEVELOPMENT

The planning and implementation framework for biodiversity corridor development has been continually evolving since the concept was introduced. While the foundations of CI's approach to corridor development can be seen in the BCPIP framework, CI has refined its conservation strategy framework to center around the concepts of Conservation Outcomes. Conservation Outcomes guide CI's conservation planning and implementation activities.

Conservation Outcomes represent the quantifiable set of species and land areas that must be conserved to ensure that biodiversity is conserved. CI has identified three primary categories of Conservation Outcomes, each further divided into subcategories of outcomes (see Figure 3). Biodiversity corridors are an essential component of this framework.

3 CI's Conservation Outcomes

Extinctions Avoided
- *Endangered and Critically Endangered Species Protected*
- *Endemic Species Protected*

Area Protected
- *Improved Management of Existing Protected Areas*
- *Expansion of Existing Protected Areas*
- *Creation of New Protected Areas*
- *Protection of Indigenous Lands*

Corridors Consolidated
- *Intact Biotic Assemblages MaintainedEcological Processes MaintainedConnectivity Established*

Discussion of corridor strategy development included the relationship between Conservation Outcomes and BCPIP's four objectives:

- To build a biodiversity corridor planning and implementation support framework;
- To strengthen, create and extend individual protected areas;
- To connect proximate protected areas to form core nuclei; and
- To connect core nuclei to form the biodiversity corridor.

Many elements of the BCPIP framework are reflected in the Conservation Outcome categories. Both frameworks emphasize the establishment and management of protected areas, along with the importance of establishing connectivity between these core protected areas. Participants noted that the BCPIP objectives are articulated to illustrate steps in the corridor development process, while CI's Conservation Outcomes articulate the key elements to achieve biodiversity conservation. Conservation Outcomes further articulate the components and biological criteria that should guide the development of an effective conservation strategy.

The information and input from participants in this workshop will be integrated into the corridor-planning module in CI's Conservation Strategies Handbook. The module will lay out key issues and steps in corridor strategy development.

4 A Flexible Corridor Development Process: The Chocó-Manabí Corridor

In the northern part of the Chocó-Manabí corridor there are many indigenous territories, Afro-Colombian collectively owned lands, private reserves and some national parks. In this context the Columbian program has pursued a strategy that focuses on creating private reserves, working with communities and landowners, and improving the management of current land uses for conservation. This has proved to be more effective than pursuing the designation of national-level parks within the region. Most landowners have part of their lands without any activity, and other parts are being used for shade coffee, ecotourism and other uses.

A thorough understanding of the land tenure context and current land uses has allowed the program to be more effective in building a matrix of the land uses needed to conserve biodiversity in the region. In the Chocó-Manabí, land tenure conditions must be understood before suggesting alternative land uses in buffer zone areas that have been occupied by people for many generations.

IDENTIFYING CI'S NICHE WITHIN A CORRIDOR STRATEGY

Participants recognized that the scale of biodiversity corridors, and the complexity of the strategy and actions required to conserve biodiversity within these corridors, make successful alliances essential to conservation success. Because funds for conservation are limited, CI's regional programs have found it essential to stay focused on achieving Conservation Outcomes and to build on CI's competitive advantages. Defining an effective role or niche within a corridor strategy requires that we are aware of our strengths, our technical capacity, and the capacity of potential partner organizations. These strengths vary between regional programs, but both the structure of CI and our Conservation Outcomes suggest areas where CI should focus its efforts within a corridor strategy.

Avoiding the extinction of threatened, endangered, and endemic species requires biodiversity research into species presence, habitat requirements, population health, and other areas. CI has developed considerable expertise biodiversity research in CABS and in CI's regional programs.

The desire to focus on conservation at the regional scale has led CI to develop expertise in landscape-level planning and skills in integrating conservation into regional-scale development planning. In this way, CI is able to leverage conservation impacts that are not possible with a focus on site-scale initiatives alone.

Establishing and maintaining connectivity should be based on biodiversity requirements and the socio-economic and development realities on the ground. To this end, CI is

success at the corridor scale requires planning and implementation at both the regional and site scales

developing expertise within both CABS and FSD in the creation, expansion, and improved management of protected areas and indigenous lands. Agroforestry has proven to be a useful tool in establishing connectivity between protected areas, and CI has considerable capacity in its field programs with supporting expertise in FSD and CELB that can be used in the design with partners of coffee and cocoa projects.

Participants at the workshop emphasized that success at the corridor scale requires planning and implementation at both the regional and site scales. In the case of the Guianas, success in protected area planning and management has made it possible to be effective at the corridor scale (see Figure 5).

5 The Guianas Corridor

Without a national system of protected areas, the focus of CI-Guianas has been to develop anchor sites (protected areas or conservation concessions) in the corridor region. Once anchor sites have been established and stakeholders have a higher level of conservation awareness, CI will shift to a systematic discussion of the corridor concept as an overall strategy for achieving biodiversity conservation. The corridor creation process will be made smoother by laying the foundations of the corridor first.

Through success at the protected area scale and through planning at the corridor scale, the Guianas program has earned the respect of the government and a seat at the regional planning table.

6 Lessons from Cerrado-Pantanal: Creating Partnerships and Capacity Building

The creation and invigoration of local partnerships has been one of the main strategies for implementation and operation of the Cerrado-Pantanal Biodiversity Corridor in Brazil. Located in a region without large urban centers, the landscape consists mostly of medium-size and low human density areas.

At the beginning of the project, the only local environmental organization was the Emas Foundation, located in Mineiros. The Foundation was founded by a Catholic priest and has been operating for about 18 years. The foundation has had substantial experience in the conservation of water resources and of Emas National Park and was invited to be an implementing partner in the Corridor.

The main strategy for building the capacity of the Foundation was the creation of a GIS and remote sensing processing lab. A technical body was formed, and the lab was set up and furnished with equipment. The improved technical capacity of the team and the quality of their work gained recognition for both the Foundation and for the Corridor. As the Corridor project progressed, many local and regional organizations sought to create new partnerships with the Emas Foundation. Research NGOs such as Pro-Carnivoros and Pequi, the state environmental agency IBAMA, and universities such as FIMES created a partnership network having the Emas Foundation at its core. The Foundation provided support to researchers in the Corridor and in Emas National Park. With the expanded interest in working with the Emas Foundation, a conflict between their original mission and the new organizational role (a regional clearinghouse for environmental research and information) soon developed.

The Foundation was under strain trying to support the additional research and manage the growth of the geoprocessing lab. The institution determined it must relinquish the role at the core of the partnership network, and transform its role into that of a member partner. The Foundation also felt it necessary to spin off the geoprocessing lab and focus on the continuity of its partnership with CI. In this new configuration, the Foundation is concentrating on environmental education and communication, and is reducing its support of research and public policy.

The separation of the geoprocessing lab from the Emas Foundation resulted in an independent entity, which is the fruit of the specialization and growth of the technical team. This recently created NGO, Oréades, was created with the goal of advancing biodiversity conservation using geoprocessing tools and supporting M&E efforts in the region. An independent Oréades has the potential to meet the local and regional demand for these kinds of services.

The experience with the Emas Foundation and Oréades can serve as a lesson when developing other partnerships. When problems arise, such as the growing pains within the Emas Foundation, we must act to transform the situation into an opportunity to promote technical capacity and to strengthen specializations.

PARTICIPATION AND PARTNER INVOLVEMENT

Participation of various stakeholders and partners is a key component to the success of conservation efforts in a corridor. Corridor managers have had a wide range of experience in involving stakeholders and partners in data collection and in the planning and implementation of corridor strategies. Participants discussed issues of concern and recommended some general principles for fostering effective participation.

Effective communication of the biodiversity corridor concept requires knowledge of partners' interests, motives and incentives

To ensure that a corridor plan is followed and is integrated in a region's development policies and implementation, it is important to have a strategy for engaging the region's stakeholders.

Participants agreed that the first step in developing a plan to engage stakeholders should be to identify corridor-level stakeholders. It is also essential to have a clear concept of the corridor before approaching stakeholders. It is important to have an understanding of the interests of the stakeholders and to articulate the corridor concept in a way that

7 The Importance of a Stakeholder Management Plan in Guyana

In the Guianas, a strategy for stakeholder identification, analysis and management was effective in nurturing support for the various corridor initiatives. At the regional level, a range of stakeholders were identified under the guidance of the existing leadership structure (national government officials, local government officials and indigenous community leaders). CI-Guyana was instrumental in ensuring that the stakeholder group being engaged to implement the corridor program was broadened to include all appropriate stakeholders in the region. This comprehensive identification of stakeholders was important to ensure that a transparent and participatory approach was adopted to formulate and implement corridor initiatives. All initiatives were presented to stakeholders for feedback before being finalized and implemented.

This highly transparent and participatory approach to project development and implementation has facilitated the successful establishment of the first conservation concession in Guyana during July 2002. Generally, land-use projects in Guyana are highly controversial and are often politicized, especially those that involve the allocation of resource rights to foreign entities. The implementation of a stakeholder management strategy, which involved identifying and facilitating the participation of a comprehensive range of stakeholders in all stages of project development, was critical to the establishment of the conservation concession in a non-controversial manner. Stakeholders were always fully informed on the nature of the project, feedback was actively sought from the very beginning of the process, and, where appropriate, such feedback was integrated into plans. This process therefore allowed all issues to be identified and addressed during the process of developing the project.

demonstrates the benefits of the corridor in terms of those interests. Hence while the underlying principles of biodiversity corridors remains the same, the communication of the corridor concept may vary depending on the nature of the partner. Without an understanding of the motives and incentives of different actors, it is not possible to design and implement an effective biodiversity corridor.

Corridor managers generally agreed that participation is a key element of an effective corridor plan, but the point at which stakeholders are brought into the process will vary depending on their mandate, capacity, and interests.

When CI-Pantanal proposed the creation of the Rio Negro State Park, the ranching community attempted to undermine CI regionally. CI had anticipated this opposition due to past experience with the ranchers, in which they had successfully blocked the Park's creation. CI-Pantanal engaged parts of the community to support improved communication and the development of creative solutions to regional problems such as organic beef production and market opportunities.

8 Examples of Site and Corridor Scale Functions

(These lists are illustrative and not meant to be complete)

Site Scale Functions	Corridor Scale Functions
• Community entry specialist • Interpreter (indigenous languages) • Park Management • Education Awareness at the site • Community development • Field/ Research Station • Monitoring and evaluation • Community Resource Evaluation/ Management, RAPS, Establishing baselines • Partnership Identification • Facilitating Training	• Corridor Planning • GIS and mapping • Management of partnerships • Identification of partners • Assessment of partners • Capacity building and creation of local NGO's • Data collection of existing info • Facilitating training and capacity building • Priority Setting • Monitoring and evaluation • Identification of other initiatives in corridor to ensure they are complementary and not redundant • Recognizing regional opportunities • Strategic planning as opposed to fighting fires/threats • Sustainable resource management – agroforestry and ecotourism • Build on successful experiences within the corridor • Refining grant making and management • Conflict resolution/management

Effective communication with the relevant actors is key to the success of corridor initiatives, and with clear articulation of our conservation interests and goals to stakeholders, more effective partnerships will emerge. Participants also have identified capacity building of partners as necessary in many cases to maintain stakeholder support over the long term.

CI'S ROLE AND STAFFING

The transition from the site scale to he corridor scale at CI has required a new approach, based on alliances and requiring new sets of skills and technical expertise. While many of the skills are necessary for effective planning and implementation at both the site and corridor scales, there are differences in the types of expertise and their focus between different scales (see Figure 8).

All participants agreed that an integral part of being successful at the corridor scale is working on the ground at carefully chosen sites. Establishing a reputation for being effective on the ground has built credibility with regional partners in both the Philippines (see Figure 9) and the Guianas (see Figure 10).

As CI's regional programs have shifted focus from working primarily at the site scale to working at the scale of biodiversity corridors, regional programs have found it important to have a plan for managing the transition. Experience has shown that a shift in technical focus and staff functions can breed uncertainty and anxiety within existing staff. Without effective communication, transparency and a transition plan, programs can lose valuable technical staff. And since highly qualified technical staff often have more options, they tend to be the first to leave.

Work at the scale of biodiversity corridors makes it necessary to work with and rely more heavily upon partner organizations to help achieve conservation outcomes. This increases

9 The Importance of Maintaining a Presence on the Ground: Lessons from the Sierra Madre, Philippines

Conservation of biodiversity cannot be done on paper. It requires work on the ground directly with the people, an investment of about 75% time. In the Northern Sierra Madre Park in the Philippines, deployment of community organizers (COs) in various locations helped elicit local support for the Park's conservation program. The empowerment of people is one of the many tasks of COs, which includes putting local people in the forefront of park conservation and protection. An indication of an empowered constituency is local people actively pushing for the cessation of illegal activities such as harvesting of treetops and branches and for a moratorium on lobsters harvesting, measures supported by an equally empowered Protected Area Management Board (PAMB) of the Park.

the importance of knowing partners' strengths and weaknesses along with our own. With the added complexity that the corridor scale brings, there is increased risk of overlapping and conflicting initiatives and inefficient use of scarce conservation dollars. By defining our roles, within a corridor, in collaboration with partners, and in recognition of our strengths we can decrease this risk.

10 Formal Partnerships with Government in the Kanuku Mountains

In the case of the proposed Kanuku Mountain Protected Area, the formal appointment of CI-Guyana as the "Lead Agency" in the process of establishing the protected area strengthened the legitimacy of existing interventions and increased stakeholder support. This designation as "Lead Agency" also enhanced CI-Guyana's credibility and influence in advancing the conservation agenda in Guyana. The appointment was a reflection of the Government's recognition that CI was already involved in several conservation initiatives in the region and had access to the resources required to establish a protected area in the Kanuku Mountains.

PANEL DISCUSSIONS

During the workshop, three panel discussions were conducted in plenary session. Each panel member was asked to respond to a question addressing common issues across many corridors. What follows is a summary of some of the main points of the discussion in plenary.

Government Support for Corridors

PANEL QUESTION

How has it been possible for you to gain the public acknowledgment from your national governments that the management of protected areas for biodiversity requires the integrated coordination of policy toward new and existing protected areas and agricultural uses across a regional scale determined by the need to prevent the extinction of key endangered species?

PANEL MEMBERS

***Bernard De Souza**, Project Manager – Biodiversity Corridor, CI-Guyana*
***Reinaldo Lourival**, Senior Director, CI-Pantanal, Brazil*
***Victor Hugo Inchausty**, Technical Director, CI-Bolivia*

Buy-in to the corridor concept from government has been achieved through a variety of means. In the case of Brazil, high-profile CI staff were instrumental in getting the national government to adopt the corridor framework. CI-Brazil's senior staff successfully advocated that the corridor concept be embedded in the G7-funded Pilot Program for the Protection of Brazilian Rainforests/PPG7. This established the corridor concept as one of the key organizing frameworks driving the government's national biodiversity conservation efforts.

In Brazil's Pantanal-Cerrado Corridor, the commitment of matching resources was instrumental in stimulating government interest in the Corridor. The siltation of rivers feeding agricultural areas also underlined the importance of planning at the biodiversity corridor scale. In Peru, the support of corporations in the mining sector was key to getting biodiversity corridors on the regional planning and development agenda. While there was a diverse experience with techniques of getting biodiversity corridors onto the government agenda, it was universally agreed that their buy in to the concept was crucial to biodiversity corridor effectiveness. A separate related question regarded keeping the concept on the government agenda.

What incentives are there for the government to continue to use the corridor concept after CI is no longer a big player? Is it public campaigns? Is it the insider game – get influential insiders to work their connections?

Protected areas continue to be the building blocks of corridors, and they are the best way to ensure the sustained impact of our efforts, even after CI has left the region. In the Pantanal this is being done as CI builds the capacity of local institutions. In Vilcabamba-Amboró, CI finds it important to continue to align its work with government initiatives and changes in priorities. Poverty reduction is an issue that concerns the government

greatly, and to show how the creation of biodiversity corridors can both reduce poverty as well as achieve conservation goals is essential. For corridors to be successful we have to reach out beyond our traditional conservation partners and include the private sector in our efforts. While the private sector often can create threats to biodiversity, for many of CI's corridors segments of the private sector have developed into key partners in achieving conservation goals.

Integrating the biodiversity corridor concept into government policy and initiatives is a delicate balance. Most developments are based on personal trust and relationships. Unfortunately as governments change, good relations with one political party or government may inhibit the adoption of initiatives supported by the old government.

The establishment and maintenance of protected areas is an effective way to ensure the impact of conservation efforts

In the case of Mato Grosso do Sul, the government in place today is completely different than that at the beginning of the corridor initiative. The current government is very participatory, and has mechanisms in place that increase the success of conservation initiatives. If this government does not remain in power, CI-Pantanal anticipates problems working with the next government.

Another approach used by CI programs has been to distance themselves from particular parties and draw attention to the strength of CI's technical expertise. While this is probably more desirable, attaining the distance can prove to be difficult.

Assuring the Impact of Conservation Action

PANEL QUESTION:

How has it been possible for you to induce stakeholders to expand existing protected areas or create new protected areas? What evidence do you have to show that attitudes and behavior towards protected areas and the critical habitat connecting them have changed irreversibly, preventing a return to pre-project attitudes and behaviors?

PANEL MEMBERS

Cecilia Kierulff, *Coordinator of Central Corridor, CI-Brazil, Atlantic Forest*
Artemio Antolin, *SMBC Program Manager, CI-Philippines*
François Martel, *Technical Director – Melanesia CBC, CI-Melanesia*
Jaime Salazar, *Director, Chocó-Manabí Corridor, CI-Colombia*

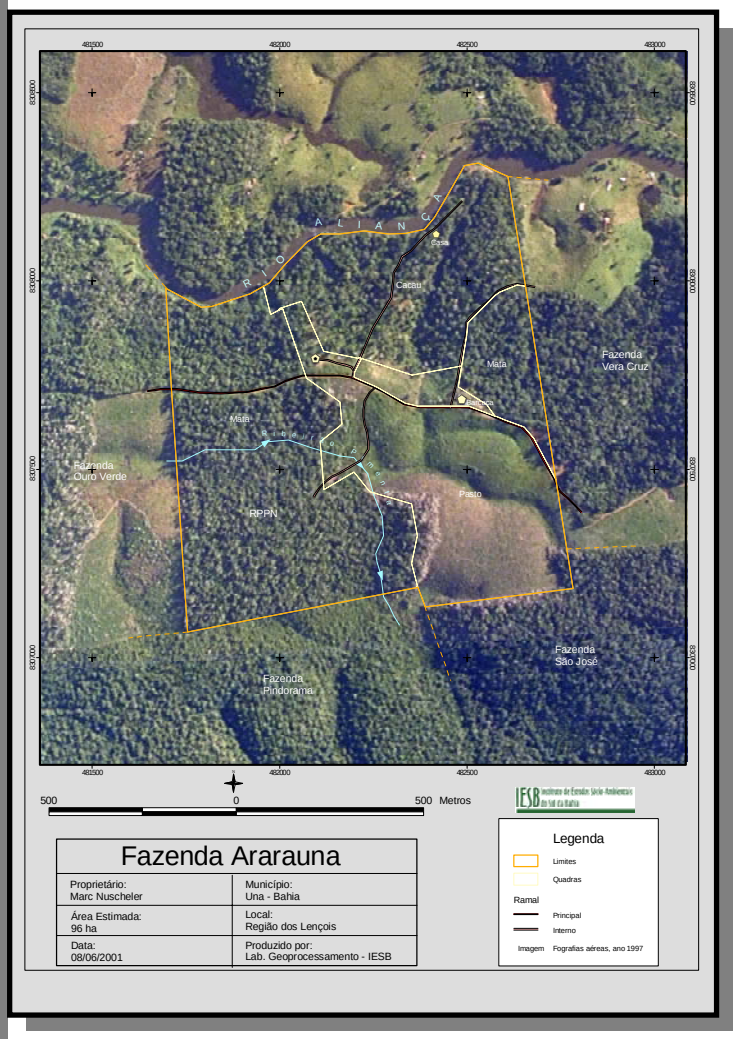
The introduction and use of private nature reserves (RPPNs) in the Central Atlantic Forest Corridor of Brazil has been an effective tool for conservation in the region. In Brazil all forest is legally considered to be non-use areas, except for the purposes of relocation of communities under agrarian reform. RPPNs are closed to agrarian reform, and RPPN landowners can pursue alternative uses such as ecotourism activities. The effectiveness and sustainability of RPPNs are being reinforced by the introduction of

11 The Cooperative of Organic Producers of Southern Bahia – CABRUCA

Working in the communities: GIS monitoring and identification of priority areas

Remote sensing has proven to be a useful tool in identifying priority areas within a corridor. Now, in the Discovery Corridor in the Atlantic forests of Brazil, aerial photographs are being used to monitor land use on organic cocoa farms. To achieve organic status in the region cocoa must be produced through an organic production process and farms must conform to labor and environmental legislation. This means that legal reserves must be demarcated and permanent protected areas, slopes, and river margins must be protected and/or recovered. Aerial photographs provide a means of creating a baseline and monitoring compliance with these criteria and are proving to be a useful management tool.

Map and Diagram were prepared by the GIS Lab at IESB.



remote sensing techniques to facilitate the development of management plans and to monitor landowner compliance with the terms of the RPPN and other agreements (see Figure 11).

Agricultural commodity market uncertainty makes diversification of agroforestry key to the sustainability of connectivity

Promoting the use of more biodiversity-friendly crops and agricultural practices such as shade-grown cocoa is a common strategy adopted in many biodiversity corridors, but caution must be exercised when this is done. The volatile nature of agricultural commodity markets suggests that cropping should be diversified to ensure that when prices drop for one commodity, other crops supporting biodiversity are still profitable to farmers, and thus connectivity is maintained.

In the Philippines, despite a law regulating timber extraction, illegal extraction continues unchecked. Analyzing the situation, the Sierra Madre team discovered that the failure is largely caused by overlapping government agency mandates and plans. Agencies are pursuing their own plans without considering the plans' relationship with the plans of other agencies.

12 Working with Communities: Lessons from The Kanuku Mountains, Guyana

In the proposed Kanuku Mountains protected area, the stakeholder group -- mainly comprised of community leaders – provided some challenges. It was discovered that many of these leaders were not systematically sharing the information they received during consultation meetings with their communities. The lack of information – and in some cases misinformation – about the nature of the proposal created significant confusion within the stakeholder communities. This situation persisted for some time while CI-Guyana sought the endorsement of the stakeholder group before approaching the community about implementation.

Furthermore, some community leaders allowed themselves to be persuaded by regional leaders with differing political agendas into using the establishment of the protected area as a bargaining tool for acquiring land rights. At one point, there was a written request to the President of Guyana to halt the advancement of the process until the issue of indigenous land title was resolved. This delayed regional activities toward the establishment of the proposed protected area for about four months. The process started again after it was clarified that only one out of eighteen stakeholder communities was not interested in proceeding.

Although the stakeholder communities had already been engaged to raise their awareness of the corridor program, the action of community leaders reinforced the importance of engaging stakeholder communities directly, in addition to their leaders. Since community leaders may sometimes bring personal and political biases into the process of making decisions on behalf of their communities, there is greater security in engaging the people within stakeholder communities; this allows an informed consensus to emerge from a more democratic process.

The process toward establishing the protected area continued largely because of the information already provided to communities during a series of community meetings. This information was adequate for the community as a whole to appreciate the importance of continuing the activities to establish the protected area. Most of the stakeholder communities subsequently communicated to the Government of Guyana that they wanted the process to continue, and this occurred some four months after the process was halted.

While taxes on environmental services and resource use can provide incentives for conservation, they also have the potential to hamper conservation efforts. In the Sierra Madre, 40% of tax revenue generated from the construction of a dam to provide water to urban areas is designated to be given back to local communities in the area. But the recipient communities are not the ones incurring the opportunity costs caused by the dam. And Communities in the watershed behind the dam are not receiving any of this revenue. Policies intended to compensate for environmental disruption or to give incentives for conservation and sustainable resource use, need to be targeted effectively.

Conservation tax incentives must be targeted to benefit those implementing conservation action

The sustainability and effectiveness of policy change will also depend on the distribution of power. In Melanesia, where village and community laws are much stronger than national laws, it is very difficult to effect "stroke-of-the-pen" changes. Changes in national policy have little relation to what is happening on the ground among the amazing number of distinct cultures. In these circumstances working directly with communities can be the more effective approach to conservation. Experience with several initiatives has shown that the most successful conservation projects are those where communities approach conservation organizations, and not the other way around. In these cases, it is important to accurately and realistically articulate potential benefits and drawbacks to avoid unrealistic expectations that may complicate continued conservation. When working with communities, it is also important to know the context in which you are working and have an effective community engagement plan (see Figure 12).

With decentralized natural resource management, working with communities can be more effective than working with national governments

Income generating conservation projects have greater impact when financial mechanism are designed to put money back into conservation

In seeking economic development opportunities for communities, project designers must not focus solely on income generation or employment without linking these objectives to environmental quality and conservation. These projects have a greater chance of success with a lasting impact if financial mechanisms are designed to put money back into conservation -- e.g., an ecotourism project that also creates and devotes a portion of revenues to a conservation fund.

In the case of Melanesia, experience suggests that the closer relationship you have with implementing partners working with communities, the greater the chance of success. Implementing through government agencies has proven to be ineffective in accomplishing conservation on the ground and in sustaining that impact over an extended period.

Managing Conflicting Interests and Opinions

PANEL QUESTION

In the management of your projects, how do you resolve differences in opinion among project implementors, when some think a specific kind of technical analysis is crucial to creating the conditions to reach a milestone, and others think that this technical analysis is dispensable?

PANEL MEMBERS

***Efrain Niembro**, Technical Director for Mexico & Central America, CI*
***Nigel Asquith**, Director, Conservation Policy, CI*
***Iwan Wijayanto**, CPTC Manager, CI-Indonesia*

At the corridor scale, with the variety of actors, conflicting and competing agendas, politics, and overall complexity of the planning environment, it is inevitable that conflicts will arise between actors, potential partners, and even between technical experts. To be effective, conservation organizations must choose partners carefully, be upfront about organizational mandates and goals, embrace technical debate, and develop conflict resolution skills.

While pursuing the development of a conservation strategy for the island of Siberut, CI-Indonesia engaged the local university and community groups on the island. It emerged that the university had a timber concession within a forest that was the object of conservation efforts, and that they were planning on earning revenue through timber exploitation to help finance their operations. The program was faced with the choice of working with communities or with the university. CI-Indonesia decided to terminate its partnership with the university and work with the communities. In planning efforts in the same region, a resource mapping exercise was initiated, but was hampered by conflicting technical opinions among partners operating in adjacent regions. It took several months to resolve the situation, but it was resolved through the production of two separate maps for each region.

Partners should be chosen carefully to assure common or complementary goals and expertise

The magnitude of problems often depend on the phase of planning and implementation. If there is disagreement in the planning or design phase, the collection of more information can often resolve the dispute. If a project is in the implementation phase and technical disputes arise, then it can be more difficult to change plans if a donor contract needs to be changed. We must see if the donor concurs with the changes to the project before we can support the changes. Usually donors are flexible and sympathetic. It also depends on the implementers; e.g., in the Chocó-Manabí Corridor, the agreements with implementing institutions are designed with the flexibility to adapt to changing circumstances or better information.

Planning, implementation and funding contracts must be flexible to adapt to changing conditions

The situation becomes more complicated when partners are international donors that have relationships with the larger institution and with CI-Washington. Sometimes difficulties arise because the institution as a whole is responsible for managing the donor relationship, while the field program is responsible for implementing and managing a particular project. This situation can be handled with good communication and respect for the expertise housed in all parts of the organization. Working groups have proven to be an effective way of organizing and managing technical input into strategy and project design. Dialogue and an explanation of realities on the ground are usually sufficient to resolve issues concerning more than one part of the institution. CI is also developing a Technical Consultation Network to facilitate communication between technical experts, field programs, and the various divisions and centers within CI (See Appendix).

Working Groups have proven to be an effective way to co-ordinate technical input into decision making

When considering making a change to a strategy or project, it is important to be able to explain the need for the proposed changes. A logical and explicit analysis is critical, and this can be backed up by additional technical information when time and resources are available. A useful way to think about the process is that an analysis consists of five steps: 1) establish the context; 2) articulate options; 3) predict the consequences of the options; 4) provide a value judgment of these results; and 5) choose the option that best achieves Conservation Outcomes. Using this process consistently, it is possible to revisit the analysis as conditions change and adapt the strategy or implementation plan.

CORRIDOR TOOLS TRAINING

The workshop provided an excellent opportunity to share knowledge about various technical tools useful in the design and implementation of biodiversity corridors. The following section of this report summarizes concepts and presentations made about specific tools at the workshop.

BUSINESS-AS-USUAL SCENARIOS FOR PREDICTING FUTURE LANDSCAPE CHANGE: A TOOL TO AID THE DESIGN OF CONSERVATION CORRIDORS

Based on a presentation by John Musinsky, Senior Director, Regional Analysis Program, CI

Designing and planning for sustainable landscapes requires an intimate understanding of the dynamics of land use and resource use over time. By graphically illustrating the effects on land and resource use caused by policy changes – and those by leaving policy unchanged – we can show policy makers the consequences of the choices they make. Modeling business-as-usual layers helps planners gauge whether or not specific actions will have the results that are intended.

Dynamic Simulation Models

What are they?

Dynamic simulation models attempt to replicate the possible paths of landscape evolution and thereby evaluate the implications of future threats to biodiversity. They can help us to understand the relative vulnerability of different areas to habitat change or degradation, i.e., the weak links in the system. They can also be combined with other modeling techniques (e.g., opportunity cost modeling in TAMARIN) for the purpose of corridor delineation and assessing priorities. Forest-based CO_2 mitigation / sequestration projects can also use these models to locate pressure points and demonstrate the effectiveness of projects and policy changes.

Types of Models

The first step in building a landscape change model consists of mapping historical changes by using a change detection methodology. For example, changes in land cover from forest to non-forest can be determined along with forest regrowth patterns. Regional

13 Types of Simulation Models

There are three basic types of dynamic simulation models:

- **Individual-based process models –** mimic individual processes of movement, behavior, birth, growth, and death according to species information, such as genotype, age, history, and location;
- **Large-scale process-based models –** simulate the role of physical and ecological processes in regulating or modifying the landscape patterns; and
- **Space-oriented cellular automata models –** arrays of cells that interact within a certain vicinity, according to a set of transition rules.

transition rates and spatial transition probabilities can be determined from this information, and annual transition matrices can be derived by using their eigenvector and values.

For example, by examining and analyzing Landsat 7 data over 10 years in Madagascar, and then projecting the trends in forest cover change over the next twenty years, a crude approximation of forest cover can be estimated. The problem with this approach is that it does not take into account changes in rate and time, and that it does not incorporate on-the-ground expert knowledge.

How can the Cellular Automata Model be Improved?

The cellular automata model can be improved through the calculation of regional transition rates and spatial transition probability maps. Weights of Evidence can be used to determine the spatial transition probability maps in relation to discreet landscape variables.

Cellular Automata models can be used to predict the effects of policy changes on land uses across a landscape

By performing regression analysis across a series of likely explanatory landscape variables, weights can be calculated that can then be used to predict deforestation, land-abandonment, and regrowth clearance. Examples of relevant landscape variables include soil, vegetation, distance to rivers, distance to main roads, distance to secondary roads, altitude, slope, distance to forest, distance to deforested land, distance to regrowth, and distance to urban centers. This type of analysis can be furthered to predict various effects of policy changes on other land uses across landscapes to determine a more complete picture of future land-use patterns.

Dinamica

Dinamica can predict trends through multiple time-step simulations based on transition probabilities

Dinamica is a tool being used in the Amazon to illustrate the effects of various development scenarios on biodiversity and landscape patterns. It can perform multiple time-step simulation with dynamic spatial transition probabilities calculated within a cartographic neighborhood. Transitional functions specially designed to reproduce the dimensions and forms of landscape changes, such as the deforestation patterns produced by different drivers of change, are being used to develop possible future scenarios. Logistic regression or weights of evidence are being applied to define the areas most favorable for each type of transition by using data obtained mainly from satellite imagery. The Dinamica modeling uses as its main input a landscape map (e.g., a land-use and land-cover map obtained from digital classification of remote sensing images).

In this manner, the model projects the trends and subsequently analyzes the effects of a series of variables on the land-use and land-cover changes in light of alternative

scenarios. Examples of variables processed by the model are rural and urban population growth; social capital, including social movements; action of non-governmental organizations; governmental policies and action of state agencies; and social and infrastructure investments.
As a main output, the model produces dynamic transition matrices, in which the rates are diverted from historical rates, according to the alternative scenarios.

Sensitivity analysis is useful to address information gaps and uncertainty in business as usual modeling

Model uncertainties are being assessed through sensitivity analyses. Since "Alternative Scenarios" is a semi-quantitative model, the output rates can vary widely due to different experts' visions and lack of empirical quantitative relationships. Although sensitivity analyses show that rates can vary widely, the behavior of the curve rate is maintained. Moreover, uncertainties will diminish as we better quantify some important variables, such as the agent deforestation capacity, distribution and trend of land-use changes among agents, and the power of inhibitory or stimulating factors for deforestation.

LESSONS LEARNED IN THE USE OF GIS / REMOTE SENSING IN CORRIDOR DESIGN

Based on a presentation by John Musinsky, Senior Director, Regional Analysis Program, CI

As conservation organizations are increasingly concerned with how to measure the impact of their conservation actions, remote sensing techniques are emerging as powerful tools in helping to answer some key questions. Remote sensing techniques help us to understand the current state of the biodiversity and the environment, and to identify and plan conservation outcomes. Remote sensing is also beginning to be employed more frequently in predicting where future threats lie.

The question of how we can measure, model, and monitor fine-scale biodiversity continues to prompt several answers, depending on the context and the nature of biodiversity. One thing that is certain is that there is no single measure, so we must use surrogates (Noss 1987). Remote sensing has most often been used in measuring and monitoring environmental or 'coarse filter' questions. Taxonomic or more fine filter questions need to be answered through different means.

Remote Sensing Components

Remote sensing tools can be put to at least three types of uses. First, they are useful to generate maps and characterize landscapes and ecological systems. Conservation planning and monitoring rely on baseline data to understand the present situation and to provide a basis for monitoring and evaluation. Many aspects of threats can be measured and depicted through remote sensing techniques. By contributing to the assessment of trends and the understanding of factors driving habitat destruction, remote sensing techniques can be used for real-time monitoring as part of a Biodiversity Early Warning System. Finally, remote sensing can be an integral input into predictive modeling of environmental trends and impacts.

Remote sensing is also being integrated into efforts to monitor the impacts of climate change on habitat and related species populations. It can be used to increase understanding of vegetation climate relations, El Niño, drought, floods, desertification, and savannization. Some remote sensing tools such as AVHRR and NASA-derived products are more useful at the global level, while others such as MODIS and Landsat are more adept at monitoring at regional or local scales.

14 Remote Sensing Uses in Tracking Landscape Changes

Remote Sensing has a wide range of uses for Monitoring Landscape Changes, including:

- Vegetation cover for site selection;
- Forest/non-forest cover and trends over time;
- Landscape metrics derived from forest cover data;
- Estimates of Net Primary Productivity;
- Resource extraction (logging, mining, oil/gas); and
- Frontier expansion trends (land-use changes, urbanization, infrastructure development, roads).

USAID Corridor Collaborations

CABS Regional Analysis Program has collaborated with all three USAID-supported (BCPIP) corridors. In the Cerrado-Pantanal, the regional analysis team gave training in aerial survey data acquisition and basic remote sensing for vegetation/land-cover mapping. In the Kanuku Mountains, remote sensing techniques were used in conducting aerial surveys and vegetation mapping. In the Sierra Madre, aerial surveys and a forest change analysis were completed.

Challenges Encountered

While undertaking remote sensing activities in the corridors, several challenges were encountered. The satellite data available in some areas of the corridors were not of high quality, which resulted in difficulties using them for monitoring and planning purposes. Because of the design of some activities, it was sometimes unclear of the relationship between the vegetation maps being produced and their usefulness in planning and implementation of the corridor strategies. This was further complicated by the manner in which classification schemes and data processing were carried out. In some cases a more participative process from the beginning would have achieved better results.

The design of remote sensing products is only useful if adapted to the needs of the users

15 Remote Sensing Lessons Learned

The experiences from implementing remote sensing tools in the corridors have led to some useful insights that can inform efforts in the future.

- Capacity building of local staff and partner institutions – along with their participation early on in the process – can help ensure that remote sensing efforts are effective in delivering the outputs required for planning and implementing corridor initiatives.
- A clear understanding of the usefulness of remote sensing products, and their specific application within the corridor planning and implementation framework, must be achieved before choosing the products to be produced.
- By involving local counterparts, we can ensure that the products produced meet the specific needs of the situation.
- By concentrating on efforts to increase the capacity of local counterparts, we can ensure that the impact of the project outlives our initial investments.

Data is only useful if it is used. To ensure that remote sensing tools and the data that they produce are indeed having the desired impact, it is essential to make sure that there is a mechanism for channeling this data to decision-makers within the corridor.

HOW TO USE ECONOMICS IN CONSERVATION

Based on a presentation and background documents by John Reid, Conservation Strategy Fund

The use of economics at CI has developed from initial uses in planning enterprise development initiatives to initiatives that integrate the value of biodiversity and ecosystem processes into regional, national and hotspot level planning.

Economics and Conservation: Some General Principles

Economics was seen in the past as the enemy of conservation. Environmental quality is often a public good whose value is not registered in market transactions, and therefore left out of project decisions and calculations of economic growth.

Much progress has been made over the last forty years in developing methods for calculating the value of natural ecosystems and in breaking down resistance to environmental economics in policy circles. However, economic analysis of the intangible benefits of nature is still very imprecise. Most analyses of ecosystems are partial, focusing on specific components, and therefore underestimate true value. Value estimates of specific species, on the other hand, are often too high because people state values without considering all the other species they would like to save.

Economics is an anthropocentric discipline. It only recognizes – and can only measure – value that people ascribe to things. Economics does not recognize religious value (value

to God) or inherent value (value of being). Therefore, the economic value of a species, a park, or a hotspot is merely the sum of the values all people ascribe to it. In economics there is no such value as "priceless". This posture contradicts religious doctrine and moral leanings about nature held by billions of people. According to economics, there is no "right" thing to do with nature, except to efficiently and equitably allocate its resources among people.

Economics has a lot more to offer than environmental valuation. Below are highlighted seven different ways in which economics can be used for conservation.

Finally, an economic analysis, even one that considers all environmental values, will sometimes indicate that the best – most efficient and equitable – use of resources involves deforestation or other forms of habitat conversion. What this means is that on the whole people will be better off by domesticating an ecosystem. While such a conclusion may cause us some despair, it is also a useful message, signaling the need to change people's values, and perhaps to concentrate conservation efforts elsewhere.

Economic Analysis Techniques

The following are the leading economic methodologies useful in conservation efforts:

16 Economic Analysis Techniques

Economic analysis techniques can be useful in

- Economic panorama
- Megaproject analysis
- Eco-enterprise feasibility
- Conservation opportunity cost
- Environmental valuation
- Outcomes of environmental policies
- Projection of future threats and opportunities

Economic panorama

Resource-use decisions are economic choices, tempered by social norms and other factors. Therefore, when planning conservation programs in a region, it is worthwhile to study the economic incentives that lead to resource-use decisions. This is actually a collection of studies that assess various economic options available to people in a particular region. An example of such an effort was the work done in 1994-5 by CI and IESB in Southern Bahia, where research was carried out on logging, tourism, ranching, non-timber forest products, and the general land-use dynamics on properties around the Una Biological Reserve. This research helped rule out some actions that at first seemed appealing, gave rise to the Ecoparque, led to a policy strategy related to logging, and oriented the team in various other ways. Further, the generation of quality information conferred status on IESB in the eyes of the state.

This approach is particularly indicated when first entering a region, before programmatic commitments have been made. It helps to plan conservation interventions in a technical sense, and also provides an opportunity to get to know important people in the area. It is also a good tool to use where resources are privately owned, and therefore more closely subject to market forces. Two qualifications: 1) it is never too late – an economic panorama assessment can be done after an organization

has been working for years in an area, and may be especially useful if conservation programs do not seem to be working; 2) conservation dynamics may be simple enough in a region that a panoramic view is overkill, and that we need only research one or two industries.

Megaproject analysis

Roads, dams, pipelines, and other infrastructure projects often unleash waves of destruction in tropical ecosystems. Performing economic analysis of such projects can have two benefits for conservation. First, it can reveal destructive projects that are economically unsound, meaning that they are either inefficient (costs>benefits), inequitable, or both. This information can be an important lobbying tool to stop or slow projects. Second, it can quantify environmental costs and provide an objective basis for compensation. This tool was used for the CSF-CI assessment of the Projeto Doador, in Brazil, showing that a water diversion project with potential destructive impacts in the Jalapão region would be an economic white elephant. The analysis also quantified some of the project's environmental costs, though these were extremely small in comparison to its direct costs.

Megaproject analysis is particularly useful in remote regions where biodiversity losses can be high and economic beneficiaries few. Ideally, it should be used on projects that are realistic enough to pose a threat, but not *faits accomplis* where no amount of lobbying will stop or change them – (it is often very difficult to know how "real" big projects are). Presenting economic arguments is most useful where decisions on financing and project approval are in the hands of publicly visible or accountable officials. It helps if the project is seeking financing from an international institution.

Eco-enterprise feasibility

Conservation funding should only go into "green" enterprises with some prospect of long-term viability. Similarly, NGOs should be careful not to recommend that communities pour resources into money-losing businesses. That does not mean that all green enterprises need to provide market rates of return. It does mean that after an initial subsidy, they should be able to eventually sustain themselves. If a permanent subsidy is needed, it raises the question of whether the conservation benefits achieved by the project might be obtained at a lower cost through a different intervention. Feasibility studies can answer the question of a project's commercial viability, while valuation (see below) is needed to assess the conservation value of subsidizing it. CI's ecobeef research falls into this category.

This approach is useful when a new, environmental product would produce real conservation value and when there is some evidence that there are commercial advantages (e.g., niche markets, government incentives) for an environmentally differentiated product.

Conservation opportunity cost

Conservation generates benefits, but also implies costs – principally the cost of not doing something else with land. This is called the opportunity cost of conservation. An

economic panorama will provide some information useful in calculating the opportunity cost, especially as a means of figuring out the cost of creating protected areas or conservation concessions. The method involves the calculation of net benefits that can be derived from the land's most economically efficient, realistic use. If there are no established concession fees, the information can be used as a basis for negotiation with the landowner (government, indigenous communities, private sector). It is also useful in the inevitable negotiations with local residents over uses and access that will be permitted in protected areas.

Environmental valuation

Environmental valuation is the process by which monetary values are attached to benefits people derive from natural ecosystems. Valuation can be used to convince officials that conservation provides society more benefits than development. It can also be used to calculate payments for environmental services, as well as fines for environmental crimes. In theory, valuation is the purest, most direct use of economics for conservation. In practice, some of the things we care about most, like biodiversity and beauty, are the hardest to place a value on. Further, there is a bias in valuation against vast wilderness areas because there are few people in them to derive use value from them, and not much information about them in the outside world, which keeps existence values low. Nonetheless, wilderness itself is becoming one of the scarcest environmental goods and scarcity should give it value. Finally, the concept of economic value associated with goods not traded in the market is still novel in some policy circles and can detract from the credibility of other analyses. For example, CSF's feasibility study of the Chalillo Dam in Belize was questioned by the electric company for including environmental externalities quantified with valuation techniques. Even excluding environmental costs, the dam was economically infeasible, but the inclusion of the externalities was used by critics to cast doubt on the entire study.

Valuation is useful where there are significant values to measure. It is useful where there are other elements and arguments in a conservation strategy. And it is particularly useful when there is some way of enabling owners of the environmental resources to benefit from the environmental goods and services they provide.

Outcomes of environmental policies

Economics is an indispensable tool for the analysis of public policy, as it is fundamentally about identifying the most efficient and/or equitable allocation of resources within a society. Among the many applications to policy analysis, economics can quantify income and employment impacts of environmental policies, and can predict responses to – and ultimately conservation impacts from – subsidies or taxes for particular land-uses. The range of policies to examine is wide: forest policy, agricultural programs, water policy, energy policy, infrastructure policy, environmental impacts assessment rules, and others.

Projection of future threats and opportunities

Environmental threats change in step with changes in demand for products, opening of new markets, technological innovation, disease, and other long-term trends.

Conservation work can get ahead of these dynamics by foreseeing them. If we had foreseen the soybean boom, for example, conservation organizations might have devoted more attention to protecting the Cerrado decades ago. Projections are done by observing past trends in the demand and supply of products, observing factors that influence demand and supply, and researching emerging patterns.

EVALUATING CONSERVATION SCENARIOS IN MADAGASCAR: POTENTIAL LESSONS LEARNED FOR OTHER REGIONS

Based on the presentation by Miroslav Honzák, Spatial Analysis consultant, and Charlotte Boyd, Resource Economics Manager, Conservation Strategies Department, CI; and on background materials provided at the workshop

The Challenge

To achieve regional conservation goals and outcomes, the needs of biological communities and ecosystems must be integrated with the socio-economic and cultural needs of the people living within the corridor. Biodiversity efforts continue to be hampered by the lack of integration of conservation goals into regional development planning. To truly be effective conservationists must work with development planners to develop regional plans that meet both development and biodiversity goals.

For conservationists to work effectively with development authorities, a spatially explicit plan for biodiversity conservation that shows how to minimize opportunity cost is often considerably more valuable than site-specific, intervention-specific, or species-specific studies. Since there are many ways to design a landscape that would achieve both conservation and socio-economic goals, making the data and criteria available permits all to evaluate proposed interventions against a common, integrated bottom-line. Government authorities may use the data and criteria to understand the trade-offs between infrastructure project location and the probability of extinctions, with the ability to know precisely what would be necessary to avoid extinctions for the entire region. Beyond the sequential and crisis-provoked attention to specific parks, roads, or social conflicts, there would be a way to envisage a range of specific landscape scenarios that would satisfy the goal of extinction avoidance.

Integrating Conservation and Development with Spatial Planning Support Software/Systems: What Can They Do?

To assist with conservation planning, GIS based spatial decision support systems have been developed (See Figure 17). One such conservation planning support software TAMARIN integrates principles from conservation biology with economic theory both in the design of alternative scenarios and the evaluation of the tradeoffs between environmental and other social goals. From conservation planning principles, TAMARIN seeks to achieve representation, resilience, and redundancy objectives. It can also incorporate and represent various costs of conservation scenarios, including financial or economic opportunity costs, and allows you to evaluate scenarios based on these costs.

TAMARIN allows great flexibility in changing assumptions and objectives or inserting new data. Although TAMARIN was tailored to the planning issues and data sources of the Atlantic Forest in Brazil, the ecological and economic underpinnings make it adaptable to many other locations.

Fundamentally, TAMARIN is a customized Arcview™ project file with customized scripts. It allows planners to test various strategies and assumptions about future land use against the desired landscape adequate to meet conservation and socio-economic objectives. It is not intended to usurp the role of policy makers, but is a tool that may be used to develop more effective sustainable regional plans.

17 Other Examples of Decision Support Software for Conservation Planning

For more information on these software, please see Appendix III or the websites listed below:

SITES (Spexan/Marxan)
http://www.biogeog.ucsb.edu/projects/tnc/toolbox.html
or
http://www.ecology.uq.edu.au/marxan.htm

C-Plan
http://members.ozemail.com.au/~cplan/

ResNet (University of Texas-Austin)
http://uts.cc.utexas.edu/~consbio/Cons/Labframeset.html

CODA (Conservation Options & Decisions Analysis)
http://members.ozemail.com.au/~mbedward/coda/overview.html

IDRISI
http://www.clarklabs.com/

WorldMap
http://www.nhm.ac.uk/science/projects/worldmap/worldmap/demo2.htm

Generating a corridor strategy is not an event, it is a process which requires refinement and updating as more and better information becomes available. TAMARIN should be used in this context. It can be used to inform decisions based on the best data available, and as information improves TAMARIN can aid in the development of more complete and useful corridor strategies.

Information Layers Required in Conservation Spatial Planning

TAMARIN is based on a planning framework that requires five layers of information. Each is the product of spatial analysis of ecological and economic processes specific to the region under consideration. The input layers are:

- ***Biodiversity Layer -Biogeographic Representation Goals*** – Information that identifies distinct bioregions and biodiversity priorities is used as the basis for evaluating whether biodiversity conservation goals have been achieved.
- ***Vegetation Cover Classification showing existing land uses*** – The vegetation cover can be used to better understand and identify habitat, current land uses, and the level of fragmentation, and to generally get a better understanding of the landscape.

- ***Projection of Future landscape based on "Business as Usual" (BAU) –*** Demonstrates the effects of current trends and policies on future habitat and land use in the region. Multiple BAU's can be developed based on varying assumptions.
- ***Threats and Opportunities*** – Spatial referenced information regarding threats and opportunities allow us to develop strategies and chose tools that effectively address the root causes of biodiversity loss in the corridor.
- ***Economic Opportunity Cost*** – A spatial representation of the economic costs and benefits of conservation across a landscape will aid in the identification of low cost priority conservation areas and facilitate the design of regional plans that optimize land use in the region based on both economic and biodiversity goals.

Using TAMARIN: Generating Scenarios

The use of TAMARIN is one step in the process of corridor strategy development. It should be used as a tool to engage conservation and development professionals in regional planning efforts. TAMARIN allows various stakeholders to design a corridor on a computer screen. With the aid of the five layers described above, and with the knowledge and expertise they bring to the table, they can design a landscape identifying areas where conservation efforts should be directed. Based on the areas identified by participants, TAMARIN is then able to evaluate the scenario based on both biodiversity and economic costs of conservation efforts.

Scenarios can be constrained by a maximum budget limit or can be unconstrained with the costs being calculated as a consequence of the plan. The framework can then

18 Evaluation Criteria Used in TAMARIN

TAMARIN analysis is primarily designed to meet broad conservation objectives (i.e., representation, redundancy, and resilience) in the most economically efficient manner possible. TAMARIN is designed to help regional planners answer four questions about the scenarios they design:

- **Representation –** Does the protected area system proposed include all endemic, threatened, and endangered species, even where little field work has been done?
- **Viability (Redundancy and Resilience) –** Does the protected area system and "biodiversity-friendly" matrix in the corridor provide the size and/or connectivity to prevent extinction of umbrella species?
- **Threats –** Does the projection of future scenarios address areas where elimination of habitat poses extinction threats most immediately, thereby indicating which interventions are adequate for the time-scale?
- **Cost –** Are economic opportunity costs minimized, subject to the objectives given above?

calculate the effects of the scenario and create a series of GIS themes, tables, graphics, and reports that summarize the salient features for comparison with the present situation and other scenarios.

The TAMARIN framework can be operated in two modes. The Evaluation mode is a GIS-based framework for evaluating the suitability of alternative landscape configurations for satisfying the ecological and economic goals of the corridor. This *non-optimizing* model looks at the consequences of particular policies, such as purchase of conservation easements from farms with specified characteristics in specified bioregions.

The Optimization mode (currently under development at UCSB) will employ an external optimizing land allocation model that selects the most cost efficient set of areas for conservation action that satisfies the desired future landscape configuration, and then TAMARIN evaluates this scenario in terms of other socio-economic and environmental factors.

TAMARIN was originally designed for use in the Central Atlantic Forest Corridor in Brazil, but it is being adapted to be used in a variety of other biodiversity corridors. Work underway will allow users to use the same five-layer framework to answer questions relevant to their corridors. The flexibility of TAMARIN lies is in the user's ability to design the layers that are relevant to their corridor; as long as the layers are inputted in a compatible format, TAMARIN will be able to evaluate scenarios based on the biodiversity goals and economic costs relevant to that corridor.

MONITORING AND EVALUATION

Based on a presentation and discussions lead by Elizabeth Kennedy, Director of Outcomes Monitoring, Conservation Strategies Department, CI

Scale and M&E

Temporal, biophysical, and institutional scale issues emerge as we move from a site-based to a corridor-based management approach for achieving conservation outcomes. Scaling up entails changes in processes and actors. Developing an effective M&E system for adaptive management at the corridor scale needs to recognize the interconnectivity of scales and include the important constraints, interactions and feedback that may be associated with changing from a site-based to a corridor-based management approach. Scaling thus goes beyond simple aggregation or desegregation of results at one scale to achieve results at a more desirable scale.

19 Lessons Learned in Developing Input Layers to Corridor Planning

There are some specific lessons that have emerged in the collection of information in the Madagascar context. Some of these lessons may be specific to the case of Madagascar, while most could be useful to other corridors:

Land Cover

- The classification of land-cover maps into forest and non-forest is relatively easy and a useful first step. More detailed land-use maps are often technically more difficult to develop but are more useful in the development of realistic scenarios.
- Classification is more difficult when based on a mosaic of individual images acquired during different seasons or years (possible misclassification).
- Misclassification due to similar spectral properties of different land covers (e.g., banana and secondary forest).
- Land-cover data missing due to cloud cover present during imaging can hinder analysis of the region.
- Problems arise when data acquisition dates for other complementing GIS layers vary (e.g., between land cover, network of roads, and protected areas).

Business-As-Usual (BAU)

- Sophisticated data modeling (e.g., using Dinamica model) can be hindered by the size of a corridor-scale dataset.
- Land-cover data missing due to cloud cover present during imaging makes BAU development difficult.
- Incompatibility of data acquisition dates for other complementing GIS layers (e.g., between land cover, network of roads, and protected areas).

Bioregion

- Utilize existing data on range of species
- Find groups of umbrella species for sub-regions of a corridor
- Look for natural breaks (barriers) where connectivity should not happen
- Correlate species presence with abiotic proxies (e.g., geology, topography)
    - Identify areas of different deforestation rates (choice of intervention dependent on the rate and irreplaceability).
    - Opportunity to protect land for low cost before infrastructure increases the land value.

VHI: If you assume that CI will last forever, it is okay that we are shooting high. If we fail and do our M&E just to please our donor, we will fail in our mission to deliver*

* Initials before quotations refer to the participant to whom the quote is attributed. Please refer to the Participant List in Appendix IV to determine the identity of the participant.

outcomes. We will be in the same place as other organizations and we won't have cohesive, coherent strategies that will allow us to make a difference.

JS: One thing is M&E project by project, another thing is evaluating impact across a whole region or corridor. The two are not the same and different plans must be developed for each.

KA: While we would have money to do certain projects that would have certain outputs, the bulk of that money would be a site-scale probabilistic impact. But now CI is requiring us to have quantitative indicators for impact at a corridor scale. … [G]iven that our money expenditures are largely at sites, how can we be evaluated at a corridor scale? So although our long-term goal is the survival of a particular species, our strategy was such that we had to accomplish many other things first to get to the ultimate goal of the conservation of the species.

The correct biophysical unit for management (e.g., corridor) may seldom coincide with an existing institutional boundary or decision-making body. As a result, the design of an effective M&E system needs to incorporate, or in some cases develop, decision – making bodies across the existing boundaries and institutional scales to address the effects of management at the corridor scale. Institutional scale or boundaries specify the area over which jurisdictions apply, as well as the roles that particular actors are assigned. Specifying jurisdictional zones is generally easier said than done. Administrative boundaries, ethnic groups, community limits, and informal arrangements rarely correspond with habitat boundaries for biodiversity, to the extent that these can be agreed upon (e.g., Melanesia and the Cerrado-Pantanal Corridors). To complicate matters further, integrated management of corridors involves a multitude of common-property, open-access, and privately owned resources such as cropland, pastures, forests, and water. Each resource has an associated complex of often-conflicting interests held by stakeholders both inside and outside the particular corridor boundary. Therefore, measurement of outcomes will be somewhat context related (e.g., corridors that cross nation-state boundaries versus corridors within a single nation may require different strategies and the number of hectares in one scenario may be more ecologically important that in another scenario).

CK: Success is relative. 1000 ha in Atlantic Forest is wonderful. 1000 ha in wilderness area is nothing. How can we honestly monitor whether we are reaching our biodiversity conservation goals? It would take 100 years.

The corridor will not always be the most rational unit for activities. In response, an M&E system will need to measure processes and patterns at multiple scales in order to apply an effective adaptive management approach (e.g., number of farmers using IPM at the community scale as well as international market fluctuations for some commodity beyond the corridor scale). Further, neither the corridors nor the people who live within them are homogeneous; the nature of their problems and the possible solutions will be varied. Thus it is the integration of improved understanding; stewardship of the land, crops and livestock; and development goals in combination with better interpersonal relations in the context of corridors that will produce tangible and sustainable

conservation outcomes. This will involve development of trust and platform building and the establishment of clearly defined roles for the different scales and types of organizations; community, municipality, state, NGOs, government. Scaling-up is about relationship building. It is not just replication of technologies or approaches, but also expansion of principles and knowledge, such that people build capacity to make better decisions and influence decision-making authorities. In this respect, scaling-up has power and development dimensions. Thus, M&E will also need to capture measures of trust, empowerment and other interaction variables at multiple scales that determine sustainability of corridor outcomes.

> *DG: our outcomes now are biophysical outcomes. Tell us nothing about long-term sustainability. What are the other social aspects that we need to monitor to tell us whether our impacts will be long-term? E.g., awareness, understanding, political changes, etc. These should only be things we aim to influence, however.*
>
> *DG: this also highlights the value of engaging the government in designing an M&E system. Also a great opportunity for you to influence how they think.*
>
> *VHI: need to remember that regardless of how small, governments also have their own form of M&E, gathering data that could be useful to us.*

M&E needs to address multi-scale processes. What processes are site specific and what processes occur at larger scales? For example, communities developing projects in headwater catchments are unlikely to put a high priority on ensuring that the resources of downstream users are not adversely affected. Corridors need to effectively link community-based activities and goals within a larger, structured framework that provides overall planning, coordination, and long-term financial support for activities at the corridor level. Equally, the corridor management framework needs to address the common interest groups on contiguous areas of land whose boundaries may be administrative, social or physical. M&E needs to address the multi-scale processes with information feedback so that actors at the different scales are aware of the impacts of their planning and land-use decisions on the system as a whole.

> *DA: … in thinking about scale, want to consider the specificity of the scale you are going to evaluate. For example, we already know forest cover, etc. These preliminary data can serve as a baseline. We're also developing a strategy with local stakeholders to develop very specific outcomes. A relevant M&E design should also follow this strategy – need to look into very specific elements of a strategy.*
>
> *VHI: We should probably define the different scales of M&E. From there we have different levels of monitoring within each. We are still initiating the corridor even though we've been at it for 2 years – we've made significant changes. We have to keep in mind that a corridor is not a 10-year process. It will take a lot longer than that.*
>
> *IW: … [W]ho provides support for M&E. … Who supports corridor kick-off? Who is responsible for actually carrying out M&E within a project?*

Any M&E system has to be targeted to provide the relevant information for the multiple scales of decision makers, but ultimately, the M&E system has to be practical in order to be effective.

> *VHI: I am glad to hear that CABS is collaborating with other institutions, but I have learned over the past 15 years that in Bolivia, we were developing different sets of indicators for each park. They were based on good science, but were not founded in practical considerations – what it takes to actual do the monitoring and evaluation. So, need to not only involve the scientific community, need to also include managers and decision makers who can introduce practical considerations into the process for selecting indicators.*

Effective corridor management requires considerable political will, investment, and planning from the outset. It also takes time, as institutions, roles, and responsibilities evolve and the slower variables change. M&E will need to provide the timely availability of appropriate information about the interrelationship between different resources to provide the critical knowledge that encourages participation and decision-making by local, national, and international organizations. Corridor management and M&E will require the following:

- The political will to democratize and genuinely empower local communities;
- Shared visions across all institutional levels, based on careful problem analysis
- Effective coordination of civil and professional science;
- Commitment to a continuous and iterative learning process; and
- Long-term funding for research in concert with organization development.

MANAGING DONOR RELATIONS: EFFECTIVE COMMUNICATION AND REPORTING

Based on presentations by David Gambill, Director for US Agency Relations, CI and Keith Alger, Vice President, Conservation Strategies Department, CI

To achieve conservation in the regions where CI works we need to have well designed strategies and projects that demonstrate direct links to conservation goals and outcomes. In many cases conservationists are successful in designing effective projects, but unable to articulate the context, conditions and logic that can convince donors of the reasons behind their design. Effective communication of the conservation strategy, logic behind the design of interventions and reporting back on progress towards these goals is key to securing scarce resources for conservation.

In developing conservation strategies we try to change the behavior of stakeholders and the underlying conditions that lead to the loss of biodiversity and unsustainable development practices. Donors and development agencies are stakeholders in conservation. Proposals and reporting on project progress are opportunities to educate our audience, expose stakeholders to conservation issues and our efforts to preserve biodiversity, build CI's reputation for effective conservation efforts and secure funding, donor priorities and time dedicated to conservation efforts.

To create support for conservation efforts by donor agencies there are several conditions that we need to create. First we have to grab their attention, second, we have to stimulate their interest and translate that into a desire to support our work and the conviction to commit resources to conservation efforts. Finally we have to mobilize them to undertake conservation action.

Proposal and Report Writing

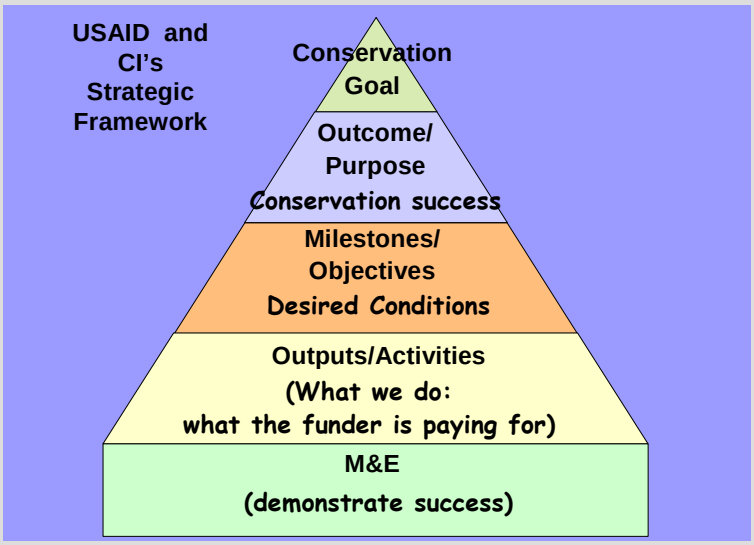
To communicate effectively it is important to be clear, logical, and concise, and to keep it simple. Your success in conveying your message will depend on how well you tell your story. Every report is an opportunity to share your plan and your vision. When writing a report it is useful to keep in mind several questions:

- ***What is your vision?***
- ***What are the big steps to get there (the conditions you're trying to create)?***
- ***What changes are you trying to create?***
- ***What are you doing to get there?***

In answering these questions in a proposal it is useful to articulate why you are making this proposal, what you are trying to achieve and how you propose to achieve it.

As mentioned above when articulating the why you should keep in mind that you are trying to educate the donor about the context and issues you want to address and how you propose to address them. This is related to the fact that you are trying to expose the donor to potentially new approaches or conditions that they may not be aware of. Each proposal submitted to a donor agency affects the way that donor perceives Conservation International. It communicates CI's level of technical expertise, capacity, priorities, and CI's understanding of what is important to a donor. The proposal should be designed to influence the resources and time being invested in the achievement of conservation outcomes. Reporting is the mechanics of how you convey that. It can only be as good as your plan.

20 The Relationship between CI and USAID's Strategic Framework



Strategic Framework

When articulating a project proposal or report

21 CI's Strategic Framework Components

CI - Term	Definition	Concrete Examples
Outcome	The necessary elements that make up a solution for biodiversity conservation. These are a quantifiable set of conservation goals that are indispensable components for reversing biodiversity loss in a Hotspot or Wilderness Area. The set of defined outcomes constitutes, in essence, a quantified and spatially explicit vision statement that outlines the conditions under which biodiversity conservation would be achieved. It clearly articulates the biological and social goals of the program or project.	Species Protected: Endangered and critically endangered species protected Intact biotic assemblages maintained Area Protected: Improved management of existing protected areas Expansion of existing protected areas Creation of new protected areas Protection of indigenous lands Corridors Consolidated: Connectivity established Ecological processes maintained
Milestone	A discrete accomplishment or condition that enables the delivery of conservation outcomes. To formulate a milestone, ask "what condition or behavioral change in key stakeholders needs to occur in order for the conservation outcome to be delivered?" Milestones are the impact that outputs are designed to have that will lead to the accomplishment of conservation outcomes.	Nation parks legislation allowing the creation of new protected areas enacted by the National government by December 2004. $20 Million trust fund for the creation and management of protected areas established by January 2003 Legal responsibility for management of natural resources in forest reserves transferred from government to local communities by November 2003
Output	Product under the primary responsibility and control of CI and its partners.	Species Example: Population viability analysis completed, specific recommendations for management and institutional responsibilities identified by February 2003. Protected Area Example: Scientific survey of potential protected area highlighting value for conservation. Corridor Example: Multi-stakeholder workshop defined corridor boundaries.
Activity	Specific actions that need to be undertaken for outputs to be produced or realized.	Trainings conducted Working groups established Nurseries established for reforestation activities Database developed Classified vegetation map produced. Forest change detection map produced.

it is important to present the connection between what you are doing, the goals of biodiversity conservation, and the goals of the funding agency. A simple framework

can be useful to help structure the articulation of a project and how it fits in with an overall conservation strategy.

Communication Tools

There are four communication tools that we are concerned with at this time; workplans, progress reports; performance monitoring plans and proposals. They are all communication tools but with different emphases. Workplans should demonstrate complete the logic of your strategy including your planned activities and how they relate to your ultimate goals or outcomes. Progress reports should describe what we planned to do, what we actually did, what the changes were in the workplan and why they were made. Performance monitoring plans should emphasize how we intend to monitor the achievement of our conservation objectives milestones or objectives and the impact that the project is designed to have on our ultimate goal of preserving biodiversity and demonstrating that people can live sustainably while conserving biodiversity. A proposal can encompass all of these aspects of articulating a strategy.

To articulate your message effectively requires a lot of planning and takes time. Often it takes more time to write a short concise proposal or workplan rather than a long report. But the time and effort taken to make it concise has the potential to pay large dividends.

In proposals or work plans you must tell a convincing story. Ultimately developing a project proposal must be designed to contribute to the achievement of conservation outcomes. But in reporting and proposal writing, it is important to demonstrate how the project will help the donor meet its mandate and needs. You must help donors meet their needs and incorporate conservation into the story to make it personal to the reader.

22 Incorporate the Relationships with Partners Interests

On the surface funders may not have the same interest in conservation as CI. They may have interests in

- Poverty
- Health
- Food Security
- Governance
- Community Development
- Economic Growth
- Population

The proposal should articulate clearly how conservation objectives and the project you are putting forth relate to these goals. Be careful to ensure that your projects have direct links to the achievement of Conservation Outcomes.

Work Plans

The example of the recent USAID work plan developed by the Cerrado-Pantanal Corridor team was used to illustrate some of these principles to workshop participants. The basic contents of a work plan include:

- Introduction
- Conservation Objectives/CI's Outcomes/Donor's
- Threats

- How our strategy addresses threats
- Sustainability
- Objectives
- Activities

Introduction

The introduction to a workplan should engage the reader and paint a picture of the context that you are working in. The goal of the project (conservation outcomes) should be articulated in a way that is technically accurate but also inspires the reader to read on. It is essential in the introduction that the project's link with the audience's interests is clearly articulated in terms of social, biophysical and institutional areas. By starting general and then getting more specific, the interest of the reader should be sparked and be motivated to read further.

23 Example of an Introduction to a USAID Workplan for the Cerrado Pantanal

This workplan is for the fourth year of the USAID-funded program that Conservation International (CI) is implementing to establish a Biodiversity Corridor in the Pantanal-Cerrado area of Brazil. Biodiversity Corridors are large, interconnected networks of protected areas. Their purpose is to maintain ecosystem and evolutionary processes to counteract the ongoing erosion of biodiversity in tropical ecosystems. CI seeks to create the Pantanal-Cerrado corridor through strategic partnerships with key stakeholders. Our role is to facilitate and encourage stakeholders to create the needed protected areas and to effectively manage them and maintain the connecting landscape. In this we integrate information and action between different disciplines and stakeholders. Involving local stakeholders in developing and implementing the corridor plans is essential to sustain the corridor and to enable local societies and economies to accrue benefits from biodiversity conservation.

The Cerrado biome covers approximately 200 million hectares, one quarter of the country's surface. It is one of the world's 25 biodiversity hotspots. This vast landscape is dominated by savanna vegetation and isolated within the South American continent; the biome ranges from open grasslands through tree and scrub savannas, gallery forests, palm groves, dry forests, high altitude rocky grasslands, and calcareous caves. The Cerrado is especially important for plants – approximately 4,400 of its estimated 10,000 plant species occur nowhere else in the world. Much of the original vegetation of the Cerrado has been modified by agriculture, but patches of the original growth remain. The Cerrado drains into the lower Pantanal. The Pantanal is a 140,000-km^2 central floodplain surrounded by a highland belt of Cerrado. The floodplain includes at least 3,500 species of plants, 300 fishes, 652 birds, 102 mammals, 177 reptiles, and 40 amphibians. It has extremely high densities of wild populations of several large vertebrate species unsurpassed anywhere on the continent. The Pantanal still contains large swaths of untouched forest and floodplain habitat.

Threats and Opportunities

Once the goals of a project have been articulated it is important to give the reader a better understanding of the threats and opportunities that exist and their relationship to the project and Conservation Outcomes. Here it is important to go into more detail about what behaviors and underlying conditions are threatening biodiversity in the region and what opportunities exist to relieve some of these pressures. This section should identify the need problems and opportunities that are shaping the project.

How does the strategy address threats?

With the context set, the workplan should describe how the project intends to address the threats leading to the extinctions of threatened species and the loss of ecological and evolutionary processes and how the project takes advantage of the opportunities present.

Sustainability

A true measure of the success of a conservation project is measured by the sustained impact it has on protecting habitat, avoiding the extinctions of species, avoiding the loss of ecological and evolutionary processes and enhancing people's livelihoods. A workplan and proposal should articulate the impact of the projects efforts and how this impact will continue to be felt even after the completion of project activities.

CI's Milestones or Objectives

Articulating the changes in underlying conditions and behaviors that the project is aiming to achieve is an important step in demonstrating the impact of the project's activities on the conservation of biodiversity. When describing a project it is important to describe the necessary and sufficient conditions to achieve conservation outcomes and how this project contributes to bringing about the changes in these conditions.

Outputs and Activities

To bring about the desired changes in conditions the project needs to articulate what action will be taken, these are the projects outputs and activities. It is necessary to identify who will do what where, when and why. Outputs and activities provide the nuts and bolts of a project and should be shown to be necessary and sufficient to achieve the desired objectives

Reporting and Proposal Writing for USAID

It is important to remember when writing proposals and reports to USAID, that it is a development organization and our conservation projects must be framed in a way that shows the link between conservation and the goals and objectives of USAID. Relating project proposals to USAID's Strategic Objectives (SOs) is essential if funding and partnerships with USAID are to be developed. Because USAID is a development organization it is important to articulate clearly the changes in behavior and sustained impacts of proposed interventions on both conservation and people's livelihoods.

USAID workplans are not written in stone. It is unreasonable to expect that at the beginning of a project all eventualities will be known. USAID expects workplans to be changed. But when changes are proposed, it is important to show how these changes better contribute to the project and USAID objectives. Remember that workplans can be read by people within USAID that are not familiar with your project so make sure that workplans are stand alone documents.

24 USAID Reporting: Useful Reminders

- The "D" is for Development
- Adaptation is Good
- Success stories
- Short
- Deadlines are real
- Quantify impacts
- Feed into USAID SOs
- USAID has explicit needs
- Gender
- Sustainability
- Each report stands alone

NEXT STEPS: INTEGRATING LESSONS LEARNED INTO CORRIDOR PLANNING AND IMPLEMENTATION

This workshop, "Biodiversity corridors in Practice: Building From Experience," is just one component of a more comprehensive learning framework being developed and implemented within CI. Conservation International firmly believes that to be successful requires constant learning, adaptation, and adoption of innovative and effective tools to achieve Conservation Outcomes. One of the fundamental tenets driving CI's approach to the exchange and use of lessons learned is that the most effective learning occurs when it is demand driven and based on experience and exchange from and in the field. CI has developed several tools and mechanisms to facilitate this kind of learning.

Institutional Framework for Learning

Centers for Biodiversity Conservation

CI is committed to attracting and developing the best technical expertise in the conservation field. To this end CI has developed the concept of Centers for Biodiversity Conservation (CBC's). These centers are focused around building regional capacity to achieve conservation outcomes in the hotspots and wilderness areas, and to co-ordinate and develop effective conservation partnerships. Moving from a model where in the past technical capacity and support were concentrated in DC, to one where regional experts in the field provide support to on the ground conservation action.

25 Objectives of Centers for Biodiversity Conservation

- To help local, regional and international organizations coordinate as partners, with clear objectives and a shared action plan. CI will work with governments, businesses, communities, universities, citizen groups and others to make the best use of their experience, knowledge and resources;
- To provide training and technical support to partners and help them develop and implement conservation strategies, as well as disseminate new information and share proven approaches;
- To mobilize the scientific community to compile a biodiversity knowledge base for planning, and coordinate the development and implementation of scientific and economic-based conservation strategies; and
- To build public support. With long-term investments in conservation professionals and educational outreach, CBCs will integrate conservation into daily decision-making for all sectors of society.

The Centers for Biodiversity Conservation are working closely with the Field Support Division (FSD) to identify lessons learned, capacity building needs and effective mechanisms to disseminate information across the institution and among partners.

Field Support Division (FSD)

The Field Support Division is responsible for coordinating CI's technical capacity across the organization and providing the necessary knowledge, expertise, and know-how at the appropriate scale(s) in the field to carry out CI's mission of saving biodiversity.

As a central part of its mandate to foster institutional technical coherence and cross regional technical quality, FSD is ensuring that our success stories from one region are internally publicized and the concept or methodologies used in these cases are made available for adaptation to other regions. This also applies to initiatives that were not a success. Knowing why these occurred, we can extract the lessons learned and make these well known to our field programs. This type of cross-regional lessons learning and sharing in all types of activities is central to FSD's evolving role within the institution. Within FSD the Conservation Strategies Department and the Capacity Building Department are actively engaging regional programs to explore and develop means of sharing these lessons learned across the institution and with partners.

FSD, along with CABS, is also facilitating the exchange of technical expertise and lessons learned through the establishment of working groups and the Technical Conservation Network (See Appendix I).

Center for Applied Biodiversity Sciences (CABS)

The mission of CABS is to strengthen the ability of CI and other institutions to accurately identify and quickly respond to emerging threats to Earth's biological diversity. It was launched to generate and disseminate science-based information in support of CI's broader goals. CABS brings together leading experts in science and technology to collect

and interpret data about biodiversity, to develop strategic plans for conservation, to forge key partnerships in all sectors, to achieve conservation goals and to promote public awareness of and involvement in the challenges of saving the planet's living resources.

As part of its activities CABS is developing mechanisms to store and share information across CI and its partners. CABS KMS and GEOID are two such mechanisms described in Appendix II.

The Center for Environmental Leadership in Business (CELB)

Solving the planet's most pressing environmental challenges requires the ingenuity and commitment of the private sector. As business acquires more influence worldwide and public support for conservation grows, companies face new incentives to demonstrate environmental leadership.

The Center for Environmental Leadership in Business provides a forum for collaboration between the private sector and the environmental community. The Center promotes business practices that reduce industry's ecological footprint, contribute to conservation, and create value for the companies that adopt them.

Corridor Learning Next Steps

During the workshop participants from the field identified some areas that they would like to have support on and that would require follow up. These included

- A clear articulation of the biodiversity corridor concept and its underpinnings
- Support with monitoring and evaluating progress towards the achievement of biodiversity corridor outcomes.
- Support with how to plan and implement at the corridor scale
- Opportunities to have south/south exchange of experience and technical expertise

Articulation of the Biodiversity Corridor concept

As articulated earlier in this report, FSD, CABS, and technical experts from the field are currently developing a document that outlines the biodiversity corridor concept and the principles that underlie it. CABS will be publishing this document and distributing it to a wide audience. It is hoped that the document will help inform CI staff, partner institutions, and other stakeholders about the necessity and benefits of working at the scale of biodiversity corridors.

Monitoring and Evaluation Support

The Conservation Strategies Department (CSD) of FSD have been supporting regional programs in their on going monitoring and evaluation efforts. To further these efforts CI has formed a task force of technical experts in the monitoring and evaluation of biodiversity, charged with developing M&E protocols for CI's conservation outcomes. Once the protocols have been developed the Conservation Strategies Department of FSD

will be supporting regional programs in using these guidelines to develop M&E plans particularly at the scales of biodiversity corridors and protected areas.

Biodiversity Corridor Planning and Implementation

The Field Support Division, in collaboration with regional programs and all of CI's divisions, is coordinating an effort to produce an institutional conservation strategies handbook that lays out CI's approach to strategic planning, and achieving our mission of preserving the Earth's living heritage and showing that people can live harmoniously with nature. Since Biodiversity corridors are fundamental to CI's approach, one of the key elements of this handbook is CI's approach to planning and implementing biodiversity corridors. The handbook will provide guidance to regional programs and corridor managers and be a key tool used by CSD to communicate the key issues and elements of planning and implementing biodiversity corridors.

South/south Exchanges

The exchange of information and expertise between practitioners in the field has proven to be an effective way of building technical capacity and is a mainstay of CI's approach to capacity building. The Centers for Biodiversity Conservation, currently up and running in four regions (Madagascar, Brazil and Guianas, the Andes, and Melanesia) are dedicating significant resources to building the capacity to achieve conservation outcomes in these regions. The Field Support Division and CABS are continuing to develop innovative ways to facilitate south/south exchanges of information, including the Technical Consultation Network, CABS KMS, and opportunities for face-to-face exchanges between technical staff both within CI and with partner institutions.

Conservation International continues to bring the best technical expertise and resources available to achieve our mission of conserving the Earth's living heritage and demonstrating that people can live harmoniously with nature. Biodiversity Corridors are a key tool that provide a framework for integrating both development and conservation goals to achieve this mission. This workshop 'Biodiversity Corridors in Practice: Building from Experience' provided a unique opportunity to bring together technical corridor staff to build on the experience CI has gained through it's work in biodiversity corridors across the planet. Conservation International is continually looking for and creating opportunities to build on the experience of its field programs and partners in conservation. And we are committed to the challenge of finding and exploring effective innovative ways of sharing experience and skills to better achieve our conservation goals.

Appendix I

The Technical Consultation Network

INTRODUCTION

The Technical Consultation Network (TCN) is a web-accessible tool for the promotion of communication and exchange of relevant information in the decision-making processes of conservation planning, implementation, monitoring and evaluation, and administration.

TCN has been developed by the Conservation Strategy Department (CSD)[1] in collaboration with Conservation Knowledge (CK)[2]. For more information, contact James-Christopher Miller at *jcmiller@conservation.org*.

PURPOSE

Conservation International has invested in the development of TCN as a tool in support of the achievement of CI's Conservation Outcomes[3], which are the measurable steps toward CI's mission[4].

As stated in the CI Strategy Handbook[5], "Achieving our Conservation Outcomes depends on sound decisions (e.g., the determination of the Outcomes, the establishment of conservation strategies, the development of proposals, and the hiring of staff) at a variety of organizational scales. Achieving Outcomes and avoiding institutional 'drift' is dependent on our ability to establish and implement standards of quality, to maintain consistent institutional positions across the organization, and to remain mission-driven. In order to make the best possible decisions, we must ensure that the best information and experience is available at all times to decision-makers. In an organization as large and diverse as CI, this often means that the necessary information and expertise is dispersed throughout the organization. We must therefore provide institutional encouragement and collaboration tools to stimulate the exchange of views on technical issues to ensure that our staff and partners can access the best information on important issues, while at the same time retaining flexibility and timeliness in the process of making decisions.

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[1] Formerly Regional Strategic Planning (RSP), and within the Field Support Division (FSD) at CI.
[2] Formerly the Knowledge Management Department, and within the Center for Applied Biodiversity Science (CABS) at CI.
[3] According to the CI Strategy Handbook, Conservation Outcomes "represent the quantifiable set of conservation goals that list the species and land areas that are indispensable for our ultimate goal of biodiversity conservation in a Hotspot or Wilderness Area."
[4] CI's mission is "to conserve the Earth's natural heritage, our global biodiversity, and to demonstrate that human societies are able to live harmoniously with nature."
[5] N.B.: quote is slightly modified for context.

"The mechanism proposed to meet this need, TCN, relies on the following principles:

- Decisions regarding regional strategies remain the authority of the regional program staff.
- Recognized technical experts ('technical group chairs') within the organization have the responsibility to develop and provide standards of quality or principles of best practice for technical delivery in their respective fields of expertise.
- Broad and relevant consultation within the organization on important decisions should be a standard practice.
- All staff should always seek the best information available before making decisions.

"TCN is not designed as a 'policing' mechanism, but rather as a way to foster better communication and collaboration on important scientific, technical, and operational issues that impact our work and reflect on the quality of our institutional product. Indeed much of this consultation already occurs via a number of informal working groups that have been formed on a range of issues (e.g., climate change, wildlife trade, bushmeat, etc.). However, consultation has not always been as systematic and thorough as it should be to tap the wealth of talent and experience available throughout the organization. Growth in the organization also compels a more formal mechanism to facilitate consultation and to ensure the maintenance of quality standards and best practice in all technical fields. With this in mind, TCN is designed with the following objectives:

- To ensure that decisions are made with the best information available;
- To keep the decision-making process flexible, while incorporating broad, relevant, and transparent consultation and collaboration;
- To establish institutional quality standards in our technical delivery and maintain them across the organization;
- To improve communication between all division within the organization;
- To actively integrate and facilitate technical input on key decisions from all CI divisions; and
- To maintain consistent policy positions across the organization.

"TCN is intended to make a qualitative change in the way that decisions are made within the organization. Our objective is that decisions at all levels are based on the best available information and are consistent with institutional parameters for best practice for technical delivery."

IMPLEMENTATION

TCN is currently under development at CI, with a pilot implementation in Fall 2002 with the four CI Centers of Biodiversity Conservation (CBCs)[6] funded by the Gordon and Betty Moore Foundation. CI-wide implementation of TCN is scheduled for Spring 2003.

[6] The Andean Region, Brazil and the Guianas, Madagascar, and Melanesia.

Appendix II

CABS Knowledge Management System (CABS KMS)

The CABS Knowledge Management System (CABS KMS) is a web-based application that provides a platform for effectively capturing, organizing, and sharing the wealth of scientific and technical information generated and collected by the staff of Conservation International (CI) and our partners and allies in conservation. Users can search and post information and electronic files on the CABS KMS related to the following: people, organizations, projects, documents, and non-spatial datasets. It also has a simple suite of collaboration tools including virtual workgroups, threaded discussions, and news. Access is password-based, and access to the content depends upon the workgroups to which you belong. We currently have approximately 1200 registered users (CI staff and outside partners), and the general public can also browse through the public information without logging in. All content in the KMS can be linked to other content and tagged by a centralized index of keywords. This allows users to quickly find all experts, documents, discussions, projects, and data related to particular topics. For example, a user who searches by the keyword "Hotspot-Madagascar" will quickly find all the experts in this hotspot, organizations who work in the area, ongoing projects, relevant documents, articles and other literature and any discussions pertaining to this topic. The CABS KMS is available in four languages, English, French, Spanish and Portuguese, and has been coded so that its users could quickly translate it into any number of languages.

CABS KMS can be accessed at *http://cabs.conservation.org/cabskms*.

For more information about CABS KMS please contact Karen Desmond at *k.desmond@conservation.org*.

GEOID (GEOspatial Information Database)

To store, manage, and disseminate the plethora of geospatial data at CI efficiently and effectively, CABS is developing a geospatial database management system prototype. GEOID (**GEO**spatial **I**nformation **D**atabase) is a geospatial database management system that will become the centralized data repository for storing spatial data sets (both raster and vector) produced via geographic information systems (GIS) for CI. GEOID has been initially designed to perform three main roles while being flexible enough to accommodate additional requirements:

1. Provide open access to large volumes of spatial data for CI's GIS end-users with current GIS/RS off-the-shelf software.

2. Serve geospatial data via ciMapper, CI's flagship web-enabled mapping application, and future geospatial web applications. ciMapper provides a dynamic way to view, query and map biodiversity information worldwide from

data within GEOID through an interactive site on the World Wide Web as well as allow users to download datasets and associated metadata.

3. Integrate with other information management systems, including IUCN's Species Information System, CABS KMS (Knowledge Management System), and CI's digital photo archives.

It will provide:

1. Direct access to one standardized spatial data source.
2. A platform for building spatial applications.
3. The ability to distribute projects without having to distribute data.
4. The ability to establish/leverage internet map services.

Some major benefits are:

1. Data Storage - GEOID will become the central spatial data repository at CI, thus data will no longer need to be scattered between disparate organizational groups, on individual desktops, or on file servers.
2. Data Management - As a central "data repository", GEOID will provide the ability to manage spatial data within a DBMS more efficiently and effectively.
3. Data Extraction - Datasets will be extractable from the system to a user's local hard drive via GIS software (specifically ESRI and ERDAS software) or via the intranet with ciMapper.
4. Data Integrity - Promote data standards that include naming conventions and metadata standards as described in this document.
5. Data Integration - Integration with other systems.
6. Community GIS - Data Sharing.

For more information about GEOID please contact Eric Michel at *e.michel@conservation.org*.

Appendix III

Examples of Decision Support Software for Conservation Planning

MARXAN

MARXAN is software that delivers decision support for reserve system design. MARXAN finds reasonably efficient solutions to the problem of selecting a system of spatially cohesive sites that meet a suite of biodiversity targets. Given reasonably uniform data on species, habitats and/or other relevant biodiversity features and surrogates for a number of planning units (as many as 20,000) MARXAN minimizes the cost (a weighted sum of area and boundary length, Possingham, Ball and Andelman, 2001) while meeting user-defined biodiversity targets.

RESNET

The ResNet software package, which can be downloaded, implements a place prioritization algorithm based on complementarity. It is a context-specific algorithm, in that it directly utilizes lists of biodiversity surrogates, and orders places on the basis of rarity and complementarity (Margules, Nicholls, and Pressey, 1988, Aggarwal et al., 2000).

SITES

Sites 1.0 is a customized ArcView project that facilitates designing and analyzing alternative portfolios. The software in Sites 1.0 to select regionally representative systems of nature reserves for the conservation of biodiversity is called the Site Selection Module (SSM). It is a streamlined derivative of SPEXAN 3.0 (Spatially Explicit Annealing) that was developed by Ian Ball and Hugh Possingham.

SITES is based on an global optimization technique known as "simulated annealing," selects sites at random, and attempts to minimize overall cost. heuristic package contains an abundance of selection components, which allow the user to tailor its cost equation in many ways,

CONSERVATION OPTIONS AND DECISION ANALYSIS (CODA)

A basic goal for nature conservation is to sample the full range of a region's biodiversity in a network of nature reserves or other types of managed areas. Working towards this goal involves assessing the suitability of different areas and the design of reserves for long term viability... and this work is usually carried out against a background of scarce resources for conservation, competing land uses and other constraints.
CODA is designed to help you address these sorts of problems. It provides a framework and a set of tools for regional conservation planning. Using CODA you can build and compare alternative conservation proposals in a simple and flexible way

C PLAN

Developed by New South Wales National Parks and Wildlife Service, C-Plan is a system designed to support conservation planning decisions.

C-Plan is a windows based software package that when linked to a GIS can display the relative contribution (Irreplaceability and other measures) of land areas (sites) towards a predefined conservation goal. These contribution measures are derived from a biological database containing modeled species or forest distributions and/or actual survey results. The conservation goal takes the form of targets assigned to individual biological entities (features) within the landscape.
C-Plan is interactive in the sense that it can recalculate and redisplay these measures when one or more sites are earmarked for protection (by selecting sites on the GIS). All recalculations take any changes into account (sites that are selected or deselected for protection) and the result is mapped back onto the GIS to display a new pattern of options. The level of protection assigned to an area can be varied (note that this is still being developed to incorporate zoning for different land use zones).

WORLD MAP

WORLDMAP is easy-to-use software for exploring geographical patterns in diversity, rarity and conservation priorities from large biological datasets. Because diversity is related in part to area extent, WORLDMAP was designed originally to use equal-area gridcells for more robust analyses, although in principle it can be applied to areas of any shape and size, at any spatial scale
Features

- Explore geographical patterns in quantitative measures of diversity, rarity and conservation priorities
- At any spatial scale (with tailored software)
- For large biological datasets
- At high speed, inter-actively
- Through an easy-to-learn, graphical interface
- With point-and-press data entry via maps in the data editor

IDRISI

Idrisi32, developed by Clark Labs, is a geographic modeling technology that enables and supports environmental decision making. Special facilities are included for environmental modeling and natural resource management, including change and time series analysis, multi-criteria and multi-objective decision support, uncertainty analysis and simulation modeling. TIN interpolation, Kriging and conditional simulation are also offered.

Appendix IV
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