The Global Conservation Program

Achievements and Lessons Learned from 10 Years of Support for Threats-based Conservation at a Landscape and Seascape Scale

Greater Madidi Landscape Conservation Area (Bolivia)

WILDLIFE CONSERVATION SOCIETY

Greater Madidi Landscape Conservation Area

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Key Achievements, Impacts and Lessons Learned Attained with GCP Funding

The Greater Madidi-Tambopata Landscape encompasses a rich patchwork of ecosystems that harbors a biota of more than 1,100 bird, 300 mammal and 12,000 plant species. This 42,500 square mile landscape spans the borders of northern Bolivia and southern Peru and is a stronghold for populations of endangered Andean condor, jaguar, titi monkey, white-lipped peccary, vicuña, Andean bear, military macaw, giant otter and other species. Several Amazonian indigenous groups continue to live in the Madidi landscape, which is also one of the most popular tourist destinations in the country. This spectacular landscape faces severe threats from illegal timber extraction, mining, expansion of agriculture and the major infrastructure development associated with highway construction and the expansion of gas, oil and hydropower projects. These threats occur, in large part, because those charged with governing the different land-uses have insufficient skills and information to plan effectively and lack the personnel and operational funds to put their plans into action. From the beginning, the Wildlife Conservation Society (WCS) has recognized that local actors need assistance if they are to integrate the principles of biodiversity conservation and sustainable use of natural resources into their development plans. WCS continues to provide innovative landscape management tools to the diverse set of conservation actors in the Madidi-Tambopata Landscape, and to ensure that these tools are applied effectively across the region's complex mosaic of ecosystems, stakeholders, and tenure arrangements.

Greater Madidi-Tambopata Landscape, Project Highlights

- **Conserving Nature by Securing Formal Title for Indigenous Peoples' Lands**. From the start, WCS understood that indigenous people whose lands were threatened by colonization, road and dam development and extractive industries were common-cause partners. Over the last decade, WCS's efforts to help indigenous people secure formal rights to their territory have been acknowledged as a model for land titling in Bolivia.

Accomplishments from the 10 years of the Global Conservation Program in the Greater Madidi Landscape Conservation Area

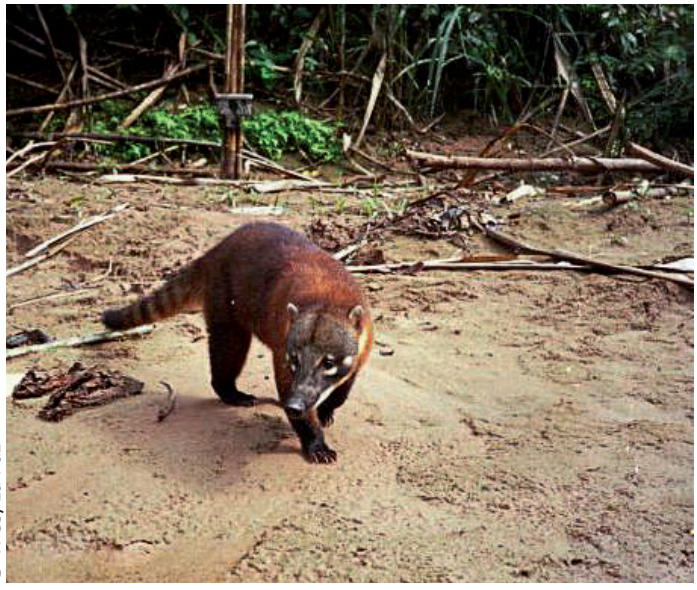
- 647 new species recorded in the landscape
- Three new species registered in Bolivia
- A new primate species described for science
- 66 Undergraduate, Master's and Doctoral theses supported
- Publication of 52 scientific articles and 22 books on studies relevant to conservation
- Documentation of the recovery of wild populations after the impact of hunting linked to timber exploitation that occurred before the creation of Madidi National Park and Natural Area of Integrated Management (PNANMI)
- A reduction, by two-thirds, in the loss of pets from predation by Andean carnivores
- 77% reduction in the loss of Camelids from diseases
- 3000 beneficiaries from sustainable livelihoods groups, achieving in some cases double the average monthly income
- Support for indigenous participation in the rehabilitation of 716,241 acres under territorial claims allowed by the State
- Support for the development of two management plans for national protected areas
- Support for the development of two indigenous land management plans on 853,707 acres; 59,082 acres under forest management plans
- Support to the Ixiamas Municipality in the creation of the Municipal Tourism Reserve of Alto Madidi covering 33,000 ha
- Establishment of a Geographic Information System for the northern part of La Paz to facilitate the processes of territorial planning in the region
- Support in the development and implementation of the land-use plan of the Takana indigenous territory, the first of its kind, which is contributing to the regulation of activities within the communities
- Support to the CPILAP (Central de Pueblos Indígenas de La Paz), the regional representative organization for indigenous people, in the preparation of a proposed co-management plan for the Madidi PNANMI
- Support to the Municipal Association for the northern La Paz Department in formulating a strategic plan, one of the first proposals that has been considered for the implementation of regional autonomy in the country.
- Establishment of a $650,000 trust fund for the management of the Madidi PNANMI
- 20% of the budget implemented to support joint work plans with grassroots organizations
- Current CIPTA administrative capacity strengthened and 20% of the budget directly managed by the organization

- Hiring lawyers ensured that land titling efforts complied with national processes and helped the grassroots organization that represents the Takana – CIPTA – frame their demands clearly using the language and framework of Bolivian law. Lengthy interactions with the National Institute of Agrarian Reform (INRA) pressed them to change the titling process to ensure greater participation of indigenous people.
- After six years of effort and 40 months of USAID support, in July 2003, the first and largest portion of the Takana TCO (indigenous territory) was legally titled by the Bolivian government. This area represents 325,327 hectares of lowland tropical forest and savanna immediately adjacent to the Madidi National Park. Subsequently, the Takana received formal title to two additional blocks of territory (42,600 and 16,558 hectares) over which they have traditional claims. Today, over 95% of the territory that the Takana initially claimed has been formally titled. This is a huge achievement given that there were 626 parties with overlapping land claims at the beginning of the process. Work continues on securing tenure for a second Takana TCO bordering Peru. The Takana currently have formal management authority over almost 390,000 ha and approximately 30% of this area is used to extract a variety of natural products for market. The Takana are keen to maintain the rest of their territory under little or no use so it can function as a source area for the species that are harvested in other zones.
- Similarly, WCS worked with Leco people from Guanay and their indigenous organization PILCOL (Pueblo Indigena Leco y Comunidades Originarias Larecaja) to obtain formal title for two areas of claimed territory, covering 62,782 and 23,944 hectares, on their behalf.
- WCS also worked with Leco people from Apolo and their indigenous grassroots representative organization CIPLA (Consejo Indigena del Pueblo Lecos de Apolo) to obtain formal title for 238,160 hectares of land.
- WCS helped create a 30,000 ha Municipal Tourism Reserve immediately adjacent to Madidi

National Park to ensure the protection of the watershed. This reserve will also allow for the development of a sustainable tourism initiative at Alto Madidi, and provide the Ixiamas Municipality with an incentive to protect this outstanding landscape.

- During 2009, on three separate occasions, CIPTA and the Takana communities have had to evict illegal settlers from portions of the legally titled Takana Indigenous Territory or TCO. While these land conflicts are always a concern, and potentially a tinderbox, the fact that the Takana communities have acted with support from CIPTA is a clear demonstration of their sense of ownership over the indigenous territory and of how indigenous communities have been able to increase their local stature and political power from the marginalized position that they occupied at the beginning of the GCP project in 1999.

- **Building Ecological Knowledge for Effective Land Management**. Although the project began with a minimal baseline of ecological information, targeted work in the Madidi-Tambopata landscape (and across Bolivia) has greatly increased the amount of ecological knowledge available to inform effective land management decisions.
  - Population density estimates for jaguar were generated for the Tuichi, Hondo, Quendeque, Madidi, Heath and Tambopata River basins, representing some of the first statistically robust density estimates for this species anywhere across its global range. These estimates will now provide a baseline for ecological monitoring in the landscape and for evaluating the potential effect of the booming local ecotourism business, as well as possible major infrastructure projects such as hydroelectric and hydrocarbon development.
  - Bird surveys conducted across the various vegetation types of the landscape increased the number of bird species registered for Madidi National Park from 590 to 917.
  - Radio-telemetry studies of white-lipped peccaries provided preliminary home range estimates of between 40 and 110 km^2, confirming the wide-ranging behavior of this species. Over the last year of funding, density estimates at four sites across the landscape (Carmen del Emero, Cachichira, Rio Hondo and Alto Madidi) ranged between 5 and 10 animals per km^2, suggesting that peccary populations are recovering within the park and are able to resist the current levels of subsistence hunting in the more remote areas of the Takana TCO.
  - In 2004 Dr. Robert Wallace, Humberto Gomez, Annika M. Felton and Adam Felton were the first researchers to film and record a new species of titi monkey (*Callicebus aureipalatii*) in Madidi. To raise funds for the conservation of the National Park, WCS auctioned the right to name this new species. The winning bid generated $650,000 for the Madidi trust fund.
  - Bird surveys in the Madidi landscape resulted in the rediscovery of the Bolivian swallow-tailed cotinga (*Phibalura flavirostris*), previously believed to be locally extinct.
  - Standard camera-trapping methodology produced the first density estimate for Andean bears.
  - A national database for medium- to large-sized mammals was created to summarize all published and available grey literature studies. The dataset, which consists of more than 32,000 records, is being used to identify gaps in the national protected area system and will help researchers to assess the likely impacts of climate change on the ability of the present protected area network to conserve Bolivia's diverse and abundant fauna.



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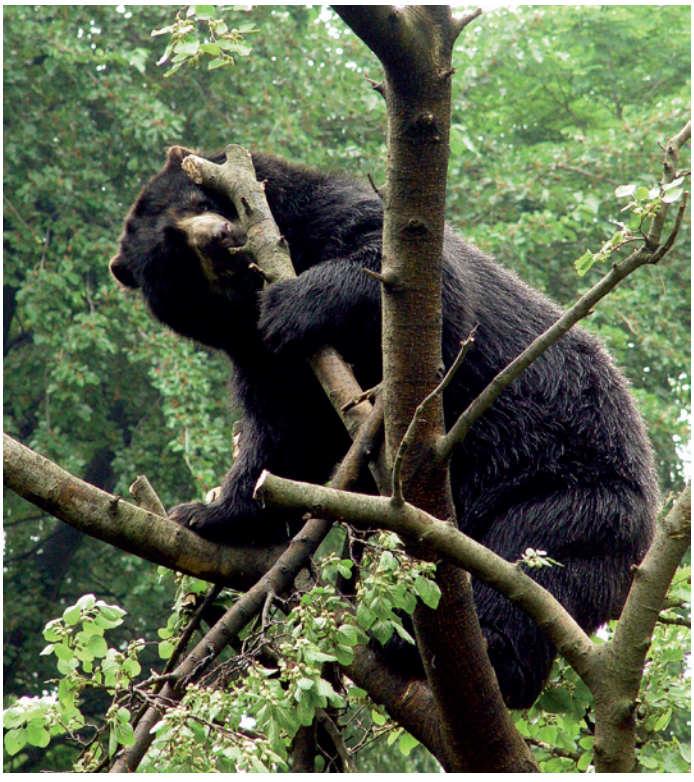
Coatimundi caught by a camera trap

- **Better Conservation through Integrated Land and Resource Planning in PAs and Indigenous Territories**. Across the Madidi-Tambopata landscape, localized unplanned, ill-planned and uncoordinated economic development is degrading national resources, fragmenting ecosystems, depleting wildlife populations and jeopardizing the livelihoods of indigenous peoples who depend on natural products for food, fuel, construction materials and income. WCS has invested substantial effort, with USAID support, to: 1) help local communities, municipalities, and government agencies develop the skills and experience necessary to prepare and implement ecologically sustainable economic development plans; and 2) ensure that development plans are integrated across this transboundary landscape.
  - Working with CIPTA, WCS developed an innovative participatory approach for zoning land-use within the new Takana Indigenous Territory. When combined with information from a series of Participatory Rural Appraisals (PRAs), this approach led to the first Territorial Plan for the Takana TCO. Over 80% of the Takana TCO I is zoned as either Reserve, Exclusive Tourism Area or another form of sustainable natural resource management, indicating the Takana indigenous peoples' commitment to conservation.
  - Early on in the program, a joint effort by SERNAP (Servicio Nacional de Areas Protegidas) and WCS resulted in the publication of "The Landscape Priorities and Actions Plan for the Northwestern Bolivian Andes Landscape," a working conservation vision for the region that was an important step toward implementing an integrated planning process that involves all major governmental and management units. Recently, WCS's focus shifted to working with the Municipal Association or *Mancomunidad* for the northern La Paz Department, supporting their overall development vision for the region while incorporating conservation goals and landscape-scale planning mechanisms. In 2009, with WCS support, the Mancomunidad published their vision for the region and, as a result of this planning document, they are now considered to have pioneered land-use planning by a regionally autonomous authority. This may represent the best mechanism for pushing a landscape-scale planning mechanism that considers protected areas, indigenous territories, overall municipal government boundaries, biological and ecological boundaries and the scale of the most important economic and development processes in the region.
  - With WCS technical support, the management plan for the Madidi National Park and Natural Area for Integrated Management was developed by SERNAP. Unfortunately, despite representing one of the most participative processes in management plan development in Bolivia, and being recognized as a leader on participation in Latin American protected area management, it has not been possible to gain local stakeholders' unanimous approval for the plan prior to its formal approval by the Government of Bolivia. This is a reflection of the social complexity of the protected area, whose local management committee is made up of more than 25 organizational representatives.
  - At a national level, the Strategy for Participation of CIDOB (Confederación de los Pueblos Indígenas del Oriente Boliviano) in the Management of the National Protected Areas System was completed with technical and financial support from WCS.



© D. Morales

*Spectacled Bear (*Tremarctos ornatus*)*

- At the regional level, WCS worked with CPILAP (Central de Pueblos Indígenas de La Paz), the regional representative organization for indigenous people, to develop the first Strategic Institutional Plan, which was published in June 2008. In addition, WCS worked with CPILAP and its member organizations to produce a proposal, published in 2008, for co-management of the Madidi protected area.
- The 'Pilon Lajas Life Plan - Management Plan' was formally approved by SERNAP and the Vice Ministry of Biodiversity, Forestry and Environment in 2008 and published in 2009. Importantly, the Management Plan was adopted and unanimously approved as a Life Plan by the assembly of community representatives of the Consejo Regional T´simane-Moseten (CRTM).
- To reinforce indigenous peoples' status as owners and sustainable managers of land in Bolivia, WCS helped to organize an "Indigenous Alliances for Conservation" event in La Paz. Attended by over 400 people, the event was a very important achievement for WCS's indigenous partners in terms of raising awareness about the purpose and contribution of indigenous territories to land management in Bolivia, and the role that indigenous people are already playing in the management and safeguarding of the country's protected areas. The Takana (CIPTA), Leco (CIPLA & PILCOL), Moseten (OPIM), T'simane-Moseten (CRTM), Takana-Quechua, Esse-Eja and Araona people were all present at this event, as were the Departmental (CPILAP) and National (CIDOB) lowland indigenous organizations. The Bolivian government was represented by the Vice Ministry of Environment, Biodiversity, and Climate Change.

- **Strengthening Indigenous Peoples' Power to Secure their Livelihoods through Sustainable Use of Natural Resources**. Individual indigenous community villages on their own are too small and too politically powerless to contest their land-use rights, or to secure these rights if formally acknowledged. Indigenous organizations, however, are better able to represent the interests and aspirations of all members of that indigenous group, empowering local people to secure and sustainably manage the lands over which they have legitimate, prior claims. In recognition of the importance of such groups, WCS has helped CIPTA (Consejo Indigena del Pueblo Takana) develop the skills, experience and credibility needed to represent the Takana, secure formal title to their lands and, through a participatory process, develop sustainable approaches to natural resource management that conserve the landscape's spectacular biodiversity, raise household incomes and secure local livelihoods.
  - WCS worked with CIPTA to train Takana community members to carry out a census of all Takana households. This information was made available to VAIPO (the Vice Ministry of Indigenous Affairs) to enable them to base their population estimates on more solid data.
  - Community-based sustainable natural resource management principles and criteria were developed by CIPTA and representatives from the member communities for the Takana TCO. These principles provided the basis for developing community-based regulations for natural resource management, including benefit distribution. This participatory process was a groundbreaking step for WCS's work with CIPTA and the Takana.
  - With WCS technical assistance, CIPTA produced, through a participatory process, an institutional constitution, statutes and a five-year management strategy and associated budget for their indigenous territory (which was subsequently titled) based on the sustainable management of natural resources. Together, these helped CIPTA to guide development activities within the Takana TCO.
  - CIPTA currently oversees 25 Takana natural resource enterprises, with a total annual turnover of more than $250,000, generating over $15,000 in funds to support CIPTA operations.
  - Between July 2007 and September 2009, WCS raised over $400,000 in funds which were successfully administered, as subgrants, by CIPTA. This followed a WCS-supported seven-year capacity building program which allowed CIPTA to develop the administrative skills and experience necessary for sound financial management. In early 2010, CIPTA will undergo a full external audit in order to provide even greater depth to their growing financial and administrative curriculum.
  - CIPTA has assumed responsibility for the management of biologists previously employed directly by WCS and has begun to include wildlife

management activities in annual work plans and budgets. WCS scientists Guido Miranda, Kantuta Lara and Robert Wallace provide senior technical advice, and WCS's efforts have continued to focus on the analysis of data which will inform a series of scientific articles on lessons learned, including: 1) the veracity of data from hunters' self-monitoring; 2) the usefulness and broader applicability of different measures of sustainability; 3) basic biological and reproductive data for a series of Amazonian mammals and large game birds; 4) community decision-making on subsistence hunting and the sustainability of the self-monitoring process; and 5) the sustainability of subsistence hunting for a range of mammals and larger game birds.

- **Sustainable Natural Product Enterprise Development**. The Takana and other indigenous groups in the Madidi-Tambopata landscape value the land and natural resources that are the foundation of their livelihoods. However, maintaining a local indigenous community constituency that is committed to conservation in the face of growing external threats and changing aspirations of the younger generations requires that local people see tangible and meaningful benefits from conservation and sustainable land management. From the start, the Takana sought WCS's assistance in acquiring the skills and experience needed to generate income from natural products that exist on the land. WCS saw that helping the Takana to implement such a proposed activity would help build a mutually trusting relationship. Additionally, the probability that the enterprise would be successful could be increased because the Takana who had proposed the idea would be the people most invested in making it a success. Such enterprise-based conservation projects started with native-bee honey production and have since been expanded to include nature tourism and the harvesting and sale of timber, wild cacao, spectacled caiman skins and meat, Brazil nuts, incense and handicrafts.
  - In early 2000, before WCS support to CIPTA and the Takana, there were three Takana community-based forestry initiatives within the Takana TCO. Today, following sustained support to CIPTA for community forestry initiatives, there are 16 different initiatives, 14 of which are currently operating. All of the operating ventures have had their overall management plans and/or annual harvest plans formally approved, as required by Bolivian law. Most of the initiatives currently provide open sessions for CIPTA and the communities to inspect accounts and papers, with percentage payments being made directly to the communities as well as to CIPTA, their representative organization. The number of initiatives doing so is increasing each year as the Takana Natural Resource Access and Use Regulation is gradually implemented.
  - During August and September 2008, the second of two formally approved annual spectacled caiman harvests was successfully conducted in the Takana TCO. The harvest lasted less than three weeks and the Takana hunters were well-organized and efficient, with a total of 524 skins processed and sold to a tannery in Trinidad. Seventy-eight percent of the $11,065 benefit obtained from this harvest was distributed equitably to the 23 participating Takana hunters, three percent was given to CIPTA, five percent to the communities, two percent to the wildlife management Animalucuana Association of the Takana TCO and twelve percent went towards reinvesting in the management process. In 2008, caiman meat was also commercialized, to increase the harvested value of each animal. In total, an additional $2,346 was generated from meat sales. As such, in 2008 the average payment to each participating hunter was $483, a considerable increase from the amount that each had received in 2007 ($312).
  - CIPTA and WCS have identified 116 fish species with ornamental trade potential. Twenty-five of these species have life histories that suggest that they may be tolerant of regulated commercial harvest. Ornamental fish management is therefore likely to be a future activity of the wildlife management Animalucuana Association in the Takana TCO.
  - The databases for subsistence hunting and subsistence and commercial fishing have informed a number of different policy-level decisions. For example, the different indigenous communities' fisheries' values have been incorporated into formal analyses of the socioeconomic and environmental impact of the planned Madeira dams.

Similarly, the hunting databases have already informed management decisions in the Takana communities and more detailed analyses have recently confirmed that hunting seasons would have little or no relevance for almost all of the main hunted species. These findings will now be considered in the wildlife management legislative process.

- Through a grant from Canada to the Takana Womens Council (CIMTA), and with WCS technical support, the Takana Women's Organization organized a series of workshops to preserve the traditional technique of weaving cotton with jipuri. Subsequently, with Blue Moon Fund and USAID ICAA support, a group of female handicraft specialists from the Takana TCO visited the isolated communities of the Takana TCO II to teach women weaving and other handicraft techniques, following a request to the Takana General Assembly in April 2008.

- **Strengthening Protected Area Management by Building SERNAP (National Protected Area Service) Staff's Skills and Capacity**. WCS has worked closely with SERNAP, providing targeted technical training and support for management plan content and process, annual work planning, ecological and conflict monitoring, and tourism management.
  - WCS and SERNAP conducted a threats and opportunities analysis for the landscape, which was fundamental to prompting SERNAP's creation of the pioneering Inter-institutional Coordination Committees of the Madidi and Apolobamba protected areas. This committee brought together, for the first time, all principal national- and local-level actors with interests in managing the protected areas.
  - With support from WCS, SERNAP developed and assisted with the preliminary implementation of a Management Plan for the Madidi National Park and Natural Area of Integrated Management. This highly participative process was new to SERNAP, and took a little over two years due to the ecological, social and political complexity of protected area conservation and use in Bolivia. The process included thorough and multidisciplinary documentation and analysis of existing biological and socioeconomic information. This information was then used in the landscape-scale planning process that incorporated the participation of local people and government authorities from within and immediately adjacent to the protected area. The management plan identified a series of concrete priority actions, including a realistic monitoring strategy that was implemented with the technical support of WCS.

- **Reducing Human-Wildlife Conflict**. WCS was invited by the Curva municipality communities to assist with the study and future management of human-animal conflict involving livestock loss to puma, Andean fox, Andean condor and Andean bear. An initial workshop that provided considerable information regarding current livestock management practices in the region was later followed up with a training program to help Apolobamba Park guards recognize wildlife-related livestock kills and to provide them with a set of methods to monitor this problem across the protected area. In 2004, WCS began a program with five Apolobamba communities (Cañuhuma, Medallani, Caalaya, Lagunillas and Curva) to implement family-level corrals for nocturnal livestock protection. This non-lethal approach to addressing the problem, a community-based solution to balancing the needs of people and wildlife, resulted in an 80% reduction in livestock-wildlife conflict. In addition, veterinary support was provided to the communities, through formal training exercises, provision of diagnoses of the main livestock diseases and subsequent outreach on how best to reduce disease risk. This support reduced disease-related losses, which are more prevalent than wildlife conflict-related losses, by 75%. The reduction in livestock-wildlife conflict and disease-related losses resulted in each family saving, on average, about $1,500 per year. A number of new communities are looking to implement these approaches, which is especially encouraging. WCS staff are working on local publications in three languages (Aymara, Quechua & Spanish) that summarize the lessons learned to date.

GCP Program Background

The goal of the Wildlife Conservation Society's Biodiversity Conservation at the Landscape Scale (BCLS) Program is to ensure conservation of biological diversity in regions of global importance, using a landscape- (or seascape-) and species-based approach. For the past 10 years, the WCS Living Landscapes Program (LLP) has been developing and testing wildlife-focused strategies to resolve the conflicts between people and wildlife that threaten biodiversity found in these important wild places. The LLP-developed Landscape/Seascape Species Approach (LSA) is threats-based and highly participatory; it promotes conservation of landscapes (and seascapes) by focusing efforts on key animal species found within that landscape/seascape. The conservation of these Landscape Species offers a focused and cost-effective way to retain a full complement of biodiversity and overall ecological integrity.

While WCS recognizes the integral role that protected areas play within national biodiversity conservation plans, we also realize that parks and reserves are seldom sacrosanct and are always embedded in larger, human-dominated landscapes. Regardless of how large or small a protected area may be, the plants and animals it contains are often threatened by human resource use, whether directly or indirectly. Therefore, the management of parks and reserves cannot occur in isolation from the surrounding landscape; rather, management plans must take into account where and how human activities conflict with biodiversity conservation as well as where conservation activities might adversely impact human welfare. As human populations continue to expand, the incentive for over-exploiting natural resources within and outside protected areas will increase and, therefore, the need for biodiversity conservation tools that address human-wildlife conflict will become even more important. In our efforts to conserve Landscape Species that frequently move beyond protected area boundaries, we recognize that parks and reserves must be integrated into the broader landscape, a landscape in which, realistically, people will continue to exploit natural areas and wild species to meet their socio-economic needs.

The Wildlife Conservation Society's BCLS Program was designed to ensure biodiversity conservation in a selection of globally significant sites, by identifying actions to conserve Landscape Species and by increasing the capacity of local and national organizations to implement such actions. Over the course of Cooperative Agreement LAG-A-00-99-00047-00, the WCS GCPII/USAID portfolio has included 7 sites:

- **Ndoki-Likouala Landscape Conservation Area** (Republic of Congo) - GCP-I
- **Greater Yasuní-Napo Moist Forest Landscape Conservation Area** (Ecuador) - GCP-I
- **Greater Madidi Landscape Conservation Area** (Bolivia) - GCP-I and GCP-II
- **Glover's Reef Living Seascape** (Belize) - GCP-II
- **Maya Biosphere Reserve Living Landscape** (Guatemala) - GCP-II
- **The Eastern Steppe Living Landscape** (Mongolia) - GCP-II
- **Southern Sudan Transboundary Living Landscape** (Southern Sudan) - GCP-II

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Location, Global Importance and Key Threats to this Landscape

Stretching from the peaks of the Andes to the Amazon River basin, the Greater Madidi-Tambopata Landscape encompasses one of the largest swaths of intact montane forest in the Tropical Andes, as well as humid grasslands and lowland Amazonian rainforest (see Figure 1). This rich patchwork of ecosystems ranges from 300 feet to nearly 20,000 feet above sea level, harboring a biological treasure chest of more than 1,100 bird, 300 mammal and 12,000 plant species. The 42,500-square-mile Greater Madidi-Tambopata Landscape spans the border of northern Bolivia and southern Peru and is a stronghold for populations of endangered Andean condor, jaguar, titi monkey, white-lipped peccary, vicuña, Andean bear, military macaw and giant otter. Five protected areas, vast indigenous peoples' territories and important archaeological sites are sprinkled across this enormous, and largely unexplored, wilderness. The landscape is a biodiversity hotspot, recognized as a "high biodiversity wilderness" (Conservation International), a "Global 200 Ecoregion" (World Wide Fund for Nature) and a "Last of the Wild" landscape (WCS).

Six indigenous Amazonian groups (the Araona, Ese Eja, Leco, Moseten, Takana and T'simane) continue to live in their ancestral lands within the landscape, and traditional Quechua and Aymara communities are found in remote highland areas. The natural productivity and biodiversity of the Madidi-Tambopata Landscape has driven historic booms and catastrophic busts in the export of rubber, quinine, animal skins and timber. Timber extraction remains an important source of employment in the region today, though intact Madidi forests are also recognized to have

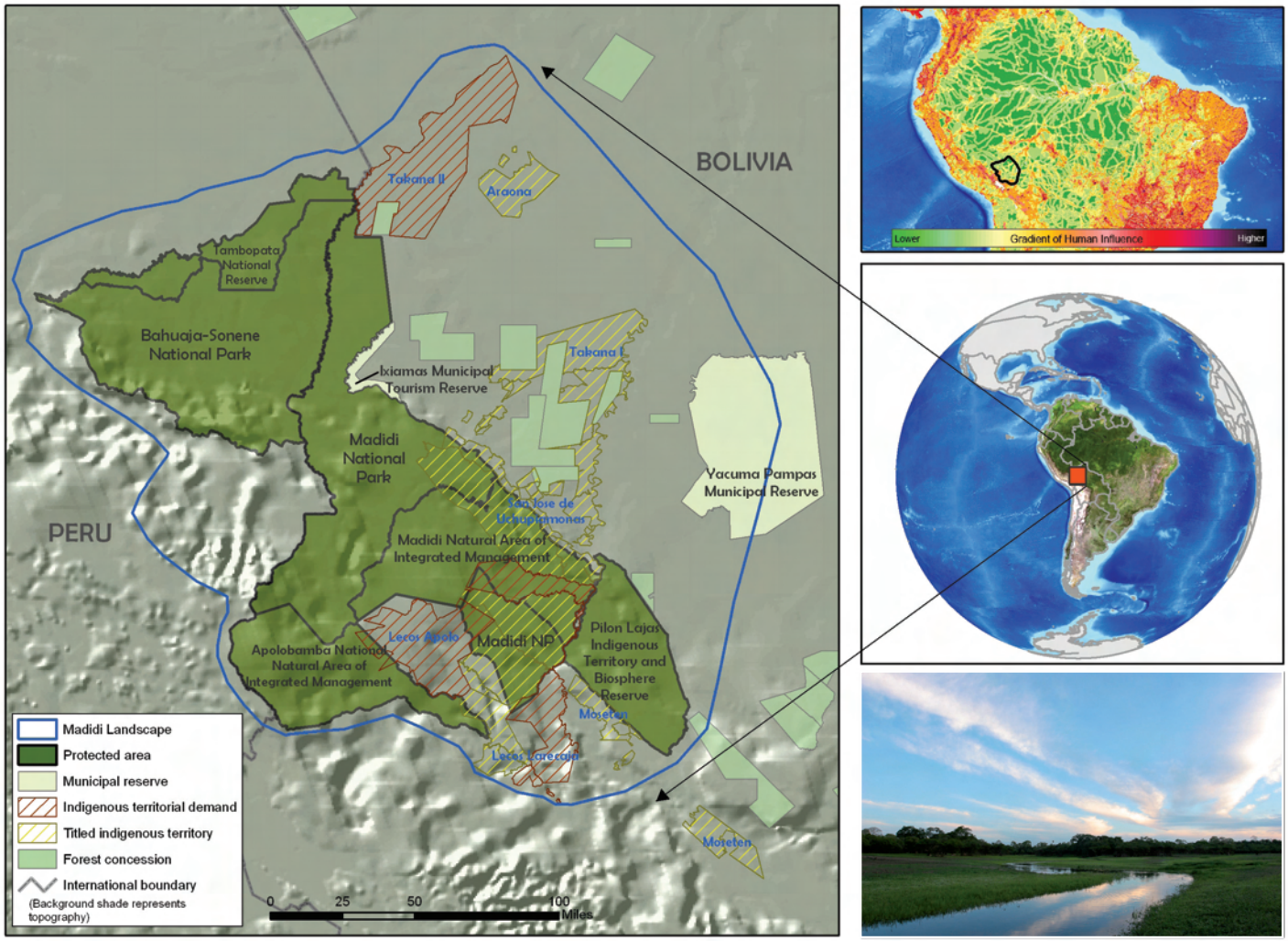

Figure 1. The Madidi Landscape. Insets show (top-bottom): The human footprint in this area, the landscape's global location, and a view of Pampas del Beni (bottom photo ©M. Spanowicz).

great value as carbon sinks and protectors of regional water supplies. Since the advent of tourism there in the late 1980s, Madidi has become one of the most popular tourist destinations in the country.

Though much of this spectacular landscape remains intact, its biodiversity and ecosystem services are severely threatened by road construction and the expansion of gas, oil and hydropower projects, illegal timber extraction, mining, an expanding agricultural frontier and proposed large agro-energetic projects. Often, those charged with governing the different land-uses (e.g., protected area agencies, national to municipal authorities, indigenous people and local research institutes) lack the sufficient skills and information necessary for effective planning and, furthermore, lack the personnel and operational funds to put their plans into action. Regional development plans are devised without consideration of their impacts on natural resources; for example, plans to connect Bolivia and Peru to Brazil's burgeoning markets and expand the (oil and gas) energy industry will involve the construction of roads through fragile areas high in biodiversity.

Landless Andean farmers who are searching for a living in the lowlands are expanding the agricultural frontier, increasing the risk of disease transmission between domestic animals and wildlife, bringing crops and domestic animals closer to wildlife predators and increasing the hunting pressure in surrounding forests. Despite a sound body of national laws and regulations, illegal timber extraction continues to spread unabated. National policy aims to decentralize decision-making and responsibility for land-use planning and natural resource management is increasingly being shifted to local and regional governments. However, the decentralization process is occurring without sufficient personnel, staff training and operational funds for these local and regional government authorities to effectively play this challenging but vital new role. Local actors need assistance if they are to integrate the principles of biodiversity conservation and sustainable use of natural resources into their development plans. WCS continues to provide innovative landscape management tools to the diverse set of conservation actors in the Madidi-Tambopata Landscape, and to ensure that these tools are applied effectively across the region's complex mosaic of ecosystems, stakeholders and tenure arrangements.

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Anhinga

The Wildlife Conservation Society's Historic and Current Roles in this Landscape

The Greater Madidi-Tambopata Landscape Conservation Program began in early May 1999, five months before receiving USAID GCP support and just before receiving formal notification of this intended support. This landscape was the only one in the WCS portfolio of sites to obtain USAID funding during both GCP-I and GCP-II. During the past decade of work in this landscape, WCS has established a nationally and regionally recognized program for developing indigenous capacity for land management and integrating different land-management regimes in Bolivia into a unified landscape-level natural resource governance system. WCS has played a leadership role, assisting indigenous groups with the clarification of land and natural resource rights; establishing participatory management plans in protected areas and indigenous territories; strengthening local stakeholders' participatory mechanisms for territorial management; promoting the sustainability of natural resource extraction; developing and communicating technical information on development alternatives; supporting incorporation of protected area and indigenous territories into regional plans; and integrating these plans at the municipal, protected area and indigenous territorial levels. By integrating territorial planning initiatives, WCS has promoted the formation of institutional alliances between local stakeholders that avoid or mitigate the cumulative impacts of large infrastructure projects, thereby conserving both the extraordinary biodiversity of the landscape and the livelihoods of those who depend on natural resource use.

WCS's Approach to Threats-based Conservation at a Landscape Scale

From the start of the Madidi GCP project, encouraging the participation and buy-in of indigenous communities was vital to the project's conservation successes. To this day, community participation, and the development of indigenous peoples' capacity for land and natural resource management, remains an integral aspect of the conservation approach implemented across the

© A. Baertsch/WCS

Otter family

focal areas of the Greater Madidi-Tambopata Landscape. However, the principal project goal for the Greater Madidi-Tambopata Landscape Conservation Area is to conserve biodiversity through the application of the Landscape Species Approach (LSA), developed by the WCS Living Landscapes Program. The LSA is based on the development of spatially explicit models that represent: 1) the threats to biodiversity across the landscape (Human Landscape maps); and 2) the biological needs of the suite of Landscape Species (a Biological Landscape map for each species).

Due to their extensive and heterogeneous spatial needs, Landscape Species often represent an extreme challenge for long-term conservation purposes. Since they are ecologically important, their removal from a landscape is predicted to have deleterious, cascading impacts on ecosystems. As WCS aims to conserve ecologically functional landscapes, the Madidi project team has tailored its efforts to respond to the spatial needs of the chosen Landscape Species as a proxy for protecting the overall landscape; the working hypothesis is that by ensuring the needs of these area-demanding species, much of the rest of the biodiversity in the landscape will also be conserved. The LSA requires the selection of the most appropriate suite of Landscape Species from across the landscape, through a process which determines which of the most highly ranked species for the five selection criteria for Landscape Species (those that are area-demanding, display habitat and socio-political heterogeneity, are vulnerable to threats, provide ecological functionality and are socio-economically significant) are also the most complementary to one another. WCS, with the assistance of national and international experts, chose the seven Madidi Landscape Species from a large set of candidate species. Together, these seven species – Andean condor (*Vultur gryphus*), spectacled bear (*Tremarctos ornatus*), jaguar (*Panthera onca*), giant otter (*Pteronura brasiliensis*), maned wolf (*Chrysocyon brachyurus*), military macaw (*Ara militaris*) and vicuña (*Vicugna vicugna*) – represent all primary direct threats and all major habitats within the landscape.

At workshops in Apolobama and Madidi, more than 40 park management staff provided over 2000 point locations from within the Apolobamba, Madidi and Pilon Lajas protected areas and the Takana TCO to complete a first draft of Landscape Species' distributions. Biological Landscape maps could then be built using this expert knowledge of each of the Landscape Species' habitat requirements to derive habitat associations. Although the seven selected Landscape Species are famed for their extensive habitat requirements, there is a relative dearth of information regarding their basic biology as well as the magnitude of their spatial requirements. In the Greater Madidi-Tambopata Landscape Conservation Area, WCS field staff have continually worked to determine the spatial needs of ecologically functional populations of these Landscape Species, developing management strategies that include protected areas (and those unprotected areas that are critical to their needs). Throughout the process, WCS has encouraged the full participation of local people and other stakeholders in management decisions.

The spectacular Madidi Landscape faces severe threats from such anthropogenic sources as illegal timber extraction, mining, an expanding agricultural frontier and harmful agricultural practices. Additionally, major infrastructure development projects threaten the integrity of the landscape; such infrastructure is being built or proposed in association with highway construction and the expansion of gas, oil and hydroelectric power projects. In order to target interventions, it is important to determine where threats occur, which the LSA accomplishes through the creation of "Human Landscape" maps. These Human Landscapes highlight the specific locations where each threat occurs, each threat's status (its severity, urgency, probability of occurrence and estimated time for recovery) and where management actions may

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Jaguar

need to be implemented. A spatially explicit threats analysis for the Madidi-Tambopata Landscape identified four large wilderness areas, isolated from human settlements, with no threats to biodiversity. These areas are located within the National Park portions of the Madidi protected area, covering 18,400 km^2.

Building the Human (threat) and Biological Landscape maps for each Landscape Species has helped identify key challenges to their conservation, and allowed the project to build a conceptual model (see Figure 2). Such a model explicitly demonstrates how threats adversely affect the targets (whether directly or indirectly) and which interventions are necessary to remove or reduce the impact of these threats and achieve the desired outcomes (the threats and interventions described in the Madidi conceptual model are listed in Tables 1 and 2). It is vital that the model be flexible, able to be easily refined over time as new biological information is gathered.

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Weighing a crocodile

Implementing Conservation at a Landscape Scale: Overcoming Challenges, Grasping Opportunities and Managing Adaptively

Careful analysis of the information gained throughout the LSA process allowed the project team to determine that, for example, overgrazing poses the real risk of pasture failure and a mass mortality of the populations of vicuña that have recovered over the last quarter of a century from previous overexploitation, and that condors are perceived as a threat to livestock and this image problem is linked to local concerns about protected areas infringing on their livelihoods. This encouraged WCS to invest in efforts that promote improved livestock management and use education to encourage positive local attitudes towards the condor.

The LSA results for Madidi provided an explicit validation of the work that WCS has undertaken with CIPTA and the Takana communities. For example, analysis showed that cooperation with the Santa Rosa de Maravilla community was especially valuable, since that community lies within one of the few intact biological corridors linking the TCO and the Madidi protected area – an important corridor for jaguar and white-lipped peccaries.

Lastly, the initial results of Landscape Species population viability analyses indicated the importance of the protected areas in neighboring Peru for effective spectacled bear, condor and jaguar conservation. This analysis highlighted why it was important to expand conservation efforts into southern Peru, as well as to the northern La Paz Department in Bolivia.

Titling of Indigenous Territorial Claims

Over the last decade, the Madidi project's efforts to help indigenous peoples secure formal rights to their territories and develop integrated capacity for the sustainable management of these territories has been acknowledged as a model for land titling in Bolivia. Hiring lawyers to help the Takana appropriately frame their territorial claims and navigate the Bolivian legal system was critical to successfully securing formal title over traditional lands.

Today, the Takana have secured legal title for over 95% of their initial territorial claims; they are now legally responsible for sustainably managing over 390,000 hectares of Bolivia. In preparing the management plan for their lands, the Takana decided to set aside over 40% of their territory as reserve or solely for tourism. Another process, to title the second Takana TCO in the north on the border with Peru, has been initiated but had not yet concluded by the end of GCP funding. However, the size of their territorial claim has been formally approved, following an official governmental review of the results of a CIPTA and WCS study on the spatial needs of the four northernmost Takana communities of La Paz Department.

Working with Leco people in Apolo and Guanay (Larecaja), and their indigenous organizations CIPLA & PILCOL, WCS was able to help them secure formal title to two areas covering 238,160 and 86,736 hectares, respectively. WCS also helped create a 30,000 ha Municipal Tourism Reserve immediately adjacent to Madidi National Park, to ensure that the Ixiamas Municipality accrued revenues from sustainable tourism within the Alto Madidi, as an incentive for their protection of this outstanding landscape.

The importance of land titling as threat abatement strategy cannot be overstated. Recently, on three separate occasions, CIPTA and the Takana communities have had to evict illegal settlers from portions of their legally titled Takana Indigenous Territory. Though these land conflicts are always a concern, and potentially a tinderbox, the fact that the Takana communities have acted with support from CIPTA is a clear demonstration of their sense of ownership over their lands. Their actions serve to demonstrate how indigenous communities have been able to increase their local stature and political power with the support of WCS and USAID.

Sustainability

Conservation of biodiversity and the sustainable production of natural resources requires active management for as long as unsustainable use threatens the valued resources. Because of this, WCS takes a long-term view when committing to the conservation of any landscape or seascape. To cover the costs of conservation and sustainable resource management, WCS has progressively developed a holistic approach that includes: 1) building local, national and international constituencies committed to the conservation of a given landscape or seascape; 2) establishing economically and ecologically sustainable natural product enterprises; and 3) developing payment for ecosystem services mechanisms. Taken together, these interventions are hoped to generate the economic and cultural incentives needed to encourage local stakeholders to adopt sustainable resource management policies and practices over the long-term.

Continued sustainability requires work at a scale where the ecological needs of a suite of terrestrial or aquatic species are met while ensuring an adequate size and configuration to allow for the sustainable use of resources. This ensures that the entire landscape/seascape has the necessary space and resources for populations of plants, animals and humans to coexist, with wildlife populations remaining at densities sufficient to fulfill their ecological and economic roles. Conservation areas that do not meet these criteria will fail, in the long-term, to meet their conservation objectives as wildlife populations dwindle for lack of space and resources. Furthermore, it will be impossible for improperly managed landscapes to meet the livelihood needs of local people over the long-term. This lack of sustainability will cause a downward spiral; pressure on natural resources will lead to diminishing flows of the ecosystem goods and services that fuel rural economies, leading in turn to greater pressure on natural resources. The implementation of the Landscape Species Approach in the Madidi-Tambopata

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Transporting cacao

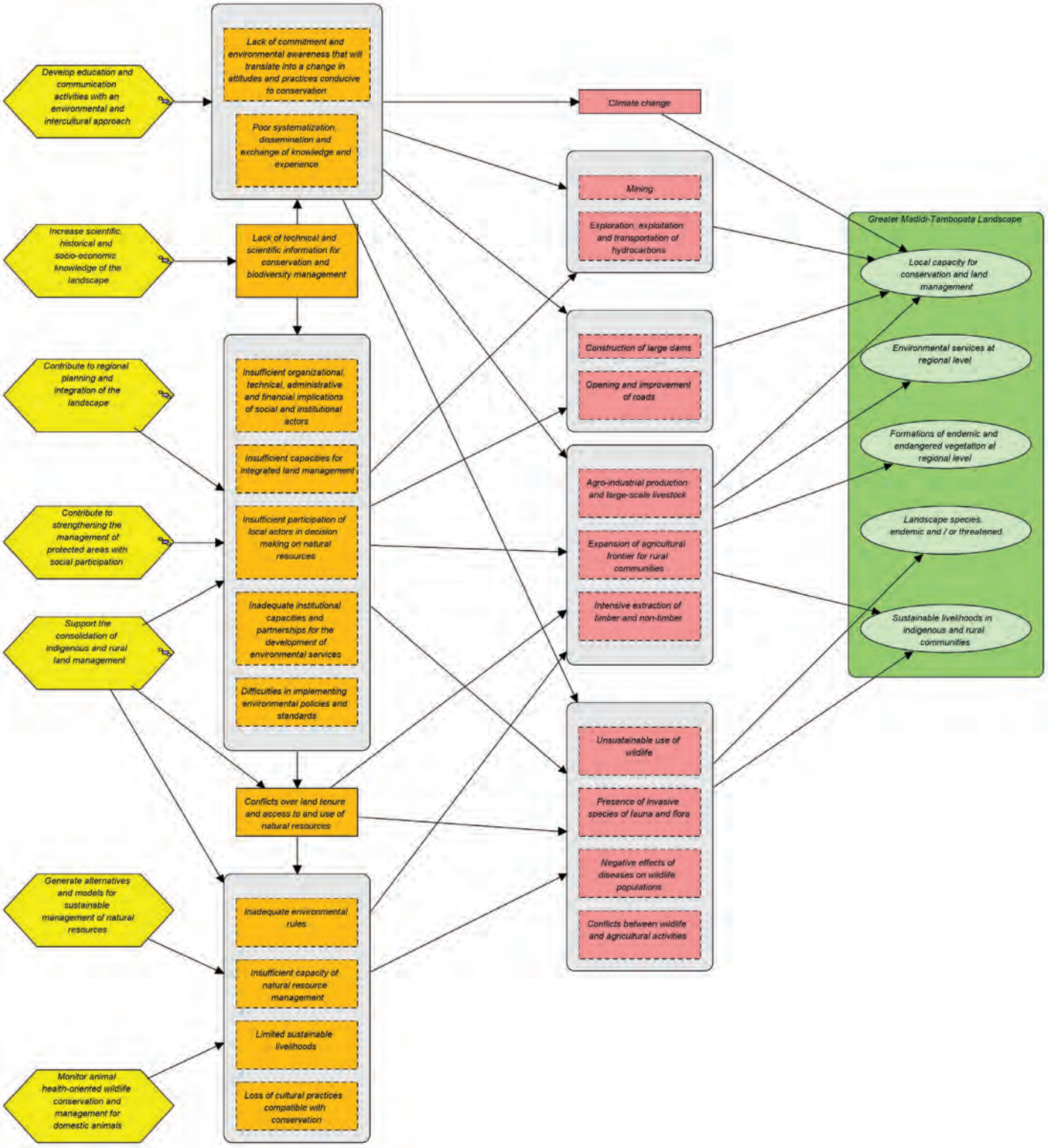

Figure 2. Conceptual Model for the Greater Madidi-Tambopata Landscape, illustrating the links between interventions (yellow), contributing factors (orange), direct threats (pink) and conservation targets (green).

Table 1. IUCN-CMP Unified Classification of Direct Threats
(from the Conceptual Model shown in Figure 2).

IUCN Classification	Direct Threat(s)
2.1 *Annual & Perennial Non-Timber Crops*	• Agro-industrial production and large-scale livestock • Expansion of agricultural frontier for rural families • Conflicts between wildlife and agricultural activities
2.3 *Livestock Farming & Ranching*	• Agro-industrial production and large-scale livestock • Negative effects of diseases on wildlife populations • Conflicts between wildlife and agricultural activities
3.1 *Oil & Gas Drilling*	• Exploration, exploitation and transportation of hydrocarbons
3.2 *Mining & Quarrying*	• Mining
4.1 *Roads & Railroads*	• Opening and improvement of roads
5.1 *Hunting & Collecting Terrestrial Animals*	• Unsustainable use of wildlife
5.2 *Gathering Terrestrial Plants*	• Intensive extraction of timber and non-timber
5.3 *Logging & Wood Harvesting*	• Intensive extraction of timber and non-timber
7.2 *Dams & Water Management/Use*	• Construction of large dams
8.1 *Invasive Non-Native/Alien Species*	• Presence of invasive species of fauna and flora • Negative effects of diseases on wildlife populations
11.1 *Habitat Shifting & Alteration*	• Climate Change

Table 2. IUCN-CMP Unified Classification of Conservation Actions ("Interventions"),
from the Conceptual Model (Figure 2).

IUCN Classification	Interventions
2.1 *Site/Area Management*	• Contribute to regional planning and integration of the landscape • Contribute to strengthening the management of protected areas with social participation • Support the consolidation of indigenous and rural land management
2.2 *Invasive/Problematic Species Control*	• Monitor animal health-oriented wildlife conservation and management for domestic animals
3.1 *Species Management*	• Monitor animal health-oriented wildlife conservation and management for domestic animals
4.3 *Awareness & Communications*	• Develop education and communication activities with an environmental and intercultural approach • Increase scientific, historical and socio-economic knowledge of the landscape
5.2 *Policies & Regulations*	• Support the consolidation of indigenous and rural land management
6.1 *Linked Enterprises & Livelihood Alternatives*	• Generate alternatives and models for sustainable management of natural resources
7.1 *Institutional & Civil Society Development*	• Contribute to strengthening the management of protected areas with social participation
7.2 *Alliance & Partnership Development*	• Contribute to strengthening the management of protected areas with social participation • Support the consolidation of indigenous and rural land management

Landscape ensured that the extent and spatial configuration of the landscape is sufficient to: 1) meet the needs of the suite of species at population densities that allow them to fulfill their ecological functions; and 2) provide sustainable streams of income for local people from the sale of natural products and other ecosystem services.

In many of the remote areas where WCS-Madidi project personnel work, local families are cut off from national society; they are the last to receive health, sanitation and education services and are both economically and politically marginalized. WCS has worked with Takana, Lecos and T'simane communities to help them secure formal rights to their lands and natural resources through the land-titling processes mentioned above. Furthermore, WCS has assisted these communities with the development of governance systems that ensure sustainable resource use and secure livelihoods, systems where the community, rather than individual families, makes and enforces natural resource management and use decisions. When people feel they have a political and economic stake in determining how natural resources are used, they often become constituents for sustainable resource management. CIPTA's authority to enforce Takana peoples' rights to land and resources, resolve natural resource management conflicts within the Takana TCO and help Takana families develop ecologically and economically sustainable natural resource-based enterprises has grown over the course of the WCS-Madidi project. This accomplishment is a testament to the success of the Madidi-Tambopata project's approach and should serve as a model for sustainable conservation and development within the Amazon.

Enterprise-Conservation: Sustainable Economic Incentives for Wildlife Conservation

In places where the economic potential exists, market forces will need to be mobilized to tie together financial and ecological systems. Experiences from WCS landscapes and seascapes around the world have shown that a portfolio of diverse revenue streams, derived from the sale of sustainably extracted ecosystem goods and services, is critical. This approach diminishes the risk associated with reliance on a single funding source which is subject to the vagaries of market demand, and recognizes the facts that: 1) revenue streams for different goods and services fluctuate seasonally and inter-annually; and 2) biodiverse areas typically have few individuals of each species and therefore require relatively low off-take rates.

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The Beni River breaking through the Bala Mountains

Over the past decade, the WCS-Takana partnership has yielded a range of natural product enterprises that manage natural resources sustainably and provide important and diversified sources of income to local families within the Madidi-Tambopata Landscape.

Measures of Success

The WCS Greater Madidi-Tambopata Conservation Program is justifiably proud of our success working with local people at both the community and representative organization levels. WCS has accepted the challenges of strengthening the organizations of a variety of actors across the landscape, because we recognize that the ecological future of the landscape depends upon the ability of local, regional and national actors to effectively manage how the landscape is used. WCS staff working in the area have made huge advances in the ecological and socioeconomic knowledge of the Madidi-Tambopata Landscape, information that was all but absent prior to the advent of GCP funding. For example, more than 100 Participatory Rural Appraisals have been conducted in the Bolivian portion of the landscape and more than 16,000 wildlife observations have been recorded in the last 10 years, representing a 900% increase from historical knowledge. The importance of this type of baseline data cannot be overestimated, most importantly because the first 10 years of the program served as a vital backdrop to future conservation work in this landscape.

WCS's conservation interventions in this landscape have maintained a focus on backing the development visions of lowland indigenous people who were previously marginalized. These types of interventions have made sense because empowered indigenous people in this region tend to have a view of the landscape that is compatible with conservation. For example, regional deforestation analyses conducted by WCS have consistently shown that rates of deforestation are much lower on indigenous lands than on surrounding lands. The project's hypothesis has been validated to date, in that working with actors who have the potential for jurisdiction over large portions of the landscape, and visions that are more compatible with conservation than classic Amazonian development scenarios, can yield positive and measurable conservation outcomes. Indeed, it is precisely this evidence that is forming the basis of potential REDD projects for the region. To make management work over the long-term, additional sustainable financial support will be required. Development of REDD projects in this landscape is one avenue that WCS is exploring to generate sustainable funding for indigenous organizations over the longer term.

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The Bala Gorge, Estrecho del Bala

Value of the GCP Program

GCP support, obtained a few short months after the inception of the Greater Madidi-Tambopata Landscape Conservation Program, represented the first major source of funds for the program and allowed and encouraged conservation at the landscape scale from the very beginning. This early landscape-scale focus has provided a fundamental undertone to all of the program's conservation interventions to date, has allowed a structured approach, and has encouraged an integrated and multi-disciplinary technical team to set clear goals and objectives.

Perhaps because of this, the program quickly became the major testing site for the ideas that WCS as an institution was developing through centralized GCP support, from participative threats analyses to the identification of a suite of Landscape Species to mapping Human and Biological Landscapes to conceptual modeling and the creation of monitoring frameworks. Throughout this process, the Greater Madidi-Tambopata Landscape has been at the forefront, helping WCS as an institution to hone and sharpen these critical tools for landscape-scale planning and conservation.

Early on, the Greater Madidi-Tambopata Landscape was also the beneficiary of Associate Awards through the GCP and from the Bolivian USAID Mission. These additional grants were absolutely fundamental to the ground-breaking work which WCS was beginning with indigenous people across the landscape, as they allowed program personnel to begin to assist the Takana people and their representative organization, CIPTA, through the land-titling process. The long-term vision of the GCP was fundamental; it provided enough time and financial security to embark on this major undertaking with the indigenous people of the region. Although WCS recognized from the beginning that this work would require a lengthy and involved process, it was clearly an absolute necessity for the long-term sustainability of conservation actions across the landscape. These achievements in land-titling would not have been as successful, nor likely possible to this extent within the 10-year time-frame, without the financial support provided to this endeavor through USAID and the GCP program.

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