

## The Condor Bioreserve: an Innovative Approach for Conservation on Montane Ecosystems

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The Tropical Andes region has an extraordinary biological diversity, with a considerable amount of local endemism. This region is characterized by being exceptionally rich in species with a high proportion of endemics. The complex topography, climate, geology and biogeographic history of the Andes have helped create a high turnover in species over distance and along steep environmental gradients (Dinerstein et al. 1995). The humid montane and premontane forests of the tropical Andes compete with the lowland Amazonian forests in species richness. Long-term maintenance of diversity in the Tropical Andes requires a management strategy that considers landscape patterns. Especially in heterogeneous regions like Andean forests the management of the landscape is more appropriate for biodiversity conservation, than the management of local sites.

A conservation strategy that takes in account the complex and dynamic nature of natural systems in tropical mountainous regions, needs to be taken in order to face the challenge of maintaining ecological processes that sustain biodiversity on this area. The Nature Conservancy (TNC) has developed the concept of working through functional landscapes. Functional landscapes constitutes an approach for biodiversity conservation that takes into account multiple scales within the ecosystem and the landscape: *Functional refers to the capacity of an area to maintain healthy, viable targets and to sustain key ecological processes within their natural ranges of variability over the long term*. *Functional landscapes typically provide more habitat, greater habitat diversity, and larger populations of known and unknown species.*

The concept of “functional landscapes” comes hand-in-hand with a great challenge: how does the concept apply and translate into real conservation action in the field? It is particularly challenging in tropical countries gifted with extraordinary biodiversity but also facing constantly growing threats to biological richness. In addition, many tropical countries have the weakness of not having enough biological information to support decisions on the best strategies for safeguarding biodiversity over the long term. TNC and three local partners, Fundación Antisana, EcoCiencia and Fundación Ecológica Rumicocha, have been working on building this concept for several years at an action site named “Condor Bioreserve”. This area can be considered a *functional landscape* – its conservation will also conserve a large number of ecological systems, ecological communities, and species at all scales from local to regional.

The Condor Bioreserve (CBR) implements the *functional landscape* concept with an innovative conservation approach that seeks to link six protected areas and its buffer zones under one management unit. This concept proposes to go beyond borders of protected areas, in order to capture biodiversity patterns. The areas under this unit share common environmental characteristics. They comprise the upper watershed of the Napo river, one of the main tributaries of the Amazon river. The six protected areas are: Cayambe-Coca Ecological Reserve, Antisana Ecological Reserve, Cofán-Bermejo Reserve, Sumaco-Napo Galeras National Park, Cotopaxi National Park, and Llanganates National Park. The land that links these protected areas constitutes natural corridors which maintain connectivity of umbrella species like large carnivores.

Located in the North-eastern Andes of Ecuador, the Condor Bioreserve covers more than 21,000 square kilometers, and is located between 400 and 5,810 m. of altitude. The Condor Bioreserve holds an extraordinary biodiversity. Its location and environmental characteristics like altitudinal variation, climate patterns, the influence from the Amazon basin have resulted

in an area with a very high concentration of biodiversity. Sixteen different vegetation types have been identified, ranging from paramo (high-montane grasslands), to cloud forests, to foothill forests. More than 760 bird species, 150 mammal species and 110 amphibian species have been recorded. The area is very important for several threatened species that require large extensions of intact habitat for their survival, including the Andean Bear (*Tremarctos ornatus*) and the Mountain or Woolly Tapir (*Tapirus pinchaque*). Covering only 7% of the surface of the country, the reserve nonetheless holds almost half the number of species of birds and mammals found in Ecuador.

The Condor Bioreserve is a fascinating place, not only in terms of its biodiversity, but also in terms of the diversity of people and cultures found within it. Communities range from the peasant communities living on the highlands, to two ancestral communities—Oyacachi and Sinangoé—whose territory is within one of the protected areas of the CBR, to the *colonos* living in the lower part of the Condor Bioreserve. In the land between the protected areas several towns, villages and small communities are found, with a population of about 120,000 people. In addition to the people living inside the Condor Bioreserve, about 20% of the population (2 million inhabitants) of the country depend on environmental services and natural resources from this area, which makes a remarkable area for the welfare of the people and the economic development of the country. Even though the Condor Bioreserve stills holds large tracts of natural habitat, it has important threats. The most important ones are habitat conversion to agriculture or pastures, infrastructure projects that are being built inside the protected areas (especially water extraction projects and roads), logging, hunting and fire.

The Condor Bioreserve has been chosen as a “Parks in Peril” site, a conservation program supported by USAID and The Nature Conservancy. Under this program TNC and its local partners in close collaboration with the Ministry of the Environment have defined a common goal for this area for the next 5 years: “To achieve a biodiversity conservation model based upon participatory strategies that promote the sustainable development of human population”. Within the Parks in Peril program, the constant questions of TNC and partners have been: How can we apply in the field the concept of functional landscapes? What are those key strategies that we need to implement in order to have conservation success? How can we have an impact on such a large area, with limited resources? Our answers have been framed around a methodology for strategic conservation planning— “Conservation Area Planning” —that analyses biodiversity at different scales from coarse to local. Through this conservation planning approach we have: identified conservation targets at several scales, analyzed the biological needs of the conservation targets, and analyzed conservation threats and the stakeholders of the area, with the purpose of identifying and designing priority strategies to maintain biodiversity health, reduce threats and increase conservation capacity.

We identified an array of conservation targets that represent biodiversity and threats of the area. The targets were chosen to represent different scales being careful to capture terrestrial as well as freshwater systems. Different scales of *biological organization* were captured by choosing *ecosystems*, such as the humid paramo as well as *species*, such as the Woolly Tapir. Also, different *spatial scales* were included capturing *wide-ranging* species as the Andean Bear as well as *locally* distributed species, such as endemic frogs that depend on montane rivers. We believe that this approach provides us a more ecologically integrated conservation strategy that conservers biodiversity at multiple scales within a single intact landscape.

One of our main questions on this process was: Does focusing on a large area mean that we are going to stop working locally? To propose working at a landscape level may bring the risk of focusing only on strategies designed to have a broader impact, like policy strategies

focused on issues like creation of new laws. And despite our recognition that these strategies are critical for the area, we also recognized that action is needed at a local level, especially in an area where the human context is complex but also presents many opportunities for implementing conservation action. So, we worked on the concept that capturing different scales of biodiversity must also be reflected in implementing strategies at different scales, from regional to local. Following this idea, in the Condor Bioreserve we have recognized the need to work on strategies of broad impact, such as supporting the National Biodiversity Law, as well as more local strategies such as work with local farmers.

At this point we felt that our planning dealt well with the first two of our questions, but the strategic planning approach still left us with one main question without answer. How can we have an impact on such a large area, with limited resources? We recognized that we needed to have actions broadly as well as locally. But we did not have the capacity to work locally throughout an area of more than 21,000 km<sup>2</sup>. Our analysis showed us that, as part of the planning process, we needed to identify those key areas where conservation impact must occur in order to maintain the functionality of the whole area. In this way we could prioritize where to focus our local action.

The key areas were identified based upon the conservation targets chosen for the area. The criteria used to identify key areas was based upon: core areas for conservation targets, capture environmental gradients by including different vegetation types, presence of large tracts of natural habitat, existing protected areas, and areas important for connectivity using landscape-species (e.g. Andean Bear) as indicators. In addition to these criteria, threats and institutional presence were chosen to select among two areas of similar importance. Different areas were delineated using a watershed approach. The Condor Bioreserve was divided in 29 watersheds, of which 11 were chosen as the key sites where the project is going to focus its impact. It is important to mention that the watersheds do not necessarily indicate places of action, but places of impact. For example, in order to have impact on certain areas, work with local governments outside the areas may be needed. As a result of the process of key areas identification, a regional approach gets implemented through local action.

What is our next challenge? The Nature Conservancy and its partners have learned much from the experience of several years of work in this area, which have been difficult and full of challenges, but also rewarding. We believe that we are making important advances in biodiversity conservation by proposing work through functional landscapes. But this approach needs to be tested, and the impact on biodiversity conservation needs to be measured. This is the step that closes the strategic conservation circle, and the step that has open for us a new process of deep thinking and analysis. But also in the face of new planning challenges, we repeat to ourselves to always be careful of not leaving all our conservation action for too much of conservation planning.