3. ECOSYSTEM-BASED SOLUTIONS AND OTHER APPROACHES TO COPE WITH CLIMATE CHANGE

TERRITORIAL MANAGEMENT, AS A MECHANISM FOR MITIGATION AND ADAPTATION TO CLIMATE CHANGE

Lilian Painter[1], Mariana Montoya[1] and Mariana Varese[1]
[1]Wildlife Conservation Society, Latin America and Caribbean Program

1. INTRODUCTION

Throughout the Amazon pollution, deforestation, unsustainable resource extraction and invasive species represent the most relevant direct threats to species, ecosystem functions and human well-being. These direct threats are a result of contributing factors including lack of knowledge to guide sustainable management, few economic alternatives, global demand for products and poor territorial governance that result in illegal resource extraction and poorly planned development.

Territorial management is a process that aims to reach a planned, sustainable and efficient land use. Territorial planning refers to the methods used by public institutions and social organizations to plan the proper and efficient distribution of people and use of resources in a specific geographical area or territory to improve their living conditions and strengthen mechanisms for sustainability. It requires an adaptive governance approach (Schultz *et al.* 2015), in which decision making processes involve multiple government and non-government stakeholders at multiple levels to negotiate, coordinate and agree on management actions across the landscape in order to deal with local and large-scale perturbations. It also contemplates environmental management, economic development, organizational consolidation, capacity building and cultural recovery. Therefore, it is an important strategy to reduce the above contributing factors.

Territorial management is implemented in different jurisdictions under strategic orientations provided by protected area management plans, subnational government development plans, indigenous life plans or integral management plans and can also be implemented within individual properties or areas under management of productive associations or natural resource management concessions. However, wherever it is implemented it is important that land use rights are clearly established so that consultation processes do not weaken the rights of legitimate stakeholders. Territorial management in specific jurisdictions will vary in their guiding principles, visions and legal basis but they all share two common elements: a zoning plan that establishes land uses according to the aptitudes of different areas and that should respond to the strategic management vision; and natural resource management regulations to support the implementation of the zoning plan by detailing permitted practices and access rights for different user groups.

It is possible to generalize the principal components of a territorial planning process. First the conditions for the planning process must be established through a body with legitimacy to convene and lead a transparent participatory construction. A diagnostic phase follows, incorporating both technical information as well as participatory mapping and analysis of different development scenarios, including those related to informal highly impacting human activities, impacts of development projects and climate change. Finally, the development of the spatial plan or zoning plan according to the different potential, constraints, opportunities and risks. Another important aspect to consider is the need to identify incompatibilities and potential synergies between the different scales and levels of indigenous, local, municipal, provincial, and even national territorial planning.

2. IMPORTANCE OF INTEGRATED TERRITORIAL MANAGEMENT FOR BIODIVERSITY AND ECOSYSTEM CONSERVATION

Protected areas usually are found over areas with a higher biodiversity than surrounding areas that are managed mainly for human subsistence and economic development. However, although protected areas are essential for biodiversity and ecosystem conservation they require connectivity with surrounding areas in order to be able to operate at a scale that is relevant for conserving biodiversity, cultural characteristics, ecosystems and their services. Operating at a larger landscape scale also allows the inclusion of jurisdictions that are challenged by the same socioeconomic threats, for example resulting from new transport infrastructure; and to take into account opportunities for reconciling development and conservation through tourism routes or forest management. Considerations of scales and multiple scales, and identifying for example, the appropriate basin scale to operate is critical to understand the context and to better address the threats to the territory (Barthem *et al*., 2014).

Because of this, it is important that land use plans are developed at different scales and across neighboring and overlapping jurisdictions in an integrated territorial plan that responds both to local development visions as well as to environmental services and species spatial requirements. Protected area management plans must therefore look at the regional development context and look to promote the reconciliation of the strategic objectives of neighbouring jurisdictions and with those of the protected area.

Many ecosystem services that are critical for human health and development also require integrated land use planning across jurisdictions for example, watershed conservation, large biomass reservoirs, areas of distribution of wild crop relatives and areas that are critical for erosion control or prevention. All of the above ecosystem services represent natural solutions to climate change (Dudley *et al*., 2009). Altitudinal and latitudinal corridors are also important to allow population movements of species during climate change and also allow humans to relocate their productive activities. Landscape species are characterized by their dependence on large, diverse areas and significant impact on natural ecosystems (Sanderson *et al*., 2012). Their habitat requirements make them particularly vulnerable to land use practices that result in habitat fragmentation or degradation and because of this they can be used to identify connectivity needs around protected areas.

Important conservation areas for ecosystems or species can overlap with ancestral indigenous territories and community owned lands both within and outside protected areas. In these cases any land use plan must be built using participatory processes and be led by the indigenous people, as established by national legislation in most Latin American countries and the United Nations Declaration on the Rights of Indigenous People. In these areas local livelihoods must be supported to deal with the pressing need to reduce poverty, conserve biodiversity, maintain ecosystem services and increase resilience to current and future climatic conditions.

3. IMPORTANCE OF INTEGRAL TERRITORIAL MANAGEMENT AS A MECHANISM FOR CLIMATE CHANGE MITIGATION AND ADAPTATION

Mitigation

In Bolivia, the Wildlife Conservation Society has been working with the Tacana People´s Indigenous Council (CIPTA) for 15 years. During this time we have provided technical assistance to support their efforts to obtain legal recognition of their indigenous territorial rights over 389,340 hectares and, in parallel to the process of land titling, developing a participatory strategic and land use plan, as well as technical, administrative and organizational tools required for territorial management (CIPTA, 2007).

The zoning plan is implemented through productive projects distributed across the indigenous land that represent an alternative to illegal encroachment associated with deforestation and increased frequency of fires for slash and burn, and therefore a mitigation strategy to climate change. Maintaining presence across the indigenous land consolidates indigenous territorial control and allows protection of critical areas for environmental services.

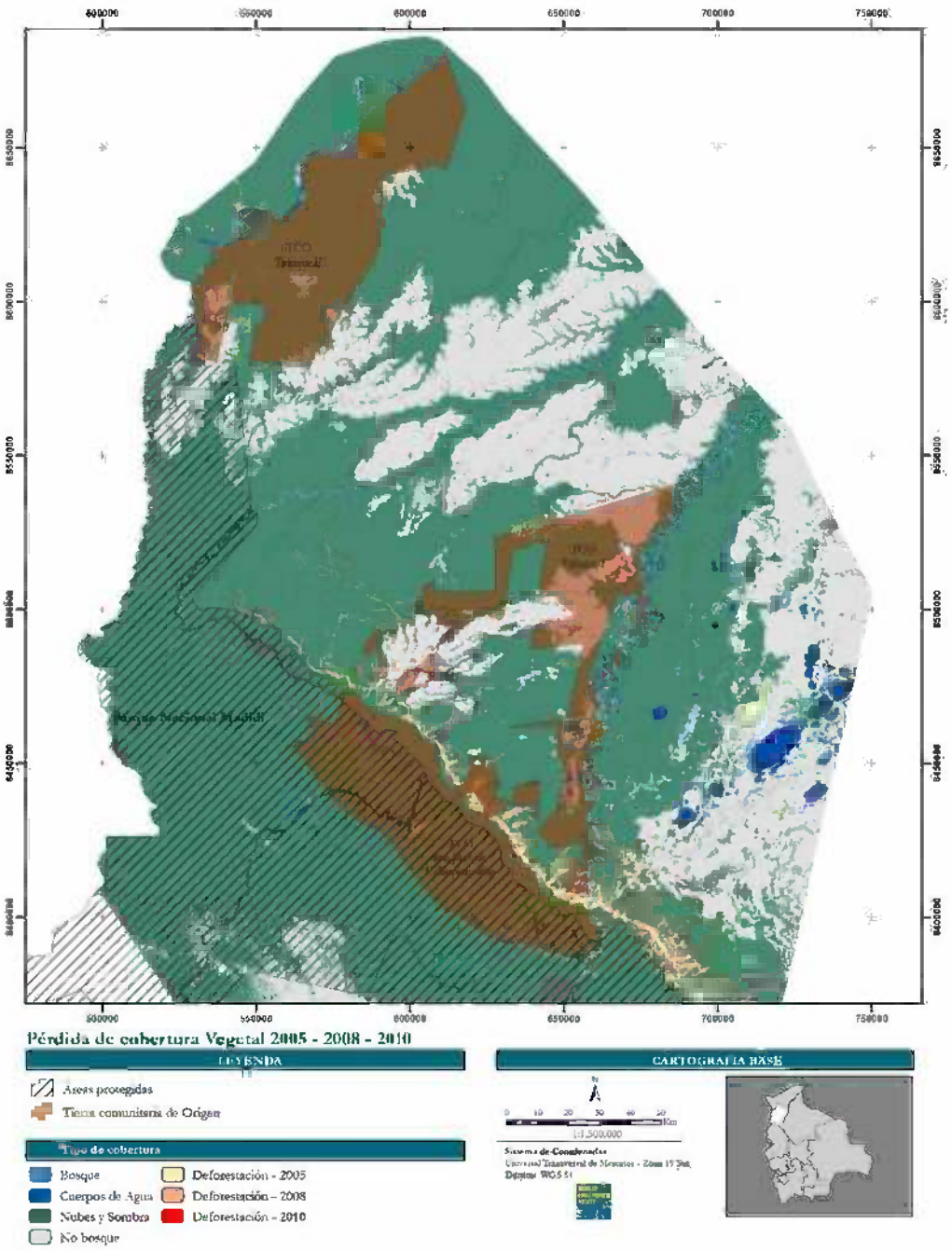

Figure 1: Forest Loss between 2005-2010 in the region of the Tacana indigenous land.

Natural resource use projects have been implemented over 81,494 hectares of forests and another 129,600 hectares of wetlands are being managed for sustainable caiman management and harvest. These projects are implemented under the general framework of a participatory indigenous management plan and are backed up by community regulations for access and use of natural resources. This is an important aspect to highlight, as agreements around land use are necessary to prevent agricultural activities being displaced to other areas. The effectiveness of this approach is documented by deforestation monitoring using remote sensing and geographic information systems.

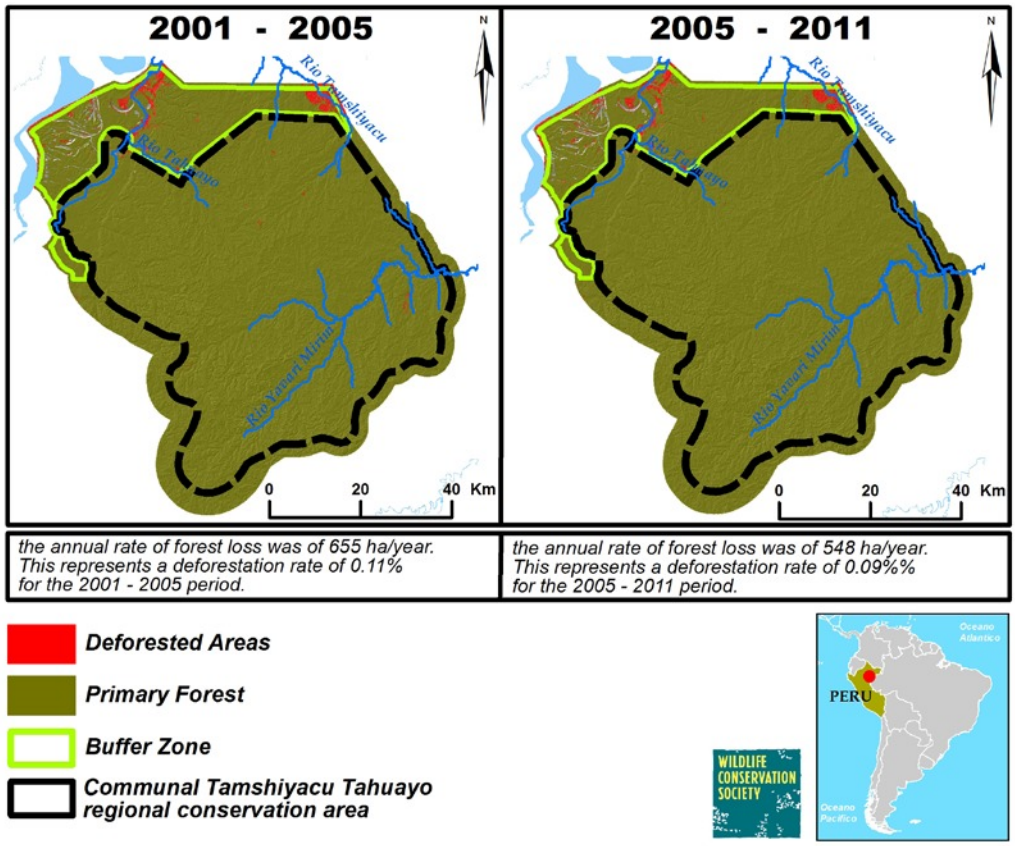

Figure 2: Forest Loss between 2005-2010 in the region of the Tacana indigenous land.

GIS and spatial statistical analysis were used to analyse the correlation between geographical conditions and loss of forest cover during a historical period (2005-2010) (Figure 1). Determinant factors were included in the analyses: land ownership, land management and improvement of road infrastructure, allowing the comparison of deforestation between the indigenous land and the surrounding areas. The annual deforestation rate along the San Buenaventura-Ixiamas road within the Tacana indigenous land, where territorial management is implemented, is 0.5% or less than a quarter of the 2.3% annual deforestation rate outside the indigenous land. In fact, during this period only 1,173 hectares of forest were lost within the indigenous land between 2005 and 2010, and only in areas zoned for agricultural use by the communities (Painter *et al*., 2013).

Similarly, the Wildlife Conservation Society in Peru has been supporting local riverine communities from the Tahuayo river in Loreto to gain legal protection to the area where they lived and on which they depend for their livelihoods. After approximately 15 years of support, this effort has led to the designation of the Communal Tamshiyacu Tahuayo regional conservation area, an area of 420,080 hectares that was created in 2009 to guarantee the sustainable use of natural resources by local surrounding communities and to promote local development (PROCREL, 2010). Zoning of the conservation area established areas that can be used for subsistence and areas that follow a source - sink hunting model, where the conservation area is the source of wildlife and the communities are the sink where wildlife can be hunted. Approximately 4150 people surround the conservation area and benefit from it, and 20% of this population has hunting agreements following the source – sink hunting model.

WCS has been supporting community land titling processes, strengthening community based control and surveillance systems and monitoring of cynegetic wildlife populations that are hunted for subsistence. Today, riverine communities living adjacent to the reserve, in particular in the Tahuayo basin, have the right to be involved in the management of

the area and to benefit from resources provided by its well-conserved forests. This process has allowed riverine local communities of the Tahuayo river to be actively engaged in a diverse set of activities such as sustainable natural resource management, artisanal crafts for the national and international markets, tourism and sustainable fish harvest, that provide an incentive to maintain the forest that harbors the resources under management.

A temporal deforestation analysis was done by WCS for the Communal Tamshiyacu Tahuayo regional conservation area and its buffer zone, and the results showed minimum forest loss. For the analysis period from year 2001 to 2005, the annual rate of forest loss was of 655ha/year (0.11%) and for the period 2005 to 2011 it was 548 ha/year (0.09%) (Figure 2). It is important to mention that forest loss is mainly concentrated outside the conservation area in the Tamshiyacu basin and not in the Tahuayo basin (Mercado, 2012) where the conservation area is almost intact. One of the main reasons of forest loss is small scale agriculture.

Adaptation

Territorial management builds resilience to current environmental risks and future scenarios resulting from climate change by reducing exposure and reducing the sensitivity of the system through better land use planning. Zoning or land use planning identifies areas that maintain critical ecosystem services that the indigenous and riverine communities rely upon and also areas that are exposed to floods, droughts or fires. It also builds consensus on the use of different areas for agriculture, tourism, hunting, logging, fishing, cattle ranching as well as sacred areas. The implementation of productive projects in the different management zones maintains diverse livelihoods that have reduced sensitivity to environmental shocks. In the case of northwestern Bolivia, cacao, forestry, incense, handicrafts, livestock management, wild honey harvesting, timber management, and other productive activities help to provide an average annual household income of close to US$1,200, or double that of the average rural household in Bolivia (INE, 2011). Supporting access by indigenous people to their ancestral lands and resources is also important for subsistence activities, such as agricultural production and hunting and fishing for household consumption or reciprocal exchange. In the case of Peru, access by riverine communities to their communal land and to the conservation area is also critical for subsistence activities. Sustainable management of subsistence hunting requires indigenous people and *ribereños* to have access to large hunting areas that are preferably linked to protected areas through wildlife corridors. Indigenous territories are also crucial to maintain the vast cultural knowledge of medicinal plants and crops that are essential to maintain current indigenous livelihoods and also maintain resilience in the face of climate change.

In addition, in both cases in Bolivia and Peru, the implementation of community natural resource management projects throughout the indigenous land and riverine communities permits the indigenous people and *ribereños* to maintain a greater control over their land, reducing and replacing illegal and unsustainable natural resource activities with regulated and sustainable activities carried out by indigenous people in their ancestral land and by *ribereños* in their communal lands. In the case of Peru, governmental authorities may support the *ribereños* to enforce control over the area, and the *ribereños* are willing to collaborate with the authorities.

Hence, indigenous territorial management represents a no-regrets strategy for the reduction of climate change vulnerabilities of indigenous populations through the generation of economic returns, diversification of local livelihoods, conservation of forest cover and related averted emissions. It therefore addresses both current poverty alleviation needs and long-term adaptation to climate change.

In addition, territorial management of riverine communities and the adjacent conservation area influence the adaptive capacity of local populations by ensuring the provision of natural resources, maintaining the forest and by strengthening local institutions. Through this influence territorial management can enhance the resilience of the ecosystems and social systems in the face of climate change (Johnson & Becker, 2015). Territorial management can also strengthen the resilience of entire socio-ecological systems to threats operating at multiple scales (Schultz *et al.*, 2015).

4. CONCLUSIONS

Territorial management is a critical process to advance in the control of drivers of forest deforestation and degradation, to increase resilience of local livelihoods to climate change and to increase the resilience of the landscape or social-ecological system. Any effort to reduce the loss and degradation of forests, as well as other ecosystems, must identify the reasons behind this loss. Deforestation is the result of complex socioeconomic processes that interact between each other and whose relative importance varies geographically. The interaction between all socioeconomic processes establishes population growth and the expansion of the agricultural frontier that is associated to the existence of markets or subsistence activities. National policies, including transport infrastructure, fiscal and non fiscal incentives or disincentives to different productive sectors, policies related to land and natural resource access and property rights, energy and industrial development policies determine the context for development and population increase.

The effectiveness of these policies to promote the welfare of its citizens depends on the development of an institutional framework that allows coordination between sectors, accountability, transparent decision-making and citizen participation mechanisms. Traditional development models have tended to justify biodiversity losses and the impact on vulnerable human populations for the economic benefits to the whole society or interest groups. The basis for agreements between stakeholders on forest management is participatory land use planning or land management.

Additionally, territorial management is the basis for planning the protection of ecosystem integrity and therefore reduces the risks and impacts of environmental threats such as floods, fires and droughts. Natural vegetation allows floodwaters to disperse and stabilize soils, reducing the incidence of landslides. Forests conserve watersheds and reduce the spread of fires. The conservation of indigenous farming practices maintains diversity of seed varieties and crops that are key to maintaining options to adapt to droughts and floods. Furthermore, natural vegetation of the flooded forest, the integrity of wetlands and their dynamics with water bodies, maintain ecological process that will sustain fish production that is critical to ensure animal protein during and after climate-related extreme events. A well conserved flooded forest, combined with sustainable fisheries management can maintain fish spawning areas and stocks after a climate disturbance, contributing to the persistence of a regional-scale fish population.

In order to further inform these processes it is important to develop our understanding on the cost-benefit of different economic alternatives and scenarios, both of different economic activities as well as different infrastructure uses. We also need to understand the landscape connectivity needs for both ecosystems and biodiversity, such as altitudinal and latitudinal corridors and wildlife corridors, and preferably at multiples scales and/or basin scales. Finally, financial mechanisms to support territorial management must be established by documenting the multiple benefits to equitable development and conservation.

5. REFERENCES

Barthem, R., Calle, I., Cañas, C., Castillo, O., Forsberg, B., Goulding, M., Heck, C., Montoya, M., Mora, C., Venticinque, E. (2014) *Inambari: Towards an integrated approach to river basin management*. Edited by Anderson, E.. Wildlife Conservation Society.

CIPTA. (2007) *Pueblo Indígena Tacana, Consolidación y Gestión territorial*. La Paz, Bolivia.

Dudley, N., S. Stolton, A. Belokurov, L. Krueger, N. Lopoukhine, K. MacKinnon, T. Sandwith and N. Sekhran [editors] (2009) *Natural Solutions: Protected areas helping people cope with climate change*. IUCN-WCPA, The Nature Conservancy, UNDP, Wildlife Conservation Society, The World Bank and WWF, Gland, Switzerland, Washington DC & New York.

Johnson, B. B., & Becker, M. L. (2015) *Social–Ecological Resilience and Adaptive Capacity in a Transboundary Ecosystem*. Society & Natural Resources, *28*(7), 766-780. doi:10.1080/08941920.2015.1037035

Mercado, A. (2012) *La deforestación histórica en el paisaje Yavarí - Samiria: Resultados preliminares*. Wildlife Conservation Society, Lima, Perú.

Sanderson, E., D. Wilkie, A. Vedder. (2001) *The landscape species approach – a tool for site-based conservation*. Bulletin 2. LIVING LANDSCAPES PROGRAM. Wildlife Conservation Society.

Painter, L., T.M., Siles, A. Reinaga & R. Wallace. (2013) *Escenarios de deforestación en el Gran Paisaje Madidi-Tambopata*. Consejo Indígena del Pueblo Tacana y Wildlife Conservation Society. La Paz, Bolivia.

PROCREL-Programa de Conservación, Gestión y Uso Sostenible de la Diversidad Biológica de Loreto. (2010) *Plan Maestro del área de conservación regional comunal Tamshiyacu Tahuayo: 2010-2015*. Gobierno Regional de Loreto. Loreto, Perú.

Schultz, L., Folke, C., Österblom, H., & Olsson, P. (2015) *Adaptive governance, ecosystem management, and natural capital*. Proceedings of the National Academy of Sciences, 112(24), 7369-7374. doi:10.1073/pnas.1406493112