

varying combinations, have been supporting community efforts and conducting research in a subregion of the Sierra Norte known as the Chinantla for many years. The Chinantla region is home to the Chinantec indigenous peoples. The Chinantecs have resided here for at least a thousand years and have historically been isolated and marginalized. Our present work is with six Chinantec communities that have a total population of 2,039 inhabitants. The communities together occupy an area of 33,921 ha, with some of the largest intact tracts of montane tropical forest and cloud forest anywhere in Mesoamerica. These forests were first described by Mexico's most distinguished botanist, the Polish-born Jerzy Rzedoski, and are well known for their unique floristic associations and endemic species.

The community of Santa Cruz Tepetotutla, the only one of the six communities which is accessible by road, has emerged as the leader of a six-community organization, the Natural Resource Committee of the Upper Chinantla (CORENCHI). The micro-political history of Santa Cruz is of particular note. This community has spent most of its many centuries in existence far from the nearest road, achieving direct communication with the outside world only in 2003. Since the 1980s, there have been intense micro-political struggles amongst different factions in the community over land-use policy connected to varying economic interests. More recently, this has led to the emergence of new conservation-oriented institutions and rules.

In the 1990s a coalition of community reformers rose to dominance in the community. This group had been inspired by its association

with ecologists who had conducted vegetation surveys in the region, and by other factors, and began to push for very conservation-oriented community land-use policies. As a result of this process, new regional management institutions are beginning to emerge, and a remarkable portfolio of sustainable land use practices and projects has been assembled. In recent years, some community members have made the transition to growing organic coffee and have banned hunting except for pest animals that attack their corn fields. Four of the communities have been certified by the government as placing over 20,000 ha of their lands in community protected areas, with additional areas in the other two communities in the process of certification. They also successfully competed for a Mexican government program for payment for hydrological services for the period 2004-2008 that covers 7,860 hectares. The National Forestry Commission (CONAFOR) also recently approved a 5-year renewal of the hydrological services program for nearly 1.5 million dollars for the six communities of CORENCHI. In addition, CORENCHI is also in discussions over hydrological service payments with Mexico's largest brewery, which depends on water generated by this watershed; the brewery is also currently co-financing the construction of a research and ecotourism center in Santa Cruz.

CORENCHI has received significant support over the years from several non-governmental organizations, the Oaxaca-based NGO, Geoconservación, currently being the most important. Among other alliances, Geoconservación has recently joined with the Interdisciplinary Research Center for Integral Regional Development (CIIDIR-Oaxaca), Florida Inter-

national University (FIU), and the Global Diversity Foundation, to conduct research, build capacity, and carry out training projects in support of CORENCHI's efforts to sustainably and profitably manage the lands they have protected.

With funds from the U.S. Fish and Wildlife Service granted to Geoconservación, the CIIDIR-FIU program is currently working with students documenting the history of how Santa Cruz came to adopt remarkably conservation-oriented land use policies, analyzing community attitudes towards wildlife, carrying out camera-trapping surveys of wildlife, particularly jaguars and their prey, and studying potential habitat for jaguars. It is also beginning studies of interactions between emigration, land use, land-use and land-cover change, vegetation mosaics and landscape ecology.

The Global Diversity Foundation (GDF), a UK-based charitable organization, has received funding through the British Embassy in Mexico to build local capacity to manage the CORENCHI community conserved areas. Under the program, which is part of the UK government's Sustainable Development Dialogues, British and Mexican specialists will offer training for community members on the sustainability of non-timber forest product extraction, scientific tourism, participatory video, and legal frameworks for community conservation. The effort will foster collaboration between local people and outside researchers at the community biological station and refuges that are being established. One result of the project will be participatory biodiversity registers that will assist communities to defend their traditional resource rights and to identify plant resources of potential

economic value. Selected community members will be able to broaden their experience by participating in cross-visits with other communities in Oaxaca that are also working on community-based conservation and scientific tourism.

We will be exploring the issue of establishing a carbon sequestration project in voluntary markets in this region. Under the Kyoto Protocol, the forests of the Chinantla, although of great value for a variety of ecosystem services, do not qualify for carbon credits because they are both intact and unthreatened due to community protection. Under current Kyoto rules, carbon credits can only be given for "additionality", i.e., new forest plantings, or, possibly in the future, for "avoided deforestation" projects that reduce the risk of deforestation.

The forests of CORENCHI, the larger Chinantla region, and others like them throughout Mexico and elsewhere present a challenge for the world community.

Here we have intact forests with high biodiversity value, which are owned and actively protected by poor indigenous peoples. Yet these people are being told that the forests have no value in terms of carbon maintained in standing stock, because of the requirement of additionality and avoided deforestation. This is a situation of carbon storage and biodiversity protection being provided free of charge by poor rural people, and raises issues of environmental justice in the context of carbon markets. This case underscores the need for more creative thinking about mechanisms to collectively address global warming, forest and biodiversity conservation, poverty alleviation, and environmental justice. One possible response is that of receiving payment for 'environmental services' for the protection of the region's unique biodiversity or payments for 'pure preservation' now being developed by the Chicago Climate Exchange. The communities of the Chinantla of Oaxaca, through their own efforts and the efforts of outside supporters, have placed themselves in a

leadership role in forging solutions to these and other dilemmas of the emerging planetary crisis.

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Parks and Poverty: The Political Ecology of Conservation

William M. Adams and Jon Hutton

In 2004, the government of Ethiopia moved 500 people out of the Nech Sar National Park in the south of the country, before handing it over to be managed by the Dutch NGO,

African Parks. The following year, African Parks signed another contract to manage the Omo National Park. The issue of evictions in these parks quickly became the subject of intense lobbying by international

human rights NGOs. Such problems have been reported from many countries as the area protected has risen, doubling in the 1970s, 1980s and 1990s. By 2005, over 100,000 protected areas (PAs) covered more

than 2 million sq. km., or 12 per cent of the Earth's land surface. Systems of protected areas existed in every country, wealthy and poor alike. The place of people in protected areas has been much discussed by academic researchers and human rights activists. For whom are parks set aside? On whose authority? At whose cost?

Debate about people and parks is typical of much wider questions about the social impacts of conservation on human welfare, including the compatibility of conservation and poverty alleviation and the feasibility of 'win-win' policy strategies. Action to conserve biodiversity, particularly in the creation of protected areas, is inherently political. Yet most writing about conservation draws, to only a limited extent, on an explicit understanding of the political and economic dimensions of conservation policy. There are various reasons for this. One is the profound and long-standing disciplinary gulf that exists between predominantly natural science-trained conservation planners and predominantly social science-trained critics of conservation. The field of political ecology offers productive possibilities for developing that engagement. Political ecology is a diverse and trans-disciplinary field. It first emerged in the 1970s, and developed through the 1980s, particularly in work by Piers Blaikie on the problem of soil erosion.

Political ecology views the environment as fundamentally social and political. The use, overuse, degradation, conservation and restoration of the environment are inherently social and political processes. Political ecology considers the interactions between ecology and the politics and impacts of social action affecting the

environment. It takes from ecology a concern with environmental dynamics and change, and from political economy a concern with the control of resources and labour. Moreover, in recent formulations (notably the work on 'liberation ecology' by Richard Peet and Michael Watts) it takes from social theory an interest in the way nature is understood and represented. It recognises the power of science and policy discourse to channel the way people combine to control the environment, and each other. Therefore not only does the actual state of nature need to be understood as the outcome of political processes, but the ways in which ideas about nature are formed, shared and applied are also inherently political, even those ideas that result from formal scientific experimentation.

The political ecology of conservation is now recognised as important in a variety of ways. A key issue is the social impacts of protected areas, particularly on people displaced (either through physical removal or denial of access), and the impacts of the ways such displacements are organised, particularly the issue of involuntary displacement and coercion. A related set of problems concerns the social impacts of conservation regulations (e.g., controls on hunting, fishing or forest use). Third, there are important political questions about the way the economic benefits of conservation activities (e.g., the revenues from tourism) are shared between people. This leads on to a fourth set of issues concerning the links between poverty and conservation, the debates about possibility of 'win-win' strategies that both conserve nature and reduce poverty. Behind all of these lies the issue of the power of ideas about nature to dictate the way conservation is thought about and practiced (for

example, in the concept of wilderness as a way of describing areas of forest or savanna with low human population densities).

Conservation has become a powerful political force, at least in the rural districts of poor developing countries. Large international NGOs have undertaken sophisticated exercises in conservation planning (such as Conservation International's 'hotspots'). Through such science and the funds they raise from supporters in developed countries, conservation organisations can wield considerable influence with governments and donor organizations. They can both initiate and drive forward conservation programmes on the ground with profound social and economic significance for rural people.

An understanding of the politics of conservation is vital if policy is to be effective and any potential harm is to be minimised. To achieve this, better dialogue is needed between conservationists (who are mostly trained in natural science) and critics of conservation, many of whom are social scientists. The emphasis of political ecology on the links between political economy and the actual state of the environment offers some potential to improve their conversation.

There is no doubt that politics matters for conservation. In December 2007, African Parks (now called the African Parks Network) withdrew from Nech Sar and Omo National Parks in Ethiopia, citing the unresolved issue of resettlement. The rights and needs of the many people resident in these parks could not be wished away. Such issues are fundamental to conservation planning. The political ecology of conservation offers a way of considering the conceptual

and material place for human society within, and not outside, nature.

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Satellite-tracked Migrations by Galápagos Green Turtles and the Need for Multinational Conservation Efforts

Jeffrey A. Seminoff and Patricia Zárata

Over the last two decades there has been a dramatic increase in the application of satellite telemetry to track the movements of threatened and endangered species. Among the taxa that have benefited the most from these efforts are sea turtles. Every few years, adults of most sea turtle species undertake long-distance migrations between nesting sites and foraging areas; satellite telemetry is an ideal tool for determining where these areas are, and the migratory routes followed by adult turtles as they move between them. More importantly, for conservation purposes, this tool provides a better understanding of the amount of time turtles spend in international waters and economic exclusive zones (EEZs) of various nations, and thus can highlight the

potential susceptibility of sea turtles to human impacts (i.e., fisheries bycatch and hunting) that occur in these areas. This understanding is critical for improving conservation measures and maintaining healthy sea turtle populations.

In a recent study by Seminoff et al. (2008), the movements of 12 green turtles (*Chelonia mydas*) were tracked by satellite telemetry after nesting in the Galápagos Islands. Turtles were tracked for up to 100 days (mean = 64 days) and moved between 75 and 1540 km away from their nesting sites. Three distinct post-nesting migratory strategies were observed, including residency within the Galápagos, migrations to Central America, and movements into oceanic waters southwest of the Galápagos (Fig. 1).

Green turtles occupied international waters as well as EEZ of Colombia, Panama, Costa Rica, Ecuador and Nicaragua. In two cases, green turtles apparently reached coastal foraging area destinations (in Nicaragua and Panama).

As the first-ever satellite telemetry research on Galápagos green turtles, novel insights gained about this insular nesting stock will be useful for the justification and implementation of conservation measures throughout the region. For example, with 10 of the 12 tracked turtles departing the Galápagos after nesting, the results of this study indicate that threats to the Galápagos nesting population, such as bycatch in high-seas fisheries gear, may be much more substantial in overall impact to the population