Cornell leads series on poverty traps and conservation

Cornell University

In rural areas of Africa, Asia and Latin America, poor farmers supplement their livelihoods by hunting and cutting wood, but such practices seriously threaten biodiversity in the developing world.

Now, Cornell researchers are leading the way to explore solutions that not only protect biodiversity but also improve the lives of the poor.

Chris Barrett, the Stephen B. and Janice G. Ashley Professor of Applied Economics and Management and professor of economics, and Alexander Travis, associate professor of reproductive biology and wildlife conservation at the College of Veterinary Medicine, have co-edited a 10-paper special feature in the Aug. 23 issue of the Proceedings of the National Academy of Sciences (PNAS) on biodiversity conservation and poverty traps. Several contributions involve Cornell alumni and faculty who attended a 2010 Cornell-hosted international workshop on the topic.

"The goals of the workshop were both to understand the linkages between biodiversity and poverty, and then evaluate new methods being used to tackle these connected problems," said Travis, who co-organized the event with Barrett.

There is a "large conceptual literature out there" offering theories and hypotheses that haven't been substantiated by interdisciplinary, empirical research, said Barrett. "Work that authentically integrates biodiversity conservation and poverty is extremely rare," he added. For example, few claims of new initiatives generating "win-win" outcomes are carefully evaluated in terms of both their social and environmental results.

G. Wittemyer

Droughts, like this one in Kenya, affect both people and wildlife, leading some rural farmers to hunt unsustainably to supplement their livelihoods and creating competition for limited natural resources.

Reducing the need for bushmeat

The link between wealth and eating bushmeat offers a good example of a complex issue that lacks data to support theories. While some researchers believe that economic development will reduce reliance on wild meat, others suggest increased wealth will accelerate hunting.

To better understand these relationships, Justin Brashares, a wildlife ecologist at the University of California-Berkeley, led a team that surveyed 2,000 households from 96 settlements in Ghana, Cameroon, Tanzania and Madagascar on how wealth, relative food prices, market access and costs of time spent hunting affect wildlife consumption per household.

"No other study assembles this volume of household level data on hunting and bushmeat consumption in rural and urban areas," said Barrett, a co-author of the paper appearing in the PNAS series.

The researchers found that near urban areas, wealthier households consume more bushmeat, while in rural settings the poorest households consume the most bushmeat. The reason, they suggest, is because meat is cheapest when purchased close to where it is caught, and poorer rural people have more time available to hunt.

However, they also found that when fields need tilling, planting or harvesting, hunting and household bushmeat consumption decline sharply. If the rural poor had more employment opportunities, Barrett said, poaching wouldn't be worth their time. "There are these long periods where people are underemployed," he said, "and then they take to the forests to hunt wildlife."

Improving agriculture to more than one rainfed harvest per year and developing a more robust non-farm economy could improve the situation, Barrett added.

Teaching better farming in exchange for guns and snares

Alex Travis

Thompson Tembo, center, a transformed poacher, now utilizes his knowledge of animal movements as a wildlife scout and guide in Zambia.

Another paper in the series -- by Dale Lewis, the Wildlife Conservation Society's director for Zambia, Travis, nine Cornell co-authors and others -- assesses the effectiveness of Community Markets for Conservation (COMACO), a new business-based approach that addresses wildlife conservation in Zambia by focusing on poverty and hunger.

COMACO staffers teach rural villagers sustainable agriculture methods that improve crop yields while reducing deforestation. COMACO also helps them earn more by adding value to crops, such as selling peanut butter instead of peanuts. Importantly, COMACO provides access to national and international commodity and retail markets. COMACO links membership in the cooperative business with wildlife conservation by having new participants turn in their guns and snares and by continued monitoring of the sustainable practices.

The organization was pioneered in 2003 in just two locations in the Luangwa Valley where Zambia has several of its largest national parks. Now COMACO programs ring the area's national parks, providing a buffer of reduced poaching and snare use. As a result, aerial surveys show that most of the wildlife populations have stabilized or are increasing, after steady declines in the 1980s and 1990s.

In addition to environmental benefits, the study showed that COMACO farmers, particularly women, had higher crop yields than their non-COMACO peers. In response, many non-COMACO farmers are now adopting sustainable farming

methods, learning from their COMACO-trained neighbors. Soil quality has improved, with higher soil carbon on sustainable farms than on conventional farms.

As a business, COMACO is diversifying its products and markets. An important example is production of high-energy protein supplements sold to Catholic Relief Services and the World Food Program for feeding orphans, HIV patients and refugees.

These efforts have allowed COMACO to move consistently toward an economic break-even point. "They are trying to do something that very few wildlife and social interventions have ever dreamed of, which is to become self-sufficient," said Travis.

Thailand Hornbill Project, Faculty of Science, Mahidol University, Thailand

The rhinoceros hornbill plays a vital role by dispersing seeds of fruit-bearing trees in the mountain forests of southern Thailand.

Providing insurance to protect hornbills and Thai people

An innovative insurance scheme that benefits wildlife and rural people provides another example of a "win-win" conservation strategy.

In another paper, lead author Sommarat Chantarat, Ph.D. '09, a research fellow at the Australian National University, Barrett and others examine how cyclones affect hornbills, an endangered and threatened keystone seed-dispersing species, and local human populations in the mountain forests of southern Thailand. High winds

destroy tree and field crops, diminishing already-poor residents' incomes, while knocking down nesting trees for hornbills, significantly reducing the birds' reproduction rates.

Chantarat and colleagues propose an insurance program that uses wind speed data to predict hornbill nest tree losses so that insurance companies do not have to directly assess wind damage prior to making payouts. This innovation makes insurance viable in this area for the first time.

Each year, the Thailand Hornbill Project (THP) would ask donors to pay the premium on an insurance contract on the number of trees that are essential to insure against collapse of hornbill reproduction. In the event of high wind speeds, THP could rapidly acquire insurance payments to replace destroyed nests with artificial ones, such that hornbills might still rear offspring during their three- to four-month breeding window. THP would hire local people to install and monitor the artificial nests, which would buffer the rural villagers' incomes against storm damages and provide an alternative to illegal logging and poaching, activities that spike after cyclones and further reduce hornbill habitat.

Encouraging new research

Barrett, Travis and Partha Dasgupta, a 2010 A.D. White Professor-at-Large at Cornell, provide an introductory paper that identifies four distinct patterns linking poverty and biodiversity. Some of these theoretical connections include "shared vulnerabilities" where large-scale processes like cyclones in Thailand can affect both people and ecosystems; or how "failure of social institutions," such as inadequate socio-political and economic support, can shape how people treat ecosystems, as discussed in the papers on COMACO and bushmeat; or heavy "dependence on inherently limited natural resources," such as wild game for bushmeat.

"These studies represent the current research frontier. Yet this is very much underexplored territory and not the final word," Barrett said. "Rather, these papers open up the discussion and encourage new empirical, interdisciplinary research."

The initial 2010 workshop, upon which the PNAS series is based, was sponsored by the David R. Atkinson Center for a Sustainable Future, the Cornell Center for Wildlife Conservation, the Baker Institute for Animal Health, and the Institute for the Advancement of Economics, all at Cornell.

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