Hidden hunger from wildlife loss

November 21 2011

The red-tinted hair and bloated abdomens of these three young girls in Madagascar are typical signs of kwashiorkor, a type of malnutrition that occurs when there is not enough protein in the diet. Credit: Photo by Christopher Golden

How do you balance the need for biodiversity conservation and human health? For Christopher Golden, '05, a Post-Doctoral Fellow in Harvard University Center for the Environment, that question is at the core of a paper he authored which found that, in societies where people rely on "bushmeat" for important micro-nutrients, lost access to wildlife, arising either from strict conservation enforcement or unsustainable harvesting, could translate into negative impacts on the health of children.

Published this week in the Proceedings of the National Academy of Sciences, Golden's paper reports on a year-long study, conducted in the

northeast corner of Madagascar, that found lost access to bushmeat would lead directly to a 30 percent relative increase in malnutrition among children 12 years old and younger.

"This research highlights a tension between conservation policy and human health and livelihoods, but solutions could be designed to benefit both," Golden said. "I wanted to study this question through the lens of ecosystem services. If the wildlife is the natural capital, and the surplus is the harvested meat, what benefit do we receive from being able to rely on this source of food?

"This is an area that is extremely poor," Golden added. "Madagascar is often ranked among the top ten poorest nations in the world, and this region is among the most impoverished in Madagascar. People there eat beef maybe one to four times a year, and chicken maybe once a month. So the wild foods they're receiving are enormously important, because the meat is providing the nutrients they aren't getting elsewhere."

Though his paper points toward the potential negative consequences of strict conservation action, Golden emphasized that it isn't a call to halt all conservation efforts.

A man prepares an aye-aye, a rare type of lemur found only on the island of Madagascar, for dinner as his younger brother walks by. These primates are a

source of food for local inhabitants, despite being critically endangered. Credit: Photo by Christopher Golden

"I'm just looking at one possible way in which biodiversity impacts human health," he explained. "There are a host of other ways in which maintaining intact ecosystems benefit human health that this paper does not explore. In my heart, I believe that conservation is a powerful and positive process that, were it not in place, it's very likely that these animals would be unsustainably harvested. Ultimately, in this region, we're dealing with the confluences of cultural preference, policy restrictions and food necessity – it's a very difficult area to traverse."

Though the word malnutrition conjures up images of starving children, the most prevalent form of malnutrition in the world is actually anemia, Golden said. Globally, nearly 2 billion people suffer from iron deficiency, a form of anemia that causes drops in hemoglobin, the protein that helps ferry oxygen throughout the body.

Even small drops in hemoglobin levels, Golden said, have been linked to problems in cognitive development, increases in maternal mortality and mental retardation.

To examine whether and how the consumption of bushmeat affects hemoglobin levels, Golden designed a study that closely monitored the diets of children in one area of Madagascar. Over a year, researchers took monthly blood samples from children age 12 or younger to measure hemoglobin levels. Over the same period of time, the children's diets were precisely measured and recorded.

"Every scrap of fish, every bit of meat, it was weighed before it went into the cooking pot," Golden said. "The goal was to create a study that

would examine the causal links between biodiversity change and human health. Because of the longitudinal study design, we were able to disentangle the true effect of bushmeat on hemoglobin levels."

Armed with those results, Golden and colleagues were then able to model the health effects of cutting off access to bushmeat. The results, he said, were a 12 percent absolute increase in anemia, and a 30 percent relative increase.

The findings suggest that the goal shouldn't be to allow unrestricted hunting or strictly controlled conservation measures, but to find a happy medium, where conservation efforts are used to maintain forests as a sustainable resource people can rely on to supplement their diets, or creating a system that allows people to reduce hunting in favor of raising domestic animals for food.

Going forward, Golden said, his goal is to broaden his research to see if the same effect is observed in other populations, and to bring together the public health and conservation communities in a search for possible policy solutions that can maintain public health while also protecting wildlife.

"The interesting thing about this research is it's empirical. It's data-driven," Golden said. "There are very few papers in the literature that examine how changes in people's environment or their natural resources are impacting human health."

In an effort to expand the base of literature on the topic, Golden and colleagues from UC Berkeley earlier this year received a grant from the National Science Foundation to expand the research in Madagascar, and bring the study to Ghana and Kenya. Golden is also part of a 24-institution consortium (HEAL) seeking to conduct similar studies in Southeast Asia with his new advisors Dr. Samuel Myers and Walter

Willett

"I'm hoping that this research brings together people from the development, public health and conservation communities," he said. "The theoretical framework of how these things work together has always been there. People like to say, 'healthy environment, healthy people,' it's intuitive and it makes sense. But until now the empirical evidence to support it hasn't been well supported."

Provided by Harvard University