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## **New study links low fish supply to increased bushmeat hunting**

Berkeley -- The declining fish supply in the West African nation of Ghana, which once had a thriving fishing industry, has led to increased illegal hunting of wild game, or bushmeat, according to new research to be published Friday, Nov. 12, in the journal *Science*.

Researchers say that dwindling marine resources for Ghanaians have led to the extinction of almost half the species studied in some reserves. It is the first study to provide empirical evidence of an association long suspected by many conservation groups.

"This study provides the strongest link yet between a local fish supply with immediate, dramatic effects on bushmeat hunting and terrestrial wildlife," said lead author Justin Brashares, assistant professor of ecosystem sciences at the University of California, Berkeley's College of Natural Resources. "If people aren't able to get their protein from fish, they'll turn elsewhere for food and economic survival. Unfortunately, the impacts on wild game resources are not sustainable, and species are literally disappearing from the reserves."

Conservation groups, fisheries researchers and African leaders have blamed subsidized foreign fleets for helping to accelerate the downturn in the fish supply. The study notes that the European Union (EU) maintains the largest foreign presence off the coast of West Africa, with EU fish catches increasing 20-fold from 1950 to 2001, and financial subsidies jumping from \$6 million in 1981 to more than \$350 million in 2001.

"Other studies have shown that EU subsidies artificially increase the profitability for EU ships to fish in African waters," said Brashares, who began this work as a post-doctoral researcher at the University of Cambridge. "If it weren't for this financial support, these studies suggest, it wouldn't be worthwhile for EU fleets to head to West Africa."

Brashares collaborated with researchers in Africa and from the University of British Columbia in Canada, the Ghana Wildlife Division and the Wildlife Conservation Society in New York.

He compiled census data recorded by park rangers from 1970 to 1998 for 41 species of larger mammals at six savanna nature reserves in Ghana. These animals included buffalo, antelope, jackals, lions, elephants, monkeys and baboons. The information was compared with the supply of fish in the region during the same time period, as determined by data from the United Nations Food and Agriculture Organization (FAO).

The researchers found a stunning 76 percent drop in the abundance of the 41 species studied. Some of the smaller reserves saw local extinctions -- defined as no recorded sightings for two years -- of nearly half of those species.

At the same time, the supply of fish in Ghana ranged from 230,000 to 480,000 tons in a year, and varied by as much as 24 percent between consecutive years.

The researchers found that years with a lower-than-average supply of fish had higher-than-average declines in land-based wildlife abundance. This relationship was seen regardless of other potentially confounding factors, such as weather, political cycles and oil prices.

They also found that low fish counts were linked to higher hunter counts by park rangers. The higher numbers of hunters seen in the reserves were, in turn, closely related to the increased rate of wildlife decline.

To check the impact on the marketplace, the researchers started surveying sales and price information for bushmeat at 12 local markets throughout Ghana in 1999. Over the next four years, they found that the monthly supply of fish in the markets was negatively linked to both the price of fish and the volume of bushmeat sold there.

"The fact that fish prices were high when fish availability was low indicates that the link with high bushmeat sales was driven by low fish supply," said Andrew Balmford, senior lecturer in conservation biology at the University of Cambridge and co-author of the report. "It is the evidence for each of the links in the chain that make this story convincing."

Conservative estimates put the regional bushmeat trade at 400,000 tons per year. Brashares noted that the figure is almost certainly an underestimate, since many animals are butchered or smoked by the time they get to market, making them difficult to identify.

Experts say some of Ghana's problems date back to 1982, when the United Nations Convention on the Law of the Sea established Economic Exclusion Zones that entitled countries to exclusive use of all marine resources 200 miles off their shorelines. This meant that Ghanaian fishing boats, which had traditionally fished all along the coast of West Africa, would have to pay other countries for access to foreign fishing grounds, something the economically struggling country could not afford.

At the same time, Ghana's enforcement of its own exclusion zone is weak, making it difficult to assess the level of illegal fishing by foreign fleets. Many conservation experts say that the fish licensing agreements Ghana and many other African countries have with the European Union and other industrialized nations are tailored to benefit the non-African fleets.

"These agreements are extremely unfair," said Daniel Pauly, professor and director of the Fisheries Centre at the University of British Columbia and one of the world's leading experts on global fisheries. Pauly was not connected to this study.

Pauly and other researchers tell of industrialized nations holding economic and other aid packages to Africa for ransom during negotiations for fishing license agreements. "If you have a

very powerful economy negotiating with weak one, then it's very difficult for weak ones to say no," he said.

As a result, said Pauly, the terms of the agreements are unusually generous to the foreign fleets, typically giving a certain number of boats access to the fishing grounds for a specified period of time, with no limits on the catch. "It's as if someone gave you three shopping carts for a day at a supermarket and told you that you wouldn't need to go through the cashier," he said. "Of course, people wouldn't go to the potatoes; they'd go to the meat department."

Moreover, the fish caught by foreign fleets do nothing to benefit the local African economy because they're taken to Europe for processing, Pauly said. Jobs are not created in Africa to process the fish or service the boats.

It's an issue that one outspoken West African leader, John Atta-Mills, the former vice president of Ghana who is now running for president of the country, has brought up in the past. He pointed out in a February 2004 article in National Resources Forum that Ghana's fishing sector currently employs about 20 percent of the country's total labor force, but it's rapidly declining. In 1992, Ghana's fishing industry employed 500,000 people, but dropped to 400,000 by 1996, a decline of 20 percent in just four years.

"Unemployment for fishers has significant social and economic impacts since Ghanaian fishers are generally poorly educated and landless with few other options for income generation," wrote Atta-Mills. "Many unemployed fishers have migrated to the cities looking for work that is simply unavailable and have been unable to improve their economic conditions."

Part of the decline could be attributed to overfishing to feed a growing population -- a three-fold increase from 6 million in 1957 to nearly 18 million in 1996 -- as well as habitat degradation. But Atta-Mills specifically cited the intense harvesting of fish by the EU Fleet and called for policy reform to minimize the impact of foreign fleets on West African marine resources.

The authors of the paper say that reforming EU policy will not completely resolve the problems of diminishing natural resources in Ghana and other West African nations, but it is a solution that can be enacted quickly.

"Other solutions, such as developing a sustainable regional livestock and agriculture resource, are essential but could take decades to implement," said Brashares. "I don't think we have that time."

The authors said that without interventions, the collapse of both aquatic and terrestrial resources would likely result in widespread human poverty and food insecurity in the region.

"At a time when regional protein shortages are evidently impacting not only local people but also driving a region-wide collapse of biodiversity, it seems questionable that foreign governments should be using their taxpayers' money to subsidize the mining of developing countries' fish stocks," said Balmford. "Given the EU's expressed concerns about the bushmeat trade, phasing out subsidies to their own fleets offers at least a short-term route to limit the trade while simultaneously enhancing local fishers' livelihoods."

Other co-authors of the study are Peter Arcese and A.R.E. Sinclair from the University of British Columbia, Moses K. Sam from the Ghana Wildlife Division and Peter B. Coppolillo from the Wildlife Conservation Society.

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