rope, and the United States, urged the government to reject the corn. The delegation's final report, which was expected to be released earlier this week, concludes that the U.S. corn should be refused on the "precautionary principle" because studies of the health risks of GM foods "are inconclusive."

It was a message that the Zambian government apparently wanted to hear. After a national GM debate on 10 August, President Levy Mwanawasa declared his intention not to allow GM food to be distributed in Zambia. Last week's decision means that of the six southern African nations reeling from drought-induced famine since 2001, only Zambia has categorically rejected U.S. food donations, the bulk of which is corn. The largest donor to the stricken region by far, the United States has promised to provide half of the 1 million tons of food required to feed people in southern Africa until the March 2003 harvest. But because GM and non-GM corn are stored together in the United States, donations cannot be certified as non-GM. Swaziland has accepted unprocessed U.S. corn, whereas Zimbabwe, Lesotho, Mozambique, and Malawi have accepted it on the condition that the kernels are first milled into flour to prevent farmers from growing GM crops.

The corn donated by the United States, which Mwanawasa has labeled "poison," is likely to include kernels from strains engineered to produce a protein from *Bacillus thuringiensis* (Bt) that's toxic to insects. In the 6 years that Bt corn has been consumed worldwide, no adverse health effects have been reported, according to the U.S. Food and Drug Administration. Seeking to get that message across, the U.S. Agency for International Development sponsored the GM fact-finding mission by seven Zambian experts.

But the Zambian delegation, led by Mwananyanda Lewanika, science adviser to Mwanawasa, took a dim view of Bt corn. Its report notes that the long-term effects of the modified corn have not been studied. The report also warns that antibiotic-resistance genes present in the altered strains could in principle be incorporated into the genomes of gut flora and promote drug resistance. "There is no scientific consensus on GM," Lewanika claims. "The first concern is that Zambia does not have a biosafety framework that would regulate the introduction of GM organisms."

Many observers have expressed chagrin at this stance. "The Zambian government has disregarded the scientific evidence," Richard Boucher, chief spokesperson for the U.S. Department of State, said in a statement on 30 October. The Zambian rejection of GM food is based on "pseudoscience," says Channapatna Prakash, a plant geneticist at Tuskegee University in Alabama. Prakash speculates that economic rather than health risks motivated the Zambian decision, referring to the possible loss of Europe—which is friendlier to non-GM products—as a food export market if GM crops are planted in Zambia.

Addressing the humanitarian crisis in Zambia will now be more difficult, says Richard Lee of the U.N. World Food Programme (WFP), which is trying to arrange for neighboring Zimbabwe to accept at least part of 15,000 tons of U.S. corn in Zambian warehouses in exchange for non-GM corn. WFP had intended to use the U.S. corn to feed 2.5 million Zambians for 3 weeks. According to a conservative scenario from the World Health Organization, at least 35,000 Zambians will die of starvation by March 2003 if more food is not provided. **–JOHN BOHANNON**

FISHERY SCIENCE

Poor to Feel Pinch of Rising Fish Prices

TOKYO—The first major attempt to project global supply and demand for fish has confirmed what many have long suspected: Rising prices are likely to drive fish out of the reach of growing numbers of poor people who rely on the sea for their protein. But, with several fisheries on the verge of collapse, some analysts believe that the study's dire projections—presented last week at the launching of a global research initiative on fisheries science and policy—might in fact be too rosy.

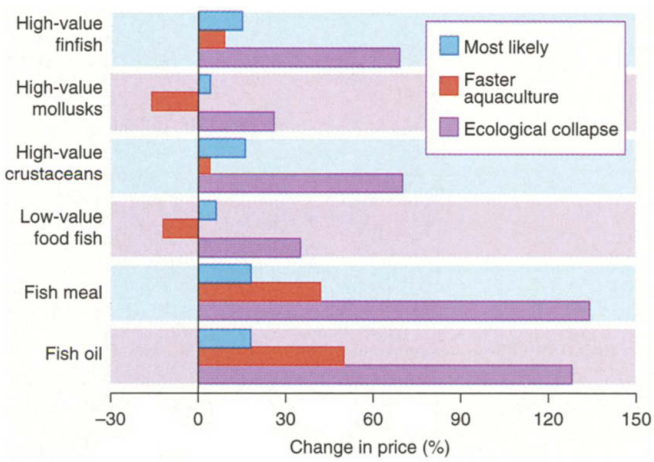
The analysis, by agricultural economists in Penang, Malaysia, and in Washington, D.C., models fish supply and demand to 2020. Under the most likely scenario, it says, prices for salmon and other high-value fish would rise 15%, and prices for low-end fish such as milkfish and carp would increase by 6%. Fish meal prices, it estimates, would jump 18% to satisfy rising demand for feed for cultured, carnivorous high-value fish (below).

"The consequences [of current trends] could be dire, depending on whether supply gains are feasible," says Mahfuzuddin Ahmed, a co-author of the study, which was done by the Penang-based WorldFish Center and the Washington, D.C.–based International Food Policy Research Institute. But a continuation of those gains—which have produced a sixfold rise in total fish catch since the 1950s—is doubtful, says his boss, center director Meryl Williams, because three-quarters of the current catch comes from fish stocks that are already overfished, if not depleted. "Those [who study] the population dynamics of fisheries would probably be pessimistic" about supplies, she says.

Fish now account for about 7% of the total food supply, according to the center, and are the primary source of protein for roughly one-sixth of the world's population. Yet fish consumption is generally overlooked in food supply models, which focus primarily on cereals and legumes. Scientists hope to correct that oversight with Fish for All, an initiative to develop science-based policy alternatives for world fisheries. Scientists, environmentalists, and industry representatives from 40 countries gathered in Penang last week for a meeting to launch the effort, led by the WorldFish Center, formerly known as the International Center for Living Aquatic Resources. Both the fish center and the policy institute are part of the World Bank–funded Consultative Group on International Agricultural Research.

The increased demand will arise primarily in developing countries, Ahmed's model assumes, where rising incomes are leading to a more diversified diet. But the vagaries of international markets might make it harder for those populations to keep fish on the tables. Under the study's most optimistic scenario, in which sustainable aquaculture is focused on the needs of the poor, lower value food fish prices could drop 12%. But prices would rise 35% if both natural and commercial fisheries collapsed.

Williams hopes that Fish for All will generate policies that stave off the worst-case scenario. "It's intended to be a nonpolitical platform for bringing the best minds together" to address fisheries issues, she says. First steps could include better statistics on catches and consumption and studies of how climate change might affect fisheries. **–DENNIS NORMILE**



Sinking feeling. An important source of protein for the poor, fish is likely to be more expensive in 2020 under any of three scenarios.

SOURCE: IFPRI IMPACT MODEL, JULY 2002