Famine: Is there a lesson from Africa?

The famine ravaging so much of Ethiopia and Chad today is frequently attributed to drought. But this drought may be only a triggering event. The root cause of Africa's crisis, says Worldwatch Institute analyst Lester Brown, is population growth faster than on any continent in history, widespread soil erosion and desertification, and a failure by African governments to adequately support agriculture. Brown, an agricultural economist, cites research suggesting that these human pressures on the natural environment may even be driving a change in Africa's climate that could perpetuate and expand the continent's suffering.

There is much that other developing countries could learn from studying events that led to the African tragedy, he writes in the Washington, D.C.-based Worldwatch Institute's second annual *State of the World* report, a book published last week. And even African leaders, he believes, could benefit by borrowing from some of the policies that are allowing countries like China to evade a crisis of similar proportions.

Brown points out that as recently as 1970, Africa was essentially self-sufficient in food. What fostered a breakdown in the continent's ability to feed itself has been a decline of nearly 1 percent per year in per capita grain production since 1968 — in part due to an annual population growth for the continent approaching 3 percent. Since populations growing 3 percent per year multiply 20-fold in a century, explains Brown, it would be hard for any land — even one sparsely populated at midcentury — to survive this with its biological support systems and social institutions intact. A sign of Ethiopia's impending breakdown appeared in 1978 when the U.S. Agency for International Development reported "an environmental nightmare unfolding before our eyes": Ethiopia's topsoil eroding at an annual rate in excess of 1 billion tons, as its growing masses denuded their land to provide firewood for warmth and cooking.

More worrisome, Brown says, is that there are no apparent changes occurring "on either the agriculture or the family planning side of the food/population equation that will arrest the slide in per capita food production." In fact, things could get substantially worse. "There is now evidence," he notes, "that population growth may be driving climate change in Africa."

Meteorologist F. Kenneth Hare, now provost of Trinity College at the University of Toronto in Canada, described how this might occur in a monograph on climate and desertification for the United Nations' World Climate Programme two years ago. In an interview last week, Hare said, "The continued [almost 20-year] decline in [Africa's] rainfall might be due to the exhaustion of stored water in the continent." It's an extrapolation from the idea, promoted by others, that a rise in the continent's surface reflectance of solar radiation — from denuding land-use practices — might decrease rainfall. "We might therefore be looking at a permanent decrease in the rainfall," he says, "induced by human activities."

China, with similar pressures, has increased its per capita grain production — despite a shrinking cropland base and still-growing population — by limiting population growth to 1 percent per year, half the rate of the early 1970s. Enforcement hasn't been easy, however, and reports of rampant female infanticide and community-forced late-term abortions cloud its approach with ethical questions. But it was only after calculating how living standards for all its people would suffer under even a "zero population growth," two-child policy that China decided it had no other choice.

China's tentative success holds out hope, Brown says, that if they can change their policies soon, many Andean states and the Indian subcontinent need not follow in Africa's starving footsteps. More importantly, he points out, "countries that wait too long [to limit their population growth] find themselves in a situation where they have to slam on the brakes." By then, as China learned, no easy solutions remain, he notes, because "there are only two ways to bring population growth down—by lowering birth rates, or increasing death rates." Forced to choose between Ethiopia's and China's handling of this dilemma, he says, "There's no question: I'd choose China's." — *J. Raloff*

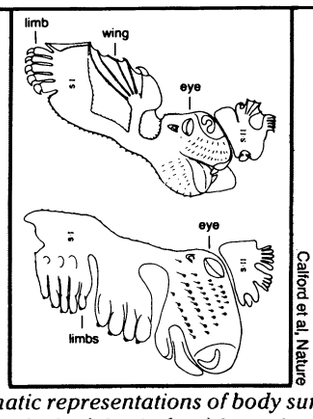
Mapping the bat's belfry

An abstract artist of the dada movement might have sketched the representation of an animal's body surface that appears on the canvas of its brain surface. And across the wide variety of mammals from rat to primate, there is a remarkably consistent organization to these abstract portraits, with some parts exaggerated, others minimized and the presentation not limited to any natural perspective. But now, a striking variation in the representation has been discovered in the brain of a bat. It appears to reflect postural differences between the flying, upside-down-hanging mammals and those that walk on all fours or upright.

Whether galloping, climbing, sleeping or playing the piano, most mammals hold their forelimbs under or in front of their heads. But bats are the exception. Their hands and arms have been modified into wings, which during flight circle behind the head.

This unusual posture is uniquely reflected in the bat's brain, scientists report in the Feb. 7 NATURE. They applied gentle tactile stimuli to the body surfaces of five bats of the type called grey-headed flying foxes. Then they measured the resultant activity at almost 800 sites in the brain region called the somatosensory cortex. As in other mammals, there are multiple representations of the body surface in this brain region, report M.B. Calford, M.L. Graydon and J.D. Pettigrew of the University of Queensland in St. Lucia, Australia, and Michael F. Huerta and Jon H. Kaas of Vanderbilt University in Nashville, Tenn.

In other mammals, the brain representation called S-I has the head at one end, the tail at the other and the limbs extending, as they generally do in mammalian anatomy, in the same direction as the tongue. The second representation, called S-II, is a smaller, cruder mirror image of S-I.



Schematic representations of body surface on the bat's brain (top) have the forelimbs—the wings—pointing in one direction and the tongue pointing the opposite way. All other mammals, including the rat (bottom), represent both the forelimbs and tongue as pointing in the same direction.

However, in the bat's brain the representation of forelimbs in both S-I and S-II extends in the opposite direction from that of the tongue. The brain diagram thus seems to depict the animal in flight.

These findings suggest that there is more to the shape of the brain maps than just the accumulation of point-to-point connections from the body surface. Somehow evolution and development have constrained these maps to reflect the customary spatial orientation of the animal's body, whether it be airborne or earthbound. Such constraints may aid the interaction among different maps in the brain. In addition to the somatosensory representations, the visual and auditory systems similarly map input from the environment. The scientists suggest that shaping the maps to reflect body orientation may be necessary to maintain an appropriate relationship between maps. — *J.A. Miller*