



# VULTURES ON THE

**THE AIR IS DUSTY**, laden with particulates, and the dawn is spectacular. A pink-orange luminescence spreads westward from the horizon, streaks of yellow tailing into dark-gray clouds. Gnarled trees, like twisted 15-foot skeletons, stand silhouetted in the early morning glow. Dogs bark in the dark, hundreds of them, packs sounding each other out to define territories.

Advancing light steals color from the sky and reveals a sprawling wasteland. The bones of dead animals—cattle, mostly, but also camels, buffalo, and goats—cover a square half-mile of desert. Plastic bags fill the gaps between decaying carcasses, and the dogs run everywhere in the light, like children at recess in a schoolyard.

This place is a carcass dump in the Great Thar Desert of northwestern India, a graveyard for thousands of cows, revered by Hindus and brought here when they die, skinned for their leather and left to rot in the hot sun. Indian cattle often eat plastic bags, and after scavengers have picked their carcasses clean, the undigested plastic remains among

## of a biological breakdown

the bones, a grim testament to the trials of bovine livelihood in India.

The bonanza of beef at the carcass dumps has established an unusual ecology in which feral dogs live and breed year-round at the dumps. On this January morning, there are at least 400 of them roaming among the carcasses. In winter, migratory birds gather, biding time until they return to their northern breeding grounds. During the two weeks I



TODD KATZNER, M.P. KAHN/WIREIMAGE.COM

# VERGE

## breakdown

by **todd katzner**

The Indian white-backed vulture (opposite) once dominated the avifauna at this carcass dump site in northwestern India (inset). Now these vultures have nearly disappeared there and throughout their range.



DAVID TEPUNG/ARND BRONKHORST

spent at the dump observing and studying the avifauna, I counted at least 300 steppe eagles, birds that traveled here from central Asia, Mongolia, and China. Egyptian vultures—both migrants and local breeders—were even more abundant. With their yellow faces and coprophagous habits, the Egyptians add color to the surreal scene. Their infatuation with feces is so consuming that every defecating dog is quickly surrounded by a cordon of yellow-faced attendants, each trying to snatch and eat the warm excrement as it hits the ground.

The most spectacular of the dump's denizens, though, are not the dogs or the eagles, but the big vultures—the stocky cinereous and the long-necked griffons. Every day, as the sun heats the earth and warm air begins to rise, hundreds of these birds glide in on thermals from their nighttime roosts to form flocks and wait their turn while the dogs eat.

But the story of these giants of the sky is a sad one, a tale that spans continents and that may soon result in the ultimate biological indignity—extinction. Twenty years ago, 400 to 600 Indian white-backed vultures and 200 to 300 long-billed vultures dominated the avifauna at this carcass dump. Now these vultures have nearly disappeared. In two weeks, I saw only ten white-backs and no long-bills. The decline of these species, which are found almost exclusively on the Indian subcontinent, extends far beyond this one site to include their entire range.

As a consequence of its speed and scope, the population crash of Indian vultures has become one of the most unusual and pressing ornithological conservation problems in the world today. Indian white-backed and long-billed vultures once could be counted among the most numerous species of large raptors in

the world. In good habitat, white-backs would breed at amazing densities of up to 30 nests per square mile. In Delhi, a city of more than 13 million people, and hardly prime wildlife habitat, you could find as many as eight nests per square mile. These vultures played an important ecological role, and numerous cultural practices grew from the close association between people and the omnipresent vultures. Among the best reported of these occurred in Mumbai (Bombay), where the Parsi, a Zoroastrian group, would place their dead on stone “Towers of Silence” to be consumed by vultures. In the past ten years, however, Indian white-backed and long-billed vulture populations have declined by more than 90 percent throughout India.

Vibhu Prakash, an ornithologist with the Bombay Natural History Society (BNHS), first noted high vulture mortality in the 1990s. He observed Indian white-backed vultures at Keoladeo National Park, in Bharatpur, Rajasthan, sitting with their necks drooping so severely that their heads often hung below their feet. Ultimately these birds became so weak they would fall from their perches and die.

In the years that followed, high rates of adult mortality wiped out the colonies at Keoladeo. Furthermore, Prakash's nationwide surveys indicated that vultures were dying in large numbers throughout India. Subsequent work by other scientists has shown similar mortality patterns in neighboring countries, including Pakistan and Nepal. In many of these adjacent countries, vulture decline appears to be in a less advanced stage than it is in India. For example, in Pakistan, surveys indicate that annual adult mortality of Indian white-backed vultures ranges between 11 and 27 percent. Nevertheless, species such as these, with extremely low reproductive rates, cannot sustain their populations when so many are dying.

The near-eradication of vulture populations on the Indian subcontinent has had important ecological and social effects. A particularly visible example is that of mammalian scavengers, primarily feral dogs, whose numbers have ballooned recently. In some places, dogs are 20 times more numerous than they were in the 1980s. India already leads the world in human deaths due to rabies—about 30,000 Indians die of rabies each year—and increases in dog populations are almost certain to push that alarming statistic even higher.

In the modern world, when wildlife dies in large numbers, the first question asked is “What human activity may have contributed to these deaths?” Accordingly, some of the first scientific tests run on dead vultures were for contaminants—organochlorines and organophosphates (pesticides), metals, and minerals—that are known to kill other birds. These initial tests came back negative, indicating that the vultures died of other causes.

Vulture mortality associated with the neck-drooping Prakash observed has certain consistent and predictable physical manifestations. Most significant, when the organs of dead vultures are examined, many are found to have visceral gout—an accumulation of white crystals (uric acid) in the kidneys, liver, and other tissues. However, because microscopic examination shows that this gout appears just before death, it is probably not the cause of the illness, but rather a secondary process resulting from some other primary illness.

So far, widespread mortality of vultures has been confined to three closely related species—Indian white-backed, long-billed,

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and slender-billed. But ornithologists fear that other species could be at risk. Two close relatives—the Eurasian and the Himalayan griffon vultures—are winter visitors to India, and the range of the Eurasian griffon extends into Africa. If susceptible, Eurasian griffons could carry a disease to Africa, where vulture decline would have significant impacts (North American vultures are distantly related to the griffon vultures and are less likely to be susceptible).

A crucial question therefore is whether these closely related species are vulnerable to this undetermined mortality factor? As of now, that question remains unanswered. In India, we occasionally saw griffon vultures hanging their heads, as do sick Indian vultures. In Kazakhstan, where I study vultures and eagles for the Wildlife Conservation Society (see “An Eagle's-eye View,” February 2003), and in the Caucasus, vulture populations appear to have declined by 30 to 70 percent over the last 15 years, but neck-drooping and dead birds are rarely observed. Recent economic changes in the former Soviet Union have caused declines of at least 75 percent in the numbers of sheep and other livestock. Because these animals are the source of most vulture food, vulture declines in the former Soviet Union may be linked to the economic troubles in that region. Nevertheless, numerical decreases still make these populations more vulnerable to other threats.

A breakthrough that may explain vulture die-off came last spring from J. Lindsay Oaks, a veterinarian at Washington State University working with The Peregrine Fund and studying birds from Pakistan. Oaks discovered that a non-steroid, anti-inflammatory drug (NSAID) called diclofenac, which is widely administered to livestock by veterinarians in Pakistan, is lethal to Indian white-backed vultures—even at very low doses. These findings, presented at the Sixth World Conference on Birds of Prey and Owls in Budapest, Hungary, were both surprising and convincing. They showed how the use of diclofenac in livestock could kill large numbers of wild vultures. The extent to which diclofenac is used in India is currently being investigated.

Finding a likely cause of the decline is only the first step. Solving conservation problems usually involves mitigation of multiple confounding factors. While addressing this problem might appear as simple as eliminating a single drug, it is unlikely to be that straightforward. As the first documented case in which a pharmaceutical product appears to have a widespread, ecologically damaging effect, the situation will have complex political ramifications.

**Also at risk of extinction is the long-billed vulture (opposite). Indian trappers are helping biologists radio-tag a close relative, the Himalayan griffon vulture (right), to track its travels from India. The die-off among vultures in India and elsewhere in Asia is the subject of intense scientific scrutiny.**

The prognosis for populations of Indian white-backed, long-billed, and slender-billed vultures is not good. Conservationists are establishing captive-breeding programs for these species, but one or more of these vultures may soon go extinct in the wild. Even if this does not happen, it is not likely that we will soon see the vulture populations in India recover to the numbers they once were.

The only good news to this story is that, at the present time, vulture populations in northern Eurasia and Africa seem to be unaffected. WCS is monitoring vulture populations in central and southeast Asia. Should we begin to see signs of die-off, we will be in a position to design conservation measures for protection of these vultures on the verge.

Todd Katzner is a WCS research associate and National Science Foundation International Research Fellow at Imperial College London. In India, he collaborated with the Vulture Rescue team made up of scientists from the Institute of Zoology and the Royal Society for the Protection of Birds, both in the UK; and from the Bombay Natural History Society in India. For more information on vulture decline, log on to [www.vulturerescue.org/](http://www.vulturerescue.org/) or [www.peregrinefund.org/conserv\\_vulture.html](http://www.peregrinefund.org/conserv_vulture.html).



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