



**STAKING OUT TERRITORY:** The greatest percentage of invasive fish species in river basins correlates with the economic activity of the region, according to a new analysis.

might go to a restaurant because there are a lot of customers there, thinking it's indicative of high-quality food."

A team of researchers has muddied the long-standing debate in the February issue of *PLoS Biology*. The investigators looked at data from 1,055 river basins covering 80 percent of the earth's land and found six "global invasion hotspots," where more than 25 percent of freshwater fish are nonnative migrants. The six hotspots encompass large networks of river basins in western Europe, North and Central America's Pacific coast, southern South America, Australia and New Zealand, South Africa, and Central Eurasia. The high number of invasive species, says Fabien Leprieur of the Paul Sabatier University in Toulouse, France, and lead author of the report, coincides with maps of the world's largest gross domestic products, greatest amount of urban development and highest population densities. Perhaps most troubling, the hotspots also boast

the greatest number of threatened native fish species.

At least on the scale of entire river basins, Leprieur's findings support neither biological hypothesis, says Levine, who researches how international trade spreads exotic plants. Evidently, human activity enables invasive species to get established in *any* kind of ecosystem.

Leprieur also expresses amazement "that natural processes are blurred by human activities in controlling the richness of nonnative freshwater fish species." But, he says, it is not hard to see how humans help invasive fish get a fin up—the more economically active a nation is, the more likely it is to engage in international shipping, which transports stowaways in ballast water, and to have large aquaculture and pet industries, where escaped fish are common. What is more, booming economies often come with dams, bridges and other environmental disturbances that could facilitate the spread of exotics.

Rochelle Sturtevant, an ecologist who studies the Great Lakes for the National Oceanic and Atmospheric Administration, hopes Leprieur's study can serve as a cautionary tale as developing nations join the global market and undertake activities that threaten to introduce exotic species into their relatively pristine ecosystems. Unfortunately, she points out, the conclusions drawn in the paper are too broad to help conservationists create concrete solutions. She thinks that more specific investigations may find evidence that biological processes actually do play a role in invasive dispersal. And, Sturtevant adds, terms such as "GDP" and "urbanization" should be fleshed out to include the specific human activities that drive exotic species invasions in a given region. Once conservationists uncover such details, perhaps they will be able to head off the next invasion.

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SOURCE: "FISH INVASIONS IN THE WORLD'S RIVER SYSTEMS: WHEN NATURAL PROCESSES ARE BLURRED BY HUMAN ACTIVITIES," BY FABIEN LEPRIEUR ET AL., IN *PLoS BIOLOGY*, VOL. 6, NO. 2, FEBRUARY 5, 2008

## PALEOANTHROPOLOGY

# Finding Fossils Faster

Good-bye, field seasons? A push to year-round collecting **BY FREDRIC HEEREN**

**E**ast Turkana, Kenya—What unnerves Louise Leakey is not so much the banditry on the only supply road or the gun battles among herders who sometimes mistake researchers for their ene-

mies—it's the goats. When a fossil in the Lake Turkana region in northern Kenya makes its way back to the eroding surface after several million years, it's just a matter of time before, as Leakey puts it, "a

herd of 200 to 600 goats with those little hooves, four apiece, goes straight over it." To lose this race against time is to lose specimens forever—including remains of our ancestors.

For millions of years, the Turkana basin has collected water and drawn life to it. Sediments have buried animal bones; erupting volcanoes along the Rift Valley have left tuffs with easy-to-date strata. Today the basin affords 1,200 square miles of covetable fossil exposure and 40 years of carefully worked-out geology. The east side contains hominid-bearing traces of the past four million years, where the famed Leakey family of paleoanthropologists has made ancestral-tree-shaking discoveries belonging to the genera *Australopithecus*, *Kenyanthropus* and *Homo*. The west side of the lake offers much older fossils from the Miocene, Oligocene and Cretaceous eras (including dinosaur remains).

Occasional rains expose the fossils not only to the light of day but also to the damage done by livestock led by herders searching for grazing. Researchers now claim to have found a way to collect fossils quickly while motivating the people to protect their heritage, a plan that involves a shift from 10-week field seasons to 50 weeks of fossil collecting annually.

The activity will fall under the aegis of the newly formed Turkana Basin Institute (TBI). Guided by Richard Leakey, his wife Meave and daughter Louise, it has raised \$2.1 million to build a permanent field station at Ileret, east of Lake Turkana. Since April 2007, this camp has been transformed from a few tents into a field worker's wish list: a stone lab with plenty of curatorial space, staffed kitchens, metal prefab buildings and a garage with a full-time mechanic. The directors hope that year-round work will accelerate fossil recovery fivefold. Next year a second station is to be built on the lake's west side.

"What we're proposing is revolution-

ary," says Lawrence Martin, Stony Brook University paleoanthropologist and TBI director. "The Turkana Basin Institute will enable us to move away from a sort of Victorian model of fossil collecting where, typically, gentlemen and their lady scientists go out and set up a tented camp for a few months and collect fossils." The institute is offering its permanent facilities to outside researchers at a fraction of what it



**SAVING HISTORY:** Paleoanthropologists Meave Leakey (left) and daughter, Louise (right), examine a fossil found near Ileret, east of Lake Turkana in northern Kenya. The Leakeys hope that a new institute, designed to support researchers who come to this region, will speed the retrieval of specimens from the fossil-rich area before they are damaged.

would cost them to bring their own support to this remote region, a four-day drive from Nairobi.

So far Kenya's recent turmoil—which began after December's troubled election that resulted in deadly violence, split along ethnic lines—has not affected the institute. In fact, life goes on as usual in the north, where the people of Ileret have long led a marginalized existence with scarce food and water. The Turkana scientists will continue their tradition of employing local people, but they now hope to add many more community jobs in labs, mu-

seums, dining facilities—and a new field school to train both African and overseas students. Working with the National Museums of Kenya as an official repository for the government's local collection, the TBI also intends to attract tourists to the spot producing so many major discoveries. The scientists hope to help the region's people recognize the significance of their heritage while also channeling benefits

from the research to sustainable livelihoods for the community. Moreover, the institute is partnering with two African and three foreign universities to develop career paths to help keep Kenyan Ph.D.s in the country.

Not everyone seems enamored of the institute, however. Rutgers University paleoanthropologist Jack Harris says he is content using the humbler Koobi Fora field station run by the National Museums, south of Ileret. Harris has expressed concern that the TBI might be encroaching on the government's authority in the region.

Martin argues that the institute is not trying to control the Turkana basin—"we're just trying to support science and support Kenya." He acknowledges that all are welcome to come and seek excavation permits from the National Museums of Kenya.

"We just think that it's a tough area to do work, and if we have the infrastructure to help—to provide vehicles and food and well-trained staff—a lot of people will want to avail themselves of those," he adds. By inviting all researchers in the region to an August workshop at the new Ileret field station, TBI leaders hope to allay suspicions, facilitate working together and radically increase our understanding of human evolution.

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