ECOLOGY

A Surprising Tale of Life in the City

As some ecologists shift their focus from wild habitats to buzzing metropolises, they are finding webs of life more intricate than anyone had suspected

Swallowing an acre of desert every hour, the rapacious maw of Phoenix, Arizona, may not seem like much of an oasis—except, perhaps, to the species bent on pushing the sprawl ever outward. But there's more to this cityscape than golfers and sun worshippers. If you want to see the yellowleg sandpiper or two dozen other kinds of migratory birds, for instance, grab your binoculars and head to one of Phoenix's sewage treatment centers. Or if you're into cottontail rabbits or tenebrionid beetles, you'll find plenty of those in Phoenix, too.

Not so long ago, cities held little interest for ecologists; they were mostly places to escape from to study real ecosystems. But in a landmark shift 2 years ago, the National Science Foundation's (NSF's) Long Term Ecological Research (LTER) program, which funds a network of sites in relatively pristine areas in the United States and Antarctica, added two urban LTER sites: Phoenix and Baltimore, Maryland. The deeper scientists dig into the ecology of these cities, the more life they are finding, according to a report on the Phoenix project released this month. "The simple notion that a city diminishes biodiversity is wrong," says anthropologist Charles Redman of Arizona State University (ASU), co-director of the Phoenix LTER site. The findings have a handful of ecologists arguing that maybe—just maybe—cities aren't such a blight after all.

That kind of heretical talk doesn't go down well with some scientists, who caution against making too much of the variety of life in the big city. "We need to be concerned about keeping what we have and not become entranced by long lists of species [in urban areas]," says Michael Bogan, a wildlife biologist with the U.S. Geological Survey (USGS) in Albuquerque, New Mexico, who contends that Phoenix's golf courses and subdivisions are no substitute for the swath of Sonoran desert they have supplanted. Bogan points to a USGS report released last month that cites urbanization as a major cause of environmental degradation and loss of biodiversity. It's true, says John Wiens, an ecologist at Colorado State University in Fort Collins, that cities "enhance the environment for some species but deteriorate it for others." But he and others submit that the urban LTER sites serve an important purpose: to get to know your enemy. "We're not going to stop urbanization," says ASU ecologist Nancy McIntyre. "What we can do is design it to ameliorate its effects."

The 20-year-old LTER program was an unlikely wellspring for an urban ecology initiative. "The idea was to first try and understand natural systems," says Scott Collins, LTER program director at NSF. Sites were chosen in isolated regions: for example, tundra in Alaska, the Chihuahuan desert in New Mexico, and the McMurdo Dry Valleys in Antarctica. But it began to dawn on many ecologists, says Wayne Zipperer, a landscape ecologist with the U.S. Forest Service in Syracuse, New York, that "we know more about other habitats than our own."

Venturing into the cities was an inevitable evolution for the LTER program, Collins says. Besides carrying out standard measurements of nutrient levels in soil or cataloguing species, researchers at the two urban sites probe the nexus between society and the environment: multidisciplinary topics such as natural resource use and sustainable development. As part of the 6-year, $4.4 million Phoenix study, researchers have examined, for instance, the effects of initiatives to encourage xeric landscapes—yards with drought-resistant plants suited to the dry local conditions and sandy gravel instead of grass. After comparing water usage of people with xeric yards to those with grassy yards, the researchers found, to their surprise, no measurable difference.

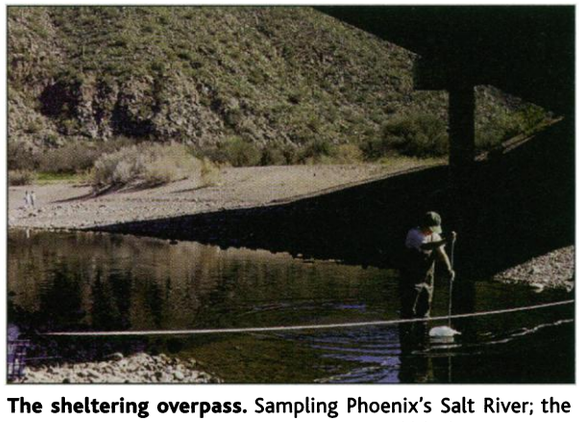
It is the species inventory that's attracted the most attention, however. So far, researchers have documented more than 75 species of bees, 200 species of birds, and hundreds of insect species within metropolitan Phoenix. "It's surprising the amount of species we have seen," says McIntyre, considering the rapid growth of Phoenix, which has 2.8 million people and counting. "You would think there wouldn't be enough room for all these critters." True, some heavyweights are absent: Bighorn sheep and other animals that need room to roam aren't going to make it in Phoenix, McIntyre says. But birds, rabbits, and other small animals are doing fine. "It depends on what kind of biodiversity you want," she says.

The biodiversity in Phoenix, it turns out, is mostly imported—95% of plant species and one in four kinds of birds, for example, are nonnatives. "Cities have become staging grounds for exotic invasions," says Julio Betancourt, a USGS paleoecologist in Tucson, Arizona, who points to starlings in Phoenix bullying gila woodpeckers out of their nests in suguaro cacti. Although Betancourt disputes the notion that the species diversity in Phoenix is a sign of a healthy ecosystem, he applauds the attention being paid to cities. "To be doing this [urban LTER] is a revolution," he says.

Other districts hope to stage similar revolutions. Stephan Paulit, a landscape ecologist at Munich Technical University in Germany, says his group has a proposal before the European Commission to launch a similar effort in six European cities. And in Asia, a study modeled after the urban LTER program could soon get under way in Taipei and Singapore. While NSF has no plans for now to add more cities to its LTER network, says Collins, the agency has issued a request for proposals for three coastal sites that "will explicitly include humans and their impacts on ecosystems."

Collins sees the creeping urbanization of some of his colleagues as a good sign and suggests that ecological research in the cities can "facilitate policy decisions and urban planning." It may take a while for the findings from the urban LTER sites to influence local politicians, but in the meantime they are at least prompting scientists to wonder what kinds of life-forms may be living in that garbage dump or down that manhole. The bottom line, says Wiens, is that "cities are not the kind of sterile wastelands that some people think."

–KEITH KLOOR



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The sheltering overpass. Sampling Phoenix's Salt River; the city is an oasis for an unexpected diversity of life-forms.

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