STUDYING AND CONSERVING DESERT LIFE

AN ECOLOGIST'S VIEW

ONCE UPON A TIME, says Dr. Yaron Ziv, ecologists inhabited a separate scientific world of their own, and a rather ivory tower one at that. "We used to focus on the relationships between organisms and environments, but questions to do with things like air pollution and water quality were the engineers' problem," he observes.

But not anymore, says Dr. Ziv, who runs the Spatial Ecology Lab and is a senior lecturer in BGU's Department of Life Sciences. Today our common awareness of conservation brings ecology to the fore and it will become even more important in the future, he says.

"If you want to understand how nature functions in order to conserve our own life-form and community, you need scientists who understand how these processes work and what they do.

"Studying community characteristics, ecosystems, open spaces, the impact of events on biodiversity—those issues are exactly our field. And they directly relate to the threats we fear most, like global changes, acid rain, degradation of land and wildlife—our nightmares that are actually happening, and faster than anticipated," states Ziv.

"Big concepts" such as global warming translate on the practical level to the functions of small particles that build our biosphere, he points out. "Because of human behavior like development, pollution and loss of open spaces we face high extinction rates. Understanding ecological processes potentially contribute to reducing those effects."

Dr. Ziv is among half a dozen scientists who teach ecology in the Department of Life Sciences and engage in a wide range of basic science and applied research projects. In addition, 10 ecologists are associated with the Louise Mitrani Department of Desert Ecology, part of the Jacob Blaustein Institutes for Desert Research. Several ecologists sit in other departments, as well. This gives BGU the largest ecology group in Israel and, says Ziv, he finds that it is recognized worldwide, as are other environmental research and study departments at the University.

Dr. Yaron Ziv with a marked Greater Egyptian Gerbil seconds before its release **Top:** Habitat fragmentation of the southern Judean lowlands

The two ecology programs—that of the Department of Life Sciences and that of the Mitrani Department of Desert Ecology—share graduate students for M.A. and Ph.D. degrees, who, because of the field's international orientation, are taught in English. The Department of Life Sciences also trains undergraduate students in ecology.

ISRAEL AS AN ECOLOGY LAB

Ziv finds that colleagues from other countries envy his location. "Israel is an excellent lab for ecological and evolutionary-oriented studies," he says. "It's located in the junction of three continents; it's a small and relatively species-rich country with huge climatic and thematic changes. In only 360 kilometers you go from 30 milliliters of rain to 650 milliliters, an amazingly sharp gradient," which means the landscape and biodiversity vary sharply within very short distances. "You can take advantage of this in asking macro-ecological questions," he adds.

Ziv's own research focuses on understanding how ecological

processes in a varied landscape determine the populations, how they are distributed, their community structure, and biodiversity patterns. He recently investigated a major macro-ecologic question—what is the relation between species diversity and productivity?

"We used to think that when you increase the amount of food available, the number of species would go up. But it's not the case. Ecologists recently found that richness increases diversity to a certain point and thereafter it decreases as resources increase. However, to study this in other places of the world, you'd have to go very long distances and cross a lot of ecosystems."

SHIFT IN ECOLOGICAL THINKING

Israel's attributes are especially useful given the enormous shift in the field's focus that Ziv has seen in his 20 years as an ecologist. The scale ecologists work on has transformed. "Instead of looking at one hectare [about 2.5 acres] of habitat in the last few years, we started looking at whole countries, continents—which is very complicated."

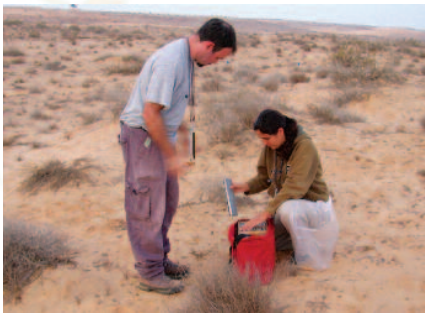
He believes this change took place in part because "the issues pushed ecologists to deal with larger scale questions. People became more aware of conservation issues and expected us to be involved."

But radical shifts in technology made the shift possible. "We now use satellite images, remote sensing, GIS [Geographic Information Systems that capture, store and analyze data], and great computers that can do all sorts of analysis. Until six or seven years ago, you'd go to international conferences and see people mainly dealing with community structure, predation [the relationship between prey and predator] and competition on a small scale. Today most of the sessions deal with habitat bordering the large scale—environmental heterogeneity, species distribution—on a continent."

This change worked out well for Ziv. When studying at the University of Arizona for his Ph.D., he needed to think about a "new niche." He decided to work with large-scale ecological processes and patterns. "So for me what's going on now is a dream come true," he says.

> "All the research we do contributes to diversity, open spaces, the functioning of ecological systems...Israel's future needs healthy land and ecological systems."
>
> —DR. YARON ZIV

Classic ecology is also evolving in the opposite direction, he points out—genetics and molecular biology are making a major impact on the field. The two polar approaches can work together well. One of his Ph.D. students is completing a dissertation on desert landscape genetics, investigating the genetic relationship between individuals and populations at a large ecological scale.



Ph.D. student Udi Columbus, left, and Spatial Ecology Lab technician Zehava Sigal at work on the dune restoration study

THE FRAGMENTATION PROBLEM

With four out of the six Ph.D. students he works with, Ziv is engaged in a long-range project located near Kiryat Gat in the southern Judean lowlands. These natural habitats are very fragmented and patchy, Ziv says, and have been for 2,000 years. The area was heavily occupied in Roman times, and now patches of natural habitat are scattered between agricultural fields, settlements, cities and factories. Ziv wants to know how this fragmentation affects populations and communities.

"Habitat fragmentation is considered the major threat to biodiversity and nature conservation worldwide, like we're seeing in the Amazon—so it's really important. The habitat patches become more and more isolated from each other over time, and keep shrinking. Individuals and communities have to cope with that."

Almost 60 different species of beetles, more than 200 species and morpho-species of spiders and about 30 species of reptiles live in these isolated patches. The team traps and studies them. "We were able to show that different groups and species respond differently to landscape fragmentation and the underlying processes, depending on their location in the food web and their foraging mode. Beetles that eat dry materials were able to cope better than predators."

Surveying plant life in the fragmented southern Judean lowlands, postdoctoral student Itamar Giladi and Zehava Sigal

This information helps us know how to conserve biodiversity and protect the major groups of plants and animals, Ziv explains. "These little creatures are responsible for the world's nutrient cycle, gas exchange, energy flow within food webs and so on. Habitat fragmentation damages those processes so if we care about

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