lands, we predicted that the lizards would develop shorter hindlimbs," says Losos. And although they are not as ground hugging as a Chevy low-rider, statistical analysis shows that, after 10 to 14 years on the new islands, these anoles do indeed grow shorter rear legs than do their ancestors.

For this change to be the first step toward the formation of new species, though, the change in limb length would have to be a genetic trait that would be passed on to the animals' progeny. But some researchers doubt that such rapid morphological change, coming in a few generations, could have a genetic basis. "They have seen a lot of evolution in a very short time," notes evolutionary biologist David Wake of the University of California, Berkeley. Losos concedes that there is as yet no evidence that the shorter hindlimb length is strongly heritable. Without that, he notes, he can't exclude the possibility that the lizards' legs develop differently on the bushy vegetation than on trees because the different vegetation types exert different stresses on the leg bones.

This kind of "developmental plasticity" would depend only on the type of environment and might not be transmitted to the offspring. "They don't have the evidentiary data to support either hypothesis," says Wake. Indeed, he even questions whether the Losos team has in fact demonstrated that the legs get shorter. He points out that the researchers did not take leg measurements from the founding populations on the new islands—not realizing that they were going to thrive. Instead, they measured lizards living today on Staniel Cay and used their legs to compare to these transplanted populations.

To help resolve these issues, Losos is now raising anoles in a variety of laboratory environments to see if the lizards consistently change morphologically from the stresses of living on different surfaces. If they do, this would favor the developmental plasticity idea.

He's also trying to take his natural radiation experiment one step further by introducing two closely related species of lizards on lizard-free islands. "That's the next step," he says. "If they compete and alter their habitat use in the presence of this other species, will that lead to a [further] morphological change?" It's that kind of competition, between populations that had started to diverge and were then reunited, that researchers say led to the rich diversity of Galápagos finches.

But whether the lizards continue to evolve depends largely on the winds of fate, says Losos. These islets are periodically swept by hurricanes that could whisk away every trace of anolian evolution—the outcome he originally pictured for them.

–Virginia Morell

BIODIVERSITY

Dams Drain the Life Out of Riverbanks

A team of researchers studying biodiversity on riverbanks in central and northern Sweden has some bad news for managers of water resources: Plant communities along the banks of rivers dammed for hydroelectric power contain significantly fewer species than those alongside neighboring free-flowing rivers. These findings, reported on page 798, are likely to fuel debates in Sweden and elsewhere on licenses for new dams and other water-regulation schemes. "The results of this study are likely to be applicable to regulated rivers in many other regions," says ecologist Stuart Pimm at the University of Tennessee, Knoxville.

Riverbanks provide a variety of environments for plant life. The inflow of nutrients and sediments; changing water levels over the seasons, which can create specialist niches; and waterborne dispersal of seeds all contribute to a rich diversity of species. It has long been known that the construction of dams and changing water levels can have a disastrous impact on original bank communities, but there is considerable debate among ecologists about how well plant populations recover and reestablish themselves alongside new, regulated water courses. "There have been many studies on the physical changes in regulated water courses and how plants adapt to these changes, but no one until now has looked systematically at the effects of regulation on plant biodiversity," says river ecologist Jack Stanford at the University of Montana's Flathead Lake Biological Station in Polson.

Ecologist Christer Nilsson and colleagues Roland Jansson and Ursula Zinko of the University of Umeå in Sweden set out to answer this question by studying the vegetation at almost 90 sites alongside hydroelectric power "schemes"—each of which can incorporate a number of dams and reservoirs. Some dams in the region date back to the 1920s, and "the regulation patterns of these systems have not changed since the schemes were first built," says Nilsson. The team also studied several undisturbed rivers in the same region as controls—something that is becoming difficult in many other areas of the world.

The team compared both the simple number of species and an index of "species richness," which compensates for differences of riverside areas. Half the samples were at main storage reservoirs, where water levels can vary substantially, and half were alongside smaller dammed reservoirs, or "impoundments," downriver, which directly feed the turbines and show much less variation in water level.

The team found about one-third fewer species around storage reservoirs than at comparable undisturbed sites; the index of species richness was only about one half for these sites. At impoundment sites, the richness index was comparable with that at control sites, but 15% fewer species were crammed into the much narrower band of habitat than in natural rivers.

By studying the vegetation alongside regulation schemes built between 1 and 70 years ago, the team also found that the number of species growing along the water's edge appears to increase slowly after the construction of a dam. They found that the number appeared to increase for an average of 34 years alongside storage reservoirs, and for 13 to 18 years alongside impoundments. Once plant communities reach these ages, however, their development


CHRISTER NILSSON/UMEÅ UNIVERSITY

Draining away. Plant life never fully recovers on the banks of dammed reservoirs.

appears to halt. "No further increase in species numbers has occurred, and the community looks permanently different," says Nilsson. "And evidence from the oldest dam schemes suggests that these communities are now declining in species number."

Some ecologists suggest that this impoverishment in riverside plant life might have a significant impact on the aquatic ecosystems. "We're just beginning to get some glimmers of the effects on biodiversity of changes in these habitats," says Pimm. "These changes are likely to lead to higher local extinction rates for some species."

The Swedish results are likely to fuel current debate on the relicensing of schemes to regulate water. "Many Swedish hydroelectric schemes were built about 30 years ago and must now undergo assessment for relicensing under Swedish requirements," says Nilsson. Concerns about their environmental impact have already led to proposals for a 5% increase in flow through the schemes. But, Nilsson says, "Our results suggest that for the same reduction in generating capacity, it would make more sense to close down one in 20 schemes and restore their original river courses." Stanford agrees: "It's becoming increasingly clear that we have to restore some of the natural attributes of river systems."

–Nigel Williams