



Eels are revered as gods by some cultures, including that of the Maori — as depicted in this wall mural in Canterbury, New Zealand.

ECOLOGY

The mystery of eels

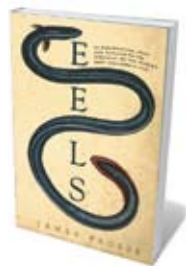
Kim Aarestrup is reminded of how little we know about these endangered fish.

Snake-like and nocturnal, eels are mysterious creatures. They spawn in remote and nutrient-poor places in the seas, and no human has ever seen one reproduce in the wild. Their rice-sized hatchlings embark on an odyssey of up to 6,000 kilometres to find fresh or brackish water, where they grow for decades — reaching weights of more than 20 kilograms — only to return to the sea, where they spawn, die and sink into the abyss.

Exploited as food for millennia owing to their abundance, taste and high energy content, eels cannot yet be cultured profitably. All traded eels are wild — and populations are plummeting. Species in temperate areas, including the American, Japanese and European eel, have become scarce, with populations dropping by more than 90% in the past four decades. European eels are now listed as critically endangered by the International Union for Conservation of Nature, a shocking development for a fish once found across all the accessible waters of Europe.

In *Eels*, naturalist James Prosek travels

and interviews leading scientists worldwide to examine the *Anguilla* genus. By broadening the perspective beyond Atlantic species, his book complements Tom Fort's marvelous *The Book of Eels* (HarperCollins, 2002). As well as describing the biology of the eel,



Eels: An Exploration, from New Zealand to the Sargasso, of the World's Most Mysterious Fish
JAMES PROSEK
HarperCollins: 2010.
304 pp. \$25.99

Prosek considers the cultural and economic value we attach to it, interweaving historic vignettes from Aristotle's interest in the origins of European eels to Sigmund Freud's nineteenth-century search for their testes.

Prosek visits New Zealand, where the Maori revere the large endemic longfin eel *Anguilla dieffenbachii* as a religious symbol, which they believe can bark like a dog

and scream like a baby. Large road projects have been diverted to avoid areas populated by *taniwha*, or special guardian eels. Prosek goes to Japan, a nation that eats vast quantities of eel, making the traditional dish *kabayaki* a multimillion-dollar industry. He also visits the Micronesian island of Pohnpei, where *Anguilla marmorata* is sacred, believed to be the islanders' ancestor.

Restoration of eel populations will be difficult. Prosek lists contributors to their decline: loss of habitat, dams, fishing, introduction of parasites, pollutants and changes in ocean currents. These factors, and our lack of knowledge about key stages of the eel life cycle, make population management problematic.

The plight of temperate species has led to a surge of eel research in the past few years. Recent papers have described captures of Japanese eels that have spawned, showing that they do so in tropical ocean frontal zones, a mixing zone between warm and cold oceanic waters. Other research has revealed the diet of newly hatched eel larvae (called leptocephali)

CONSERVATION

Biodiversity as a bonus prize

Rare species and ecosystem services make uneasy bedfellows, discovers **Emma Marris**.



and suggested alternative larval migration routes for European eels other than the North Atlantic drift current. Prosek's book stops short of capturing these emerging results.

For American and European eels, monitoring the late stages of their life cycle in the Atlantic is the greatest challenge. Only by assessing survival rates can we focus remedial action on the most important life stages. The difficulty of tracking small animals over vast distances is immense — attached telemetry devices that measure and transmit data are currently the only feasible method of following adult eels across the ocean. The miniaturization of transmitters in the coming years should advance knowledge considerably. More information on tropical eel species is also needed, as we know even less about them — a new species was even discovered recently in the Philippines (*Anguilla luzonensis*) — and different factors will affect their survival.

Eels is a solid introduction to global *Anguilla* species. It provides a convincing argument that eels should be preserved because of their unique life cycle, and their economic and cultural importance. To restore and manage eel populations worldwide, we need a deeper understanding of their life history. ■

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As biologist Ken Thompson explains in *Do We Need Pandas?*, conserving rare species does not really benefit people. If you care about nature because of its usefulness to humanity, pandas are a luxury item — and so are most other rare species. The money that is spent on saving them could be better applied by protecting ecosystems that provide us with food, timber, clean water, a liveable climate and flood protection.

If one's aim is to prevent extinctions, as in much of traditional conservation, then identifying and fussing over endangered species is the best way forward. If one sees the environment as a source of services, as Thompson does, the more sensible course is to “conserve the fabric of whole ecosystems, and let the rare species look after themselves”.

The reason, he explains, is partly because rare species are too sparse to significantly influence the functioning of an ecosystem. They are thus unlikely to be essential for the continued provision of ecosystem services.

Thompson traces conservation scientists' failed attempts to prove that biodiversity is inherently good for ecosystems. First, the results of these experiments — typically using small plots containing manipulated numbers of plants — were not what they were cracked up to be. Yes, more-diverse ecosystems were more productive on average. But this was not a result of their variety alone — it was because they were also more likely to include the most productive plant, monocultures of which could be even more productive. Second, experimenters defined productivity in terms of turning sunlight into biomass.

Yet growth need not tally with value: in lakes, high productivity often means more algae and fewer fish.

Thompson proposes

that we give up the goal of maximizing biodiversity. Instead, we should focus on saving whole ecosystems that are useful for humanity. In the process of conserving such areas, biodiversity will be protected anyway, as a sort of bonus prize.

But by putting the focus only on what nature can do for us, Thompson leaves open the possibility that ecosystems that do not deliver sufficient services might be thrown out, with all the biodiversity that they contain. He admits that society has benefited from the turning over of forests and wetlands to agriculture: “It is only because of such conversion that you and I have enough to eat.” But he does not support conversion of any of the remaining wild habitat. Others disagree: some economists might argue that a particular wild patch would provide better services to humanity as pasture or plantation. This is the peril of the ecosystem-services model. Hitch your wagon to it, and when conversion provides better services than protection, your biodiversity bonus is cancelled.

Despite his book's provocative title, Thompson does not claim that we don't need pandas. Like most ecosystem services enthusiasts, he is keen to have his economic pragmatism and his emotional love of nature too. Letting the panda go extinct would be “a profound failure for our stewardship of the natural world”, he feels. But he cannot have it both ways. If the ecosystems in which pandas live do not provide economically valuable services to humanity, then it is goodbye panda. ■

Emma Marris writes for Nature from Columbia, Missouri.



Do We Need Pandas? The Uncomfortable Truth About Biodiversity
KEN THOMPSON
Green Books: 2010.
160 pp. £9.95

“We should focus on saving whole ecosystems that are useful for humanity.”

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For a review on protecting the panda, see:
go.nature.com/3dk65d