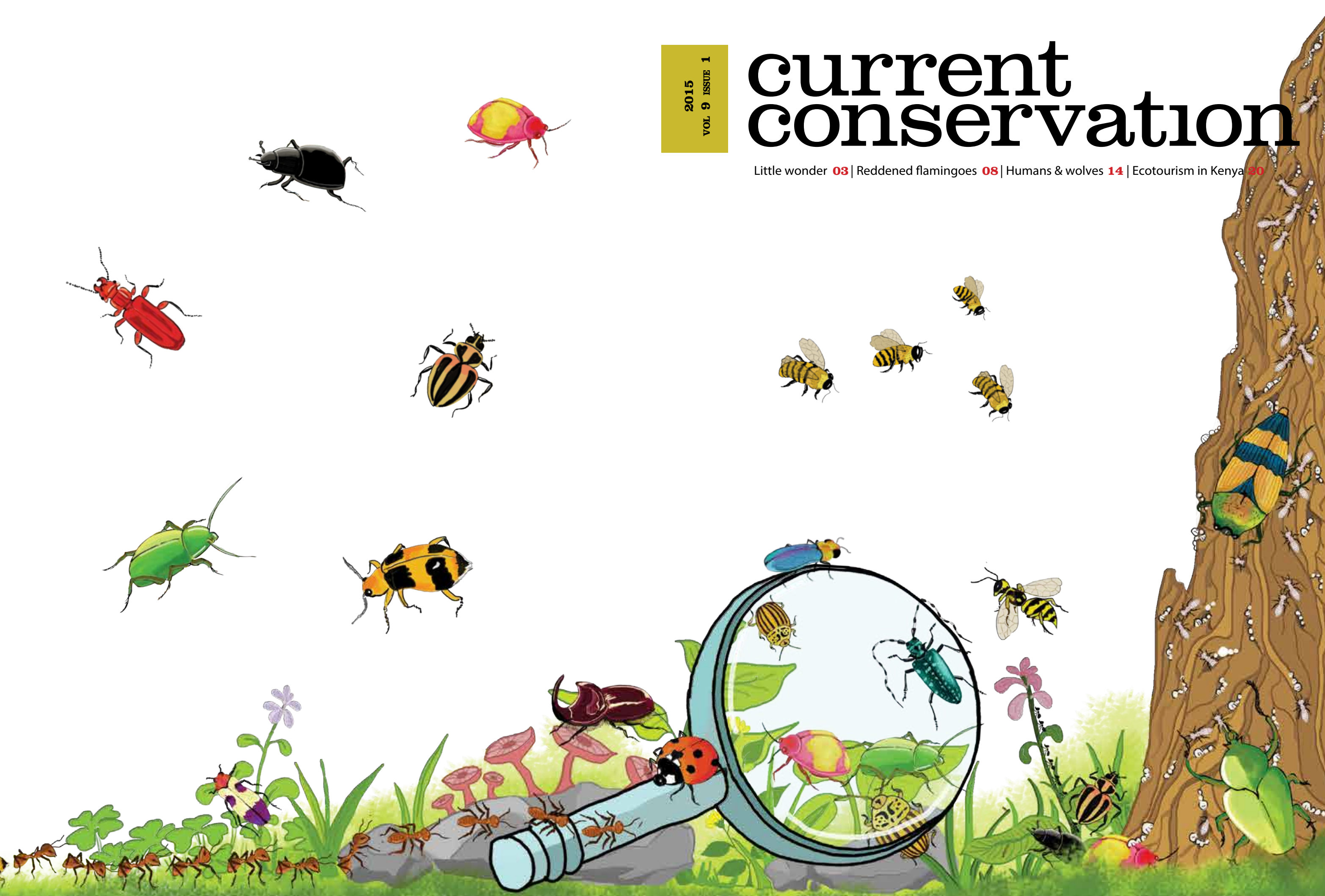


2015  
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# current conservation

Little wonder **03** | Reddened flamingoes **08** | Humans & wolves **14** | Ecotourism in Kenya **20**



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Cover art by Megha Vishwanath

This issue of Current Conservation brings together a variety of pieces. While conservation focusses on its charismatic mega-fauna, usually vertebrates, the astonishing diversity of many small fauna is often missed. Matt Creasey aims the spotlights at the world of marine bacteria, nematodes and insects such as beetles and ants, showing that there is much wonder in little things. Turning to charisma though, Caitlin Kight finds shades of pink the world of flamingos, with some doing quite well while others are of serious conservation concern. And Anna Busse looks at an animal that has been both reviled and worshipped over the centuries—wolves—and examines the ecological role that such apex predators play. Dave Hodgson reports on a student tour of Kenya, cutting across a range of land use types and conservation approaches. In a new section, Anisha Jayadevan writes about a field trip along the west coast of India in search of elusive cone snails.

Current Conservation conducted a science journalism contest during the Student Conference on Conservation Science, Bangalore, 2014 where participants were asked to send 250-300 words summary of two papers- one on celebrity advocacy by Daniel Brockington and one on small drones for forest monitoring by Lian Pin Koh, both plenary speakers at the conference. The 25 entries we received were evaluated by a panel of judges and the winners were Anjali Vaidya and Karthik Teegalapalli whose articles have been included in this issue of CC.

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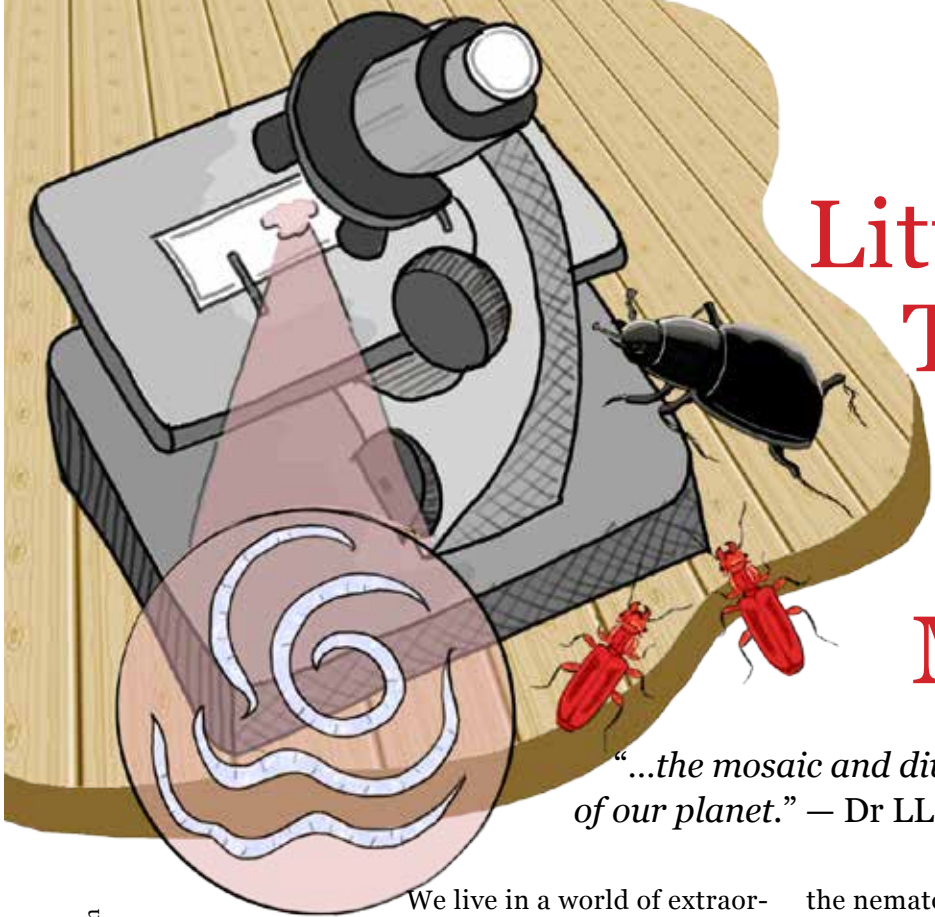
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Megha Vishwanath

# Little Wonder: The Untold Story of the Minute Majority

“...the mosaic and diversity of life is the living story of our planet.” — Dr LL Gaddy, naturalist & author

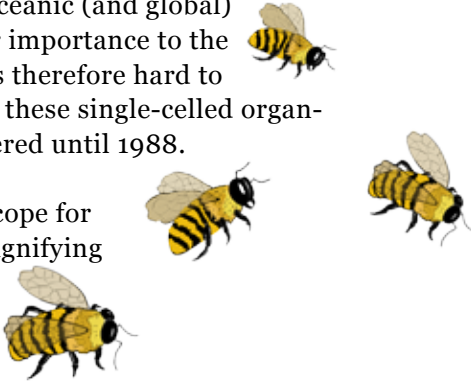
We live in a world of extraordinary diversity and richness. From the tangled labyrinth of the tropical rain-forest to the seemingly endless ice shelves of the arctic north, and the stormy seas which surround them, lifeforms have evolved to exploit every opportunity and to fill every niche. So great is this variety that it can be overwhelming, and as a result it can be easy for some species to be forgotten, passed over and left to drift into obscurity. Especially if they are very small. But it is the species which are least physically imposing that form the silent majority, the greatest portion of life on our planet, and in many ways it is from them that we have the most to learn. As the Harvard professor EO Wilson has said, “the little things... compose the foundation of our ecosystems, the little things...run the world”. So this is the story of the little things. The forgotten species that in the seething tide of life get lost and ignored, but which despite their anonymity have a fascinating tale to tell.

If we are all sitting comfortably, I’ll ask you to take up your microscope, and we can begin. Nematode worms are the most abundant of all animals on the planet. Four out of five animals are nematodes. It has been said that if all solid material on Earth’s surface was removed, the outline of the physical structures would still be visible, from

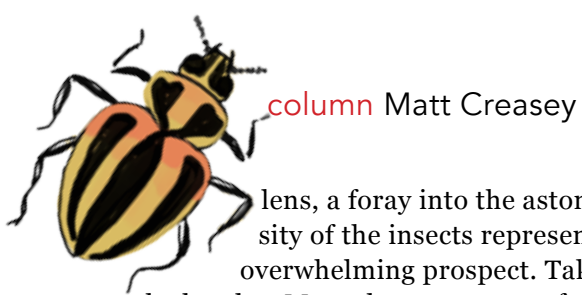
the nematodes. This alone highlights the profusion and fecundity of life on earth, but what is perhaps even more astounding is that we have only begun to peel the outer layer of the diversity onion. Until the early 2000s, scientists had formally described ~6000 species of bacteria worldwide. A great number. However, new techniques for sequencing DNA now suggest that in a single gram of agricultural soil, that’s less than a tea spoon’s worth, there may in fact be over 26,000 bacteria species, while in forests the figure may be as high as 53,000. All these species are engaged in complex ecological interactions, and the DNA they carry, ‘chosen’ as it were by natural selection, suits each to a discrete niche and mode of life. So 53,000 niches, in a teaspoon of soil. Already the mind begins to struggle.

The diversity in the world’s oceans is no less astounding. Marine bacteria of the genus *Prochlorococcus* may in fact be the most abundant organisms on Earth, playing a significant, if not pre-eminent role in oceanic (and global) photosynthesis. Their importance to the health of our planet is therefore hard to overestimate, and yet these single-celled organisms were not discovered until 1988.

Swapping the microscope for a lower resolution magnifying







column Matt Creasey

lens, a foray into the astonishing diversity of the insects represents a similarly overwhelming prospect. Take for example the beetles. More than a quarter of all species described so far are beetles. Their numbers do not simply exceed those of most other taxonomic groups; it has been estimated that there are more beetle species than there are amphibian, reptile, bird and mammal species combined, 11 times over. That's 350,000 species, many of whom, together with the other forms of tiny life which form the foundations of our planet's ecosystems, make a living decomposing and re-constituting 'spent' biological matter, and so act as the powerhouse for the diversity pyramid which rests upon their narrow shoulders. And what of those other tiny lifeforms? No story of our planet's little things would be complete without mention of the Hymenoptera, the sawflies, bees, wasps and ants. To take just the latter, the ants are perhaps most astonishing for the way, when it comes to both time and scale, they combine the inconceivably large with the minutely small. A queen black ant (*Lasius niger*), for example, is 1cm in length, but can live to 28 years of age. Super-colonies of the Argentine ant (*Linepithema humile*) can contain literally billions of workers, and spread over hundreds of kilometres, but each individual worker is less than 3mm long. Dubbed the 'dinosaur' or 'proto-ant', *Nothomyrmecia macrops* is found in the arid region of South Australia, and has hardly changed from ancestors which were already extant 60 million years ago: that's just 5 million years after the dinosaurs went extinct, and 59.98 million years before the first modern humans evolved.

Meanwhile, if we turn to other insect groups, certain species of termite can boast feats of architectural accomplishment which not only rival those of human engineers, but actively inform and inspire them. In the savannahs

*No story of our planet's little things would be complete without mention of the Hymenoptera, the sawflies, bees, wasps and ants. To take just the latter, the ants are perhaps most astonishing for the way, when it comes to both time and scale, they combine the inconceivably large with the minutely small.*

of Namibia, the spired mounds of *Macrotermes michaelseni* can be 12 metres in circumference and almost 4 metres high. Elaborate examples of functional design, inside the mound's imposing walls is an intricate network of variously sized tunnels. Smaller tunnels near the surface help to reduce the effects of turbulent air currents outside. By impeding stronger gusts, air moving more gently can permeate the walls, moving in and out in wave-like currents, and refreshing the air inside. What is more, in addition to maintaining air quality, by carrying wet soil in and out of the mound the workers actively regulate the moisture levels inside the mound, keeping the humidity close to a constant 80% year round. This is not just for comfort however. It is vital for a complex mutualism which greatly increases the efficiency with which the termites can process their food. Strict vegetarians, the termites gather vegetation from

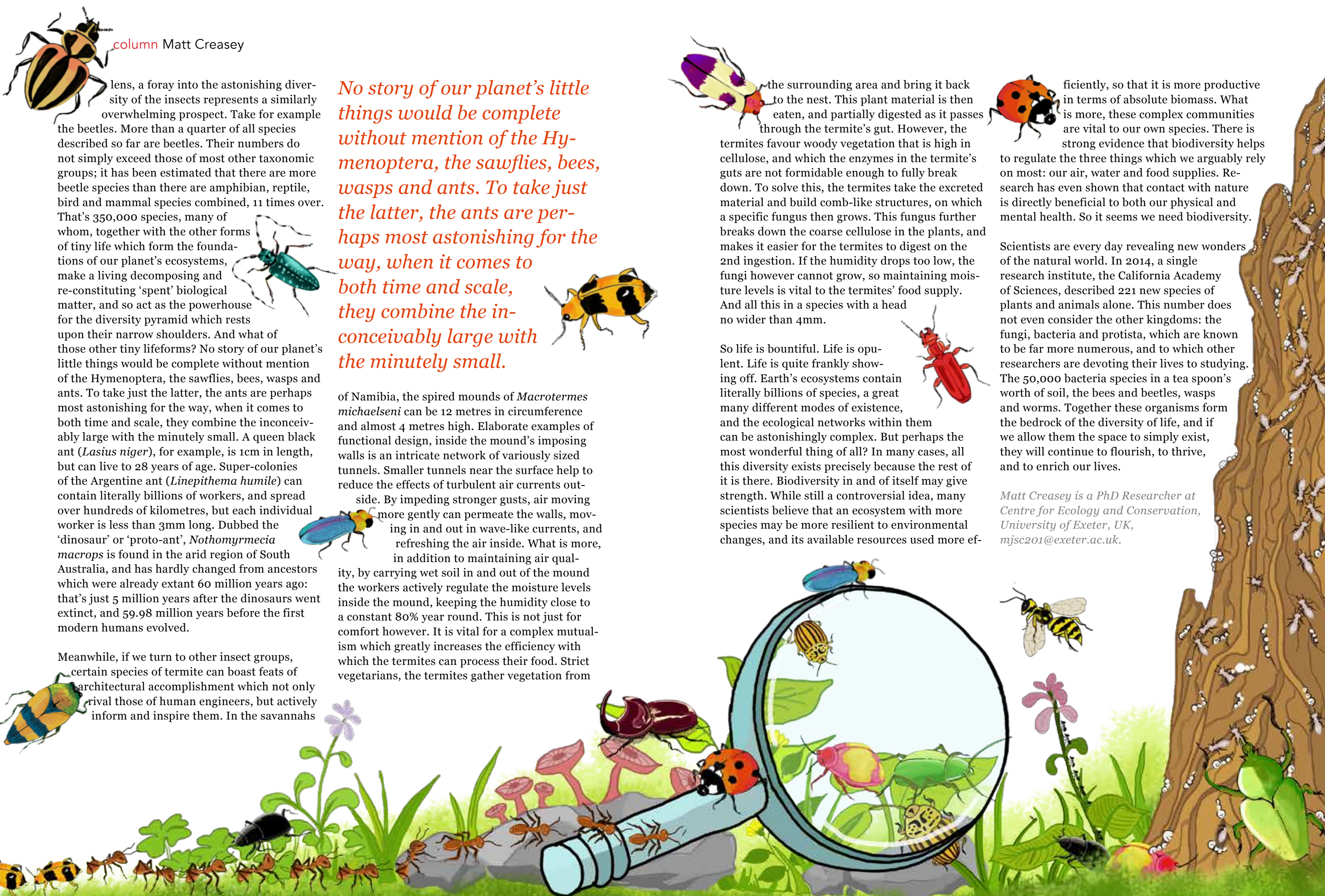
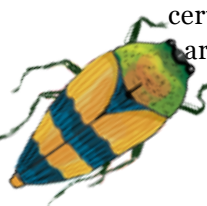
the surrounding area and bring it back to the nest. This plant material is then eaten, and partially digested as it passes through the termite's gut. However, the termites favour woody vegetation that is high in cellulose, and which the enzymes in the termite's guts are not formidable enough to fully break down. To solve this, the termites take the excreted material and build comb-like structures, on which a specific fungus then grows. This fungus further breaks down the coarse cellulose in the plants, and makes it easier for the termites to digest on the 2nd ingestion. If the humidity drops too low, the fungi however cannot grow, so maintaining moisture levels is vital to the termites' food supply. And all this in a species with a head no wider than 4mm.

So life is bountiful. Life is opulent. Life is quite frankly showing off. Earth's ecosystems contain literally billions of species, a great many different modes of existence, and the ecological networks within them can be astonishingly complex. But perhaps the most wonderful thing of all? In many cases, all this diversity exists precisely because the rest of it is there. Biodiversity in and of itself may give strength. While still a controversial idea, many scientists believe that an ecosystem with more species may be more resilient to environmental changes, and its available resources used more ef-

ficiently, so that it is more productive in terms of absolute biomass. What is more, these complex communities are vital to our own species. There is strong evidence that biodiversity helps to regulate the three things which we arguably rely on most: our air, water and food supplies. Research has even shown that contact with nature is directly beneficial to both our physical and mental health. So it seems we need biodiversity.

Scientists are every day revealing new wonders of the natural world. In 2014, a single research institute, the California Academy of Sciences, described 221 new species of plants and animals alone. This number does not even consider the other kingdoms: the fungi, bacteria and protista, which are known to be far more numerous, and to which other researchers are devoting their lives to studying. The 50,000 bacteria species in a tea spoon's worth of soil, the bees and beetles, wasps and worms. Together these organisms form the bedrock of the diversity of life, and if we allow them the space to simply exist, they will continue to flourish, to thrive, and to enrich our lives.

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# Celebrity advocacy and development

Is a good cause helped by a well-known face rooting for it?

Charitable causes have increasingly begun to enlist celebrities as brand ambassadors these days, with mixed effects. For every Emma Watson giving impassioned speeches about gender equality, there are dozens of other public figures who live with their feet in their mouths. More importantly, the association of a famous name is no guarantee that a charitable cause will make lasting change in the face of complex global problems. How did we get to the point where entertainers from Bono to Angelina Jolie became the face of social and environmental justice?

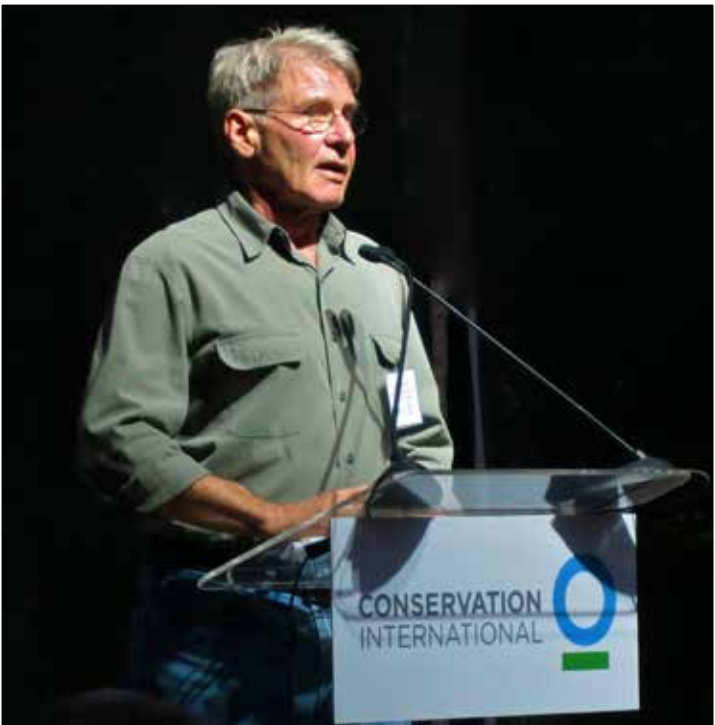
Daniel Brockington, professor at the University of Manchester, believes that the increasing prominence of celebrities in charitable initiatives is a symptom of a larger pattern: the rising dependence of NGOs on corporate interests. In a February, 2014 paper in *Third World Quarterly*, Brockington analysed interviews and data collected from both sides of the charity-celebrity divide, from NGO employees to journalists, agents and public relations officials in the UK and the USA. In addition, Brockington presented a history of charity-celebrity partnerships, beginning with the first Live Aid concert held in 1985. What Brockington found was that such partnerships have become increasingly systematised, as NGOs comb databases for suitable celebrity sponsors. One impetus behind that search is competition for corporate funding, which NGOs can draw if they promise added glamour to corporates: a glimpse of the rich and famous.

Brockington emphasises that celebrity involvement is a marginal factor when it comes to the effects that NGOs actually have on the ground. “The value of this account is that it

delineates the limits of interest in the topic for development scholars,” he says. However, he acknowledges that the clouding of NGO functioning with corporate and celebrity agendas is becoming an issue of increasing importance, and pushes for similar research within the global South.

Dan Brockington. 2014. The production and construction of celebrity advocacy in international development, *Third World Quarterly*, 35:1, 88-108, DOI: 10.1080/01436597.2014.868987.

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Steve Jurvetson

# Rise of the drones: using drones for forest monitoring

Marrying traditional community knowledge-gathering with the latest in surveillance technology

Imagine a camera floating above a forest, regularly transmitting precise images to the community or the organisation monitoring it for conservation and management. Science fiction? Read on.

Tropical forests are presently under several large-scale threats making their monitoring critical. Community-based forest monitoring (CBFM) has been shown to be useful to maximise collection of such information. Jaime and others discuss the practicalities of scaling this up further by using state-of-the-art technology. In their recent article, they reviewed literature on the use of small drones and evaluate their feasibility for CBFM. The advantages among others include high spatial and temporal resolution, relatively low price and importantly, acquisition of the data by communities themselves, thereby empowering them. The disadvantages are mostly technology-limited which will improve in the future, except a few such as ethical issues, ambiguous national laws and

social repercussions. Decentralisation of data acquisition and management, they mention is also possible using drone-assisted CBFM. They suggest that the prospect of having access to such fine-level information will attract communities to partake in CBFM and Reduced Emissions from Deforestation and Forest Degradation projects, to better manage their forests and to monitor illegal activities such as logging and mining. This information will also be useful for governments, non-governmental organisations and scientists.

They also provide recommendations for deploying drone-assisted CBFM programs based on their practical experience. They suggest testing the feasibility of drones in existing CBFM programmes since while practicability, replicability and incorporation of local community knowledge are the advantages, the constraints are of program implementation, enthusiasm and decision-making of the communities as well as ethical issues. Once these nuances are addressed, the use of drones promises a landscape-level method for forest conservation, management and monitoring, which is the need of the hour.

Galvez J *et al.* 2014. Small drones for community-based forest monitoring: An assessment of their feasibility and potential in tropical areas. *Forests* 5(6): 1481–1507.

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Conservationdrones.org



# Pink birds in the red

Kalyani Ganapathy

## The majority of the world's flamingos are of conservation concern; can they be protected?

Flamingos have been described as both the most charismatic of all bird species and one of the most recognisable. While some might argue with the former claim, few would challenge the latter. Thanks to their bright, cheerful plumage, hefty, crooked bill and spindly legs—one often held aloft in that iconic balanced position—flamingos can easily be identified by people around the world.

Though the birds are often referred to generically as 'pink flamingos', there are actually six different species: American (also called Caribbean, Cuban, or rosy; *Phoenicopterus ruber*); greater (*Phoenicopterus roseus*); Chilean (previously also known as red-kneed; *Phoenicopterus chilensis*); lesser (*Phoeniconaias minor*); Andean (*Phoenicoparrus andinus*); and puna (also called James; (*Phoenicoparrus jamesi*)). Evidence of ancient flamingo ancestors has been unearthed in both Australia and Antarctica. Today, however, free-living flamingos are only found in North America (American), South America (Andean, Chilean, and puna), Europe (greater), Africa (lesser and greater) and Asia (lesser and greater).

All extant flamingos require habitats characterised by a single common feature: shallow saline pools. These can be fed by underwater springs, ocean waves, rivers, and—perhaps most importantly—rain. Water in flamingo habitats is often saltier than the sea and may contain compounds that are toxic to many species if consumed in large doses. This seemingly inhospitable habitat is perfect for brine shrimp, small molluscs, diatoms and cyanobacteria—all potential prey items for flamingos. Because so few animals can tolerate extremely salty environments or figure out how to collect the tiny particles of food available there, flamingos have been able to exploit this niche virtually uncontested.

It can be difficult to census flamingos because they tend to live in such remote, impenetrable wetlands. To make matters worse, the birds have a habit of relocating frequently and unexpectedly, which means that researchers may show up to

known flamingo haunts only to discover they have just been vacated in favour of grounds that are tens or even hundreds of kilometres away. Available data indicate that global population sizes vary widely from one species to the next; the least abundant species is the Andean, with only 34,000 individuals, while the most common is the lesser, with as many as 3.2 million birds.

These numbers, however, belie the complexity of flamingos' conservation situations. All three South American species are threatened by anthropogenic disturbance and habitat destruction; while Andeans are considered 'vulnerable', punas (100,000 individuals) and Chileans (200,000 individuals) are listed as 'near threatened'. This is also the status of lesser flamingos, 90% of which breed at a single site that is threatened by industrial developers. Only the American (330,000) and greater (680,000) flamingos are listed as being of 'least conservation concern'.

It's not entirely surprising that so many flamingo species should be under threat; the pink birds have a long history of unpleasant interactions with humans. Phoenician traders are reported to have transported flamingos to Cornwall, UK, where the birds were passed off as phoenixes and traded for tin. Flamingos were kept in captivity by the Egyptians and some groups of Native Americans, and flamingo meat was enjoyed by people of several cultures—though perhaps most of all by the Romans, who have recorded for posterity recipes for properly preparing flamingo tongues for delectation. Even today, the birds are sport-hunted or poached across their range. The illegal slaughter of dozens of adult birds caused an uproar in India in early 2012 because it occurred when hundreds of preeminent ornithologists and birdwatchers were visiting Gujarat for the Global Bird Watcher's Conference.

Flamingos are also known to be negatively impacted by nearly all forms of human traffic, including planes, boats, and all-terrain vehicles. Both the noise and visual disturbance caused by these



vehicles disrupts feeding and breeding efforts and may even lead to habitat abandonment. Ironically, much of this traffic is associated with ecotourism activities that are supposed to generate funds for protecting the birds over the long term.

Even more worrying is the fact that flamingo habitat is under nearly constant threat from human activities such as mining, farming and urban expansion. These activities can reduce the quality of feeding and breeding sites by altering water pH, introducing invasive species that out-compete flamingos for food, removing water (for use in irrigation or to facilitate easier access to minerals), and introducing dangerous structures such as power lines, with which flamingos can become entangled while flying. In the Mediterranean, where native greater flamingos often come into contact with escaped lesser, Chilean, and American flamingos, researchers worry about the potential detrimental genetic and behavioural effects of mixed-species breeding attempts.

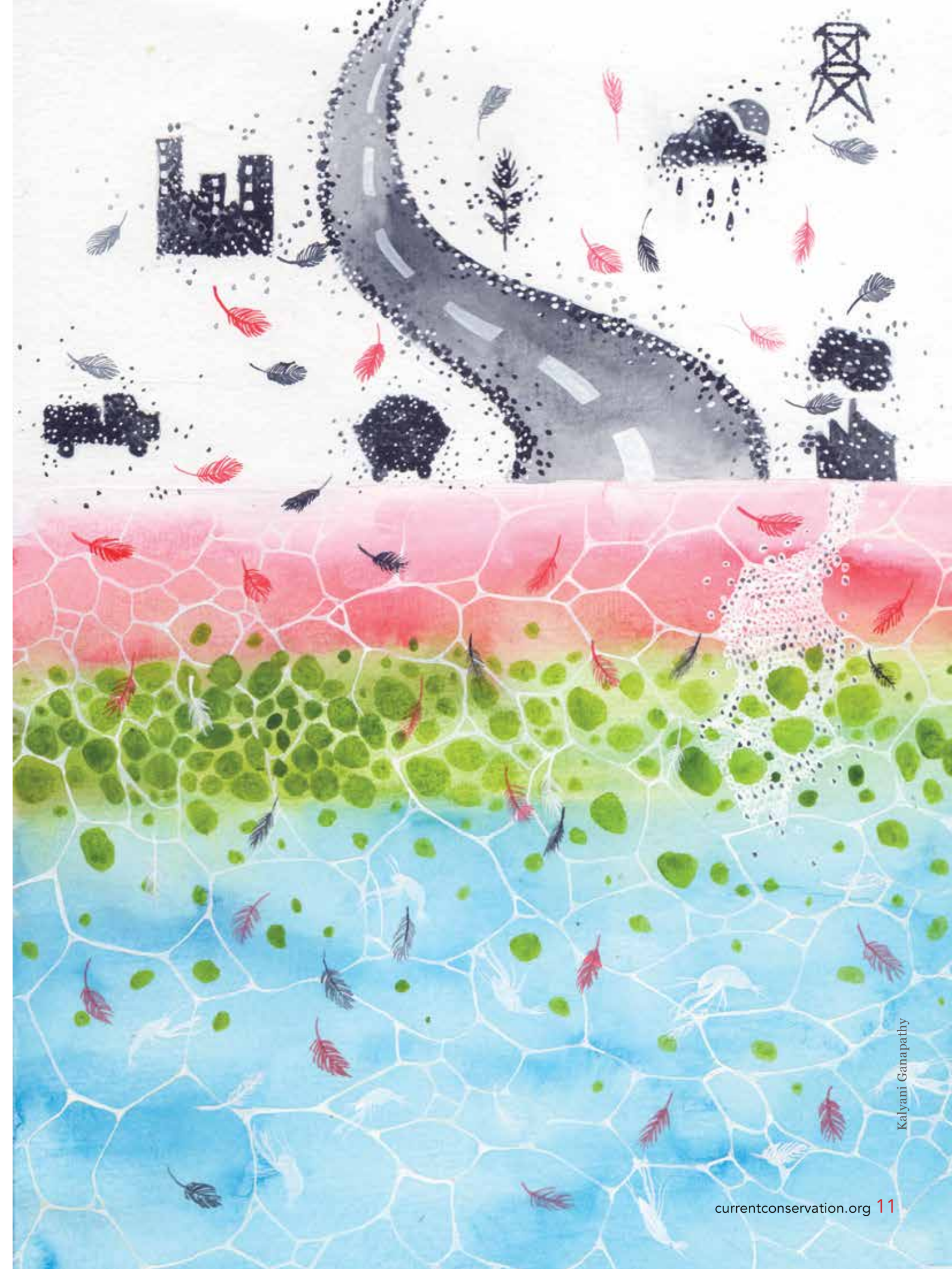
One of the most contentious issues is the proposed construction of roads through irreplaceable flamingo habitat. This has been one of the biggest threats to lesser flamingos at Tanzania's Lake Natron—the single most important breeding ground in the world for lesser flamingos. As detrimental as the road itself could be, even worse is the accompanying plan to open a soda extraction plant that could alter water levels at the lake, thereby potentially reducing the quality and quantity of food available to the birds. Over the years, several proposed developments have also threatened to degrade habitat near the 'flamingo city' in India's Rann of Kutch. Biologists fear that construction in this area will alter water flow and reduce the accessibility of vital flamingo food resources.

Another worry is climate change, which could render favourite habitats unsuitable for feeding or breeding by either drying them up or flooding them to the point that they no longer have the pH required to sustain flamingos' primary prey. Changing water conditions might also encourage blooms of toxic algal species or the spread of harmful bacteria—issues that have already been implicated in the deaths of large numbers of water

birds in Africa. Flamingos are incredibly sensitive to subtle variations in their microhabitat and may decide to forego breeding if they perceive that environmental conditions are not optimal for nesting. While some flamingo populations have readily adapted to anthropogenic environments, this is not generally true. This suggests that the birds would not be likely to utilize man-made alternatives introduced as replacements for degraded natural areas.

Worldwide, conservationists have already initiated several efforts to get the threatened birds out of harm's way. Important habitats for the South American species have been given official protected status, and activists are hard at work to achieve a similar goal at Lake Natron and other African lesser flamingo haunts. Anti-poaching laws have been introduced in some regions and guards have been hired to protect flamingo colonies throughout the breeding season. Perhaps most importantly, researchers have been working on surveying more flamingo habitats—particularly in South America. These intensive efforts are vital for finding out how many birds remain, whether populations are stable or fluctuating, and which flamingo habitats most need to be protected.

*Flamingos are incredibly sensitive to subtle variations in their microhabitat and may decide to forego breeding if they perceive that environmental conditions are not optimal for nesting. While some flamingo populations have readily adapted to anthropogenic environments, this is not generally true.*





- Extant flamingos emerged as a distinct group nearly 60 million years ago.
- Flamingos are most closely related to grebes, together with whom they form a phylogenetic group known as Phoenicopterimorphae.
- The tallest of the six species is the greater flamingo, which can reach nearly 190 cm (75 in) in height.
- Flamingos are pink because they eat photosynthetic organisms (plants, algae, bacteria, fungi) containing carotenoid pigments. These compounds are taken up into the birds' own tissues, imbuing a reddish hue to skin, blood, egg yolks, feathers, and preen oil.
- Feeding and breeding grounds are often quite far apart, and so flamingos may regularly travel hundreds of kms in a single trip, potentially flying up to 15 hours straight at speeds of up to 76 km/h (47 mph).
- Researchers have observed flamingos drinking water as hot as a fresh cup of coffee, without any apparent discomfort.
- Flamingos have highly vascularized 'erectile' tissue in their mouths; this helps them grip and swallow food while filter-feeding in a head-down position.

However, flamingo conservation efforts do not just involve wild birds and field researchers, but also captive birds and aviculturists. Over the years, observations of flamingos at zoos and parks have provided a wealth of information on the birds' natural histories—particularly for the three South American species, which are difficult to locate and study in the wild. Another benefit of captive flamingo populations is that they are a huge draw to visitors whose admission fees are often funnelled directly into conservation efforts. Outside of zoos, the majority of visitors are unlikely to have an opportunity to see flamingos in the wild. As a result, captive facilities are a vital tool in the campaign to raise awareness of, and support for these threatened birds.

Although it has taken many years, aviculturists have finally worked out how to keep flamingos happy and healthy enough to breed in captivity. This has been a boon to conservation efforts for two main reasons. First, sustainable captive populations reduce, or even remove, the need to import wild-caught birds—a process that is always associated with the risk of injury and death to the birds, during both trapping and shipping. Second, maintenance of a large and healthy global population of captive birds acts as an insurance policy against any catastrophes that happen in the wild. Captive flamingos may some day be an important source of genetic diversity required for re-invigorating wild stocks, or, if captive breeding programs reach their full potential, they could even be used to produce birds that can be released into natural flamingo habitats.

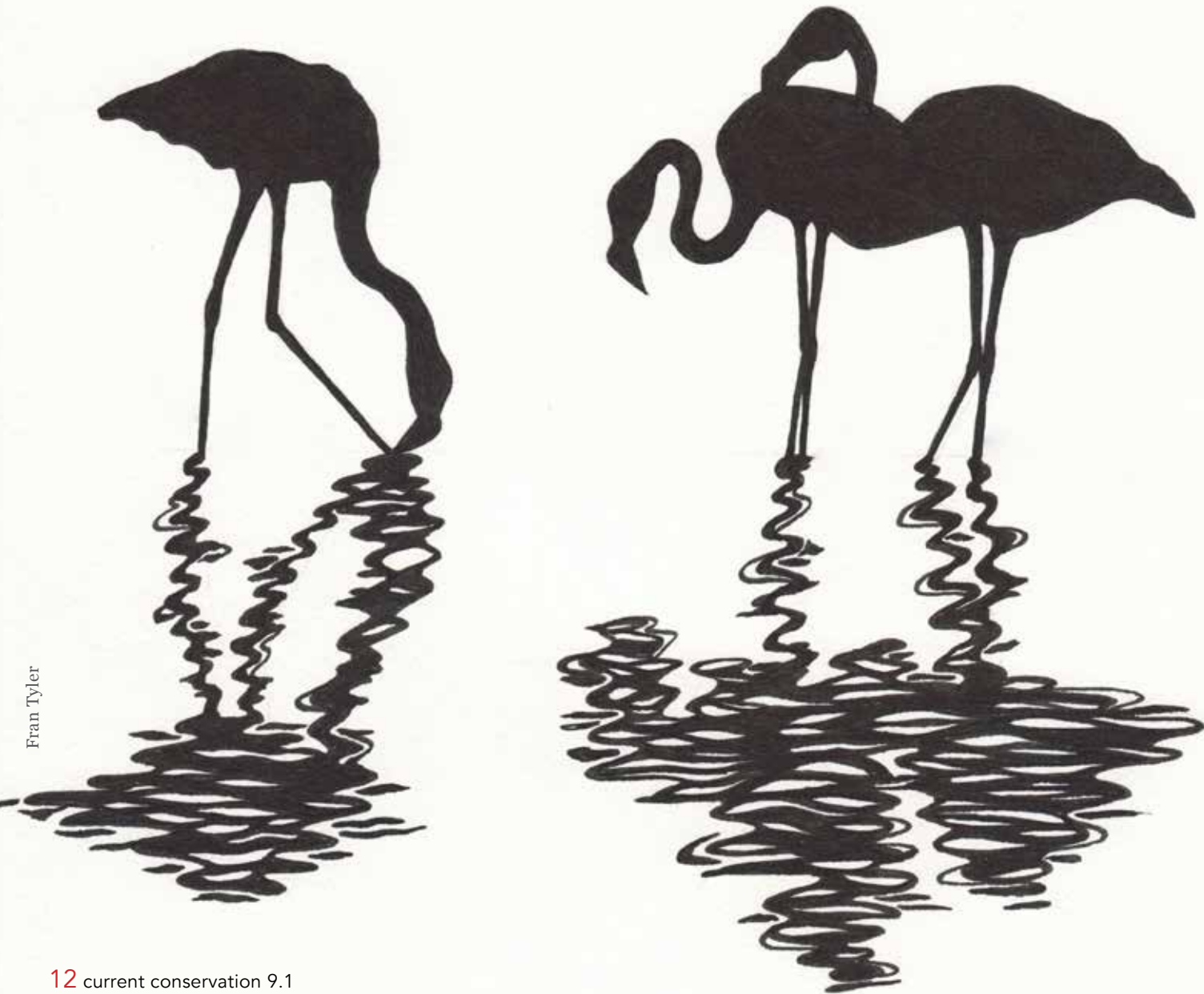
Recently, there has been increasing interest in keeping captive flamingos happy as well as healthy. Perhaps unsurprisingly given the fact that where there is one flamingo, there is usually another, an integral part of happiness is a satisfactory social life. Observations of 'friendships' and 'coalitions' within flocks can help managers decide, among other things, what the optimal flock size is, how much space birds need before they start getting on each other's nerves, and which sex ratios are optimal for promoting breeding behaviour. By being aware of which birds prefer to flock together, aviculturists can also avoid separating 'friends' when moving birds between enclosures or

giving animals away to other facilities. Studies of sociality in flamingos could also provide insights into group dynamics of other species—including humans.

*Although it has taken many years, aviculturists have finally worked out how to keep flamingos happy and healthy enough to breed in captivity. Captive flamingos may some day be an important source of genetic diversity required for re-invigorating wild stocks, or, if captive breeding programs reach their full potential, they could even be used to produce birds that can be released into natural flamingo habitats.*

Regardless of whether we're watching flamingos in order to learn something about ourselves or just to admire their beauty, it is hard not to be impressed. Although they may look delicate and slight, these deceptively hearty birds manage to survive in some of the harshest habitats on earth, and have been doing so for millions of years. We can only hope that efforts to protect flamingos and their habitats will keep these living fossils around to brighten many more days over the generations to come.

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Fran Tyler



# Reconciling the relationship between humans and wolves

Kalyani Ganapathy





We have an ancient relationship with wolves. This relationship has taken many forms over the centuries, and the myths and tales that we tell about wolves reflect this. In some stories the wolf is a devourer, a demon or a destructor. In others the wolf is a guardian, a nurturer or a guide. Many stories teach us to fear and loathe wolves, but there are also stories which teach us to respect and revere them.

Whether the stories of your childhood rendered the wolf friend or foe, one thing is for sure: the wolf is making a comeback. Today communities in the United States and Western Europe are facing rising wolf populations and struggling to decide whether or not they are willing to welcome these wild, ferocious-looking neighbours.

Historically, humans and wolves have had a turbulent relationship that has cost us both lives and livelihoods. Since 1878, for example, the Indian wolf (*Canis lupus pallipes*), a subspecies of the gray wolf (*Canis lupus*), has been responsible for over 1,000 documented human casualties, including hundreds of children. For villagers who live in regions where the Indian wolf roams, the threat of losing a child to a wolf is a very real one. Human lives are not the only ones at risk; domesticated livestock and the human livelihoods attached to them are also threatened by wolves. The predation of livestock by gray wolves is an international issue which impacts the economic survival of ranchers and herders from Russia to the United States.

For wolves, the cost of our relationship has been both life and land. The territory wolves inhabited once covered most of the Northern Hemisphere, and this species is now confined to scattered areas that humans have not yet overtaken.

Though a portion of the historical range of wolves is still accessible to them, they have been intensely hunted by humans for centuries. By the early 1900s, hunting had led to the extirpation, or local extinction, of wolves from most regions of the United States and Western Europe, including the entire United Kingdom.

Destructive outcomes have made our relationship with wolves problematic for both species.

Despite widespread persecution, wolves have proved themselves both resourceful and adaptive, and their return to parts of the US and Western Europe demonstrates an ability and willingness to coexist with humans. The question we now have to answer is whether we can coexist with them.

*Historically, humans and wolves have had a turbulent relationship that has cost us both lives and livelihoods.*

The biggest challenge to wolf conservation is low cultural acceptance amongst politically powerful communities, particularly herdsmen and hunters. The communities most resistant to wolf reintroduction are typically found in areas that wolves have only recently returned to or might inhabit in the near future. These communities lack livestock practices that prevent wolf predation, and lack a clear understanding of how wolves affect other animal populations and the ecosystem overall. These communities have not yet adapted to wolves but they could, especially if provided with economical and educational resources to support the transition.

**The ecological role of the wolf**

As members of the global food web, both humans and wolves find themselves irrevocably intertwined in an entanglement of connections that we are still only beginning to understand. This food web represents a larger context for the conflict between humans and wolves and both of our roles in the global ecosystem are worth examining if we are to best determine how to guide present and future wolf conservation.

Unlike humans, wolves alter their diets in response to changes in the populations of other species in the food web. Since wolves and other large predators have no natural predators themselves

(humans are typically not considered a “natural” predator for these species), they are classified as apex predators, which hold a top-level, regulatory role in food webs. By interacting with both herbivores (also known as primary consumers) and smaller predators, apex predators promote a balance of genetic health, competition, and biodiversity throughout the ecosystem.

In Yellowstone National Park (Wyoming, USA), for example, tree saplings of willow and aspen act as producers that are eaten by primary consumers such as elk (*Cervus canadensis*). These are then hunted by coyotes (*Canis latrans*), which are mid-level predators (or mesopredators). Wolves are the apex predators residing at the top of this food chain, regulating the populations of both primary consumers (which they hunt) and mesopredators (with which they compete). The dynamic of this food web is influenced by additional species, including plants, rodents, foxes, bears, eagles and countless others.

Apex predators impact prey species not only by eating them, but also by altering their consumptive and migratory behaviours by influencing their perception of predation risk—the likelihood of predator-induced mortality. This can lead to

reduced foraging behaviour and increased energy usage, which regulates the rate of survival and reproduction among prey species. Predation risk also increases migratory behaviour, thus mitigating the impact of herbivorous species on plant populations by preventing the continued exploitation of a particular plant species or area. In the absence of apex predators, primary consumers create ecosystem imbalances by over-consuming key plant species. In the United Kingdom, where red deer (*Cervus elaphus*) have proliferated in the absence of wolves and other large predators, over-consumption of saplings has hampered reforestation efforts, leading to reductions in bird density. The red deer also compete with livestock for food, creating unforeseen costs for those who rely economically on livestock.

Apex predators regulate mesopredator populations primarily through competition rather than direct consumption; not only do they consume key prey species that mesopredators also consume, but they may also prompt mesopredators to avoid entire habitats altogether. In the absence of apex predators, increase in mesopredator populations (known as mesopredator release) leads to a decline in the populations of the species they consume. This has been demonstrated in Min-



As apex predators wolves act as vital regulators for the surrounding ecosystem

Anna Busse



Lisa Alba



The grizzly bear (*Ursus arctos horribilis*) is another apex predator that plays an important role in North American ecosystems

nesota where coyote populations have risen in the absence of wolves, causing a decline in rabbit and hare populations. Because mesopredators target a wide variety of prey species, this unregulated consumption can create an ecosystem imbalance.

This type of ecosystem influence can extend beyond the wilderness and into human interests. The absence of wolves as apex regulators in the US has led to increased livestock predation by mesopredators such as coyotes which, when compared to wolves, may be responsible for over 26 times the number of sheep fatalities, and 14 times the number of nationally recorded cattle fatalities. The potential for gray wolves to control coyote populations—and, thus, coyote predation on livestock—is a compelling reason on its own to preserve wolf populations, even for herdsmen.

### Controversy over conservation law

Despite wolf conservation policies upheld by the US and EU, the rise of wolf populations in select

regions has been met by strong political resistance which has managed to slow reintroduction efforts, and in some territories (such as the UK) has prevented them entirely.

For example, in the US, wolves have been protected by the Endangered Species Act since 1973, but the return of sizable populations to the Rocky Mountains and Great Lakes region from Canada generated enough political resistance that protection was removed from these two areas in 2011 and 2012, enabling legal hunting of wolves to take place. Conservationists continually fought both rulings and in 2014 the decision to delist wolves in the Great Lakes region was overturned, providing federal protection for that population once again.

*The absence of wolves as apex regulators in the US has led to increased livestock predation by mesopredators such as coyotes which, when compared to wolves, may be responsible for over 26 times the number of sheep fatalities, and 14 times the number of nationally recorded cattle fatalities.*

Wolves are protected under EU policies as well, prohibiting destruction and damage to populations, though there are many exceptions which allow killings similar to those occurring in the US to take place. Norway and Sweden have been conducting highly controversial wolf cullings since 2005 and 2009 (respectively) despite public resis-

tance, frequent suspensions and questionably-low wolf populations in both countries.

### Resolving our differences

The competitive relationship between wolves and humans will always have the potential for conflict and overcoming the human instinct to hunt wolves will not be easy. Because of this, the conservation of wolves faces many obstacles, but also provides numerous opportunities. As we work to conserve the wolf and its habitat, we can also work to mitigate the relationship between wolves and the humans they come into direct conflict with. Herdsmen can be supported through the employment of range riders who patrol around herds and discourage wolf attacks. Additional means of livestock protection can be implemented such as predator-proof fencing, herding and livestock protection dogs, and the removal of livestock carcasses which provide an invitation and an easy meal for predators. Hunters can be engaged with and educated about the importance of conserving wolf populations. In all of these communities, individuals who believe in the conservation of wolves can be empowered to transform the perspectives around them.

Wolves and other apex predators, despite their competitive relationship with humans, act as vital regulators for our global ecosystem. They help maintain healthy population sizes of various spe-



Wolves regulate the population size of prey species such as caribou (*Rangifer tarandus*)

Lisa Alba

cies, encourage the continual movement, genetic and overall fitness of prey populations, and self-regulate their own population in response to environmental conditions. As the impacts of human development have placed our global ecosystems in a precarious position, it would be wise for us to conserve these regulators rather than eliminate them and put further strain on ecosystems already under stress. By utilizing more mindful human practices and educating ourselves on the value of wolf conservation, we can overcome the limitations of our relationship with wolves and can begin to write a new chapter in the mythology of the wolf.

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# Preserving wildlife for posterity and prosperity: an ecotourism case study

A two-week-long educational trip to Kenya provides insights into the challenges and opportunities of ecotourism.

Those involved in conservation know that it is an interdisciplinary field combining sociology, politics, economics, culture, biology and ecology. It is not an easy thing to share the complexities of conservation dynamics with students who, when they make their first forays into the field, tend to see the issues in very black and white terms. Residential field courses, however, offer unique opportunities for budding conservationists to see and experience the issues first hand—to be impressed and moved by the majesty of wildlife, but also to view the inequalities and injustices that drive people to engage in poaching, deforestation and other activities that threaten not just certain species, but entire ecosystems. Having recently returned from such a field course, I am struck by how these sorts of trips allow students to fully appreciate how difficult it is to measure natural systems, and how “truth” is often concealed by propaganda, opinion, misinformation, disinformation and the occasional total lack of information.

Our destination was Kenya, which is home not only to a famous diversity of wildlife, but also a number of other riches—geothermal energy,

water, oil and food. Our trip spends 14 days in a small polygon of Kenya with vertices marked by Nairobi, Lake Naivasha, Lake Nakuru, Mount Kenya, and the western and eastern ends of the Maasai Mara. Here, it is particularly easy to see how Kenya’s prosperity waxes and wanes with changes in climate, national politics, global politics and the interests of global superpowers, multinational companies and international charities.

Kenya’s wildlife, and the tourism it attracts, is one of the keystones of the nation’s economy. But Kenya faces social and environmental problems that affect international tourism, and its government seeks economic prosperity and technological development in ways that usually conflict directly with the nation’s natural capital. Furthermore, it is not only Kenya’s wildlife that needs conserving; there is also the country’s vast melting pot of cultures to consider.

**The field course begins: Land-use change around Nairobi**

We began near Nairobi in the Kitengela triangles, barely-triangular tracts of land that traditionally formed dispersal corridors for the great mega-herbivore migrations of the Serengeti ecosystem. The pressures of economic development in



Nairobi have caused land value to sky-rocket in this region. Without sensible regulation of land sale and subdivisions, the Kitengela plains have changed from a continuous stretch of savanna and scrub into a patchwork of small-holdings, farms, cement factories, and villages, fenced and fragmented to such an extent that wildlife migrations are blocked. Nairobi National Park, a honeypot for safari tourism due to its proximity to Nairobi, is now fully encircled by urban sprawl and poorly-regulated, anthropogenic, landscape fragmentation. Is it now any more than a big zoo?

We found hope on the fringes of the park, where members of the Olerai Conservancy aim to halt the subdivision of land into fenced, half-acre plots. The native Kenyan managers of the conservancy have worked with their local communities for several years now, fostering trust that their vision of posterity can also yield prosperity through a combination of low-impact agriculture and tourism. Grants from the Kenyan government and the World Bank have helped to support the installation of water pans, which provide precious permanent drinking for livestock and wildlife.

We met pastoralist landowners on the very edge of the park, where loss of livestock to lions and hyenas, and loss of crops to large herbivores, is not just a threat but a reality. This sometimes prompts

illegal retaliatory killings, which can be discouraged via compensation schemes, assisted installation of fortified livestock enclosures, and new methods for deterring predators. Unfortunately, these schemes—run by government and international charities—are usually transient, dictated by pockets of large-scale funding.

**Kenya’s lakes: Floriculture, catchment-scale management, and ecotourism**

We found a new set of environmental problems at Lake Naivasha, a freshwater lake fed by catchments that stretch back to the Aberdare mountain range. The lake has a long and ecologically devastating history of species introductions, the most obvious of which are the vast floating mats of water hyacinth and papyrus. In some years, boats fail to reach the central lake waters through this floating thicket. Introduced crayfish and tilapia fish have radically altered the natural aquatic community, but even these fish stocks have declined in the face of sedimentation from upstream agriculture and the burgeoning floriculture industries on the lake’s shore.

Lake Naivasha is now a booming industry for international flower-growers, growing and sending roses to the supermarkets of Europe. The cynical view of this industry is that it exports Kenya’s scarcest commodity, water, to water-rich countries, in the form of flowers. This might sound like taking coals to Newcastle, but the tax breaks provided by the Kenyan government, coupled with the ideal growing conditions and cheapness of human labour in this region, make it highly profitable.

We visited two flower farms where drip irrigation is used to minimise water usage; where the use of







pesticides and fertilisers is carefully regulated—sometimes using biological instead of chemical controls; where attempts are made to capture rainwater efficiently and recycle water wherever possible; and where there has been investment in riparian waste-water treatment systems to reduce the output of waste chemicals into the lake itself. We discussed the provision of minimum wages and ethical working conditions for staff, the provision of housing and schooling for the families of workers, and the work of the Lake Naivasha Riparian Association whose members hope to reduce the impact of floriculture on wildlife and the lake ecosystem.

We also drove to Lake Nakuru National Park, a completely fenced, but still vast, wildlife sanctuary on the edge of Nakuru city. This is a hotspot for rhinoceros conservation, hosting healthy populations of both white and black rhinos alongside a host of other charismatic species. Despite enjoying the wildlife, we wonder whether we are visiting part of Kenya’s vast wildness—a bastion of conservation in the face of rising pressures from rhino poaching—or whether the fence simply creates a large safari park for tourists.

**Middle Kenya: Conserving rhinos and water**

After relocating to the western flank of Mount Kenya, we explored several sites in middle Kenya. The first was Solio, a cattle ranch forming a buffer around a wildlife reserve that supports very large densities of black and white rhinos. Solio’s income is derived from a mixture of cattle ranching and high-end tourism, alongside national and international trade in rhinos for restocking programmes.

The latter income source is currently threatened

by increasing levels of poaching, but perhaps more directly by changes in government policy. Until recently, only the indigenous wildlife of Kenya was the property of the Kenyan people, and was managed by the Kenyan Wildlife Service. The recent Wildlife Act made even the non-indigenous wildlife of Kenya, including white rhinos, also the property of Kenya. This prevents ranches like Solio from earning money from trade in white rhino, and begs several questions: If the Kenyan government insists on ownership of all wildlife, how will private conservation entrepreneurs support conservation on private land? Could private ranches benefit from community engagement, so as to reduce the incidence of poaching? How can rhino horn be devalued internationally to reduce the profits in poaching—or should we consider legalising trade in rhino horn?

With this conservation conflict still ringing in our ears, we returned to the issue of water regulation and conservation. Water is more plentiful on the flanks of Mount Kenya, but the catchments extend all the way to the Indian Ocean, and with increasing levels of water extraction, mountain-side rivers soon turn into seasonal streams needed by pastoralists and wildlife alike. In Ngushishi, a Water Resource Users Association (WRUA) is supported by the Department of Water to regulate the use of natural water sources by domestic users, flower farms, local farmers and larger farms growing crops for the international supermarket trade. Water users who join the WRUA are given a proportion of the water flow, but the WRUA ensures that a fixed amount of water is left to flow to the lower parts of the catchment. Here, regulation is essential because the wealth is at the top of the catchment and, left unchecked, there would be no incentives for upstream users to leave water for

downstream use. Thanks to good management and an apparent lack of corruption, Ngushishi WRUA succeeds where others have failed; however, questions remain: What happens during drought years? What happens when water prices fluctuate? How does illegal water extraction get policed?

We also met an organic farmer who is supported by the WRUA and has created an exemplar of low-impact, organic farming. On a small piece of land, he grows a diversity of crops for the local, national, and (sometimes) international market. He rears cattle in barns to supply milk for the local market. He composts his domestic and horticultural waste to return nutrients to the soil. He drip-irrigates to minimise water consumption. In fact, he uses every drop of water four times. He has built water pans to store rainwater, ensuring water availability for at least three months of drought conditions. This water is used domestically before entering a large fishpond, where the farmer rears fish for the local market. The water from the pond is used to irrigate crops and is then recycled to feed a composting system. On the fringes of the composting pits and water reservoirs, the farmer rears bees for honey and silk moths for fabric. We were suitably impressed by his organisation and productivity.

**Land use and safari in the Maasai Mara**

For the final leg of our journey, we folded ourselves into our matatu vans and endured the long journey to the Mara North Conservancy at the western end of the Maasai Mara. At dusk, we entered a patch of scrub where we camped for the night. Maasai guards kept the leopards and hyenas away, and the students were awestruck by the stars unobscured by light pollution here.



Students in the flower farm

A dawn walk by the river revealed hippos and buffalo, but the feeling of wilderness was dispelled when the students were shown the nearby lodge and glamping tents at Salt Springs, located only metres from our supposedly “wild” camp. The facility is run entirely by Maasai and helps bring income into the Mara North Conservancy. It is a preferable alternative to unsustainable agricultural activity, or the illegal development of permanent structures, on this critical habitat. Rising land value and a new sense of ownership have driven Maasai landowners to sell to the highest bidder, resulting in fences and international investment. The Serengeti ecosystem is vast, but development risks the natural movement of the wildlife that maintains this northern section.

Many conservation issues are raised by the following two days of safari. We drove too close to the animals, spent too long watching them, and found ourselves voyeurs of traditional Maasai lifestyles during a touristic visit to a local manyatta. It made us question our very presence in Kenya. The experiences were those of a lifetime, but how does tourism change local lifestyles, impact on the be-







haviour and persistence of the wildlife, and drive the market forces that exploit Kenya's natural resources?

We debated our impacts on Kenya, concluding that a field course like ours can only be justified if it has legacy; what the staff and students learn from the experience must be translated into efforts to help Kenya develop sustainably—and to conserve, but not in the sense of preserving the wildlife and ecosystem. Rather, we would wish for conservation that means adapting to maintain biodiversity, quality of life for local residents, and natural environment (which is also natural capital) in the face of national and international politics, market forces and climatic change.

### Summing up

Having been involved with Kenya field trips for ten years now, I can sense changes—although I often can't tell whether I am gradually forming opinions, finding out more truth, or detecting real change. This year, I came home feeling more

positive than ever that the instinctive optimism of Kenya's people will bear fruit, and will provide the impetus for the conservation and sustainable development of the country's natural environment. Despite political instability, corruption, poaching and terrorism, the people of Kenya understand that their wildlife contributes both posterity and prosperity to them and to their nation, and are motivated to conserve it. I hope that Kenya's political systems catch up with this optimism and learns to support, regulate, and align the interests of Kenya's human and natural systems—and that the country can serve as a model to other nature-rich nations looking to balance economic and ecological goals.

*Dave Hodgson is Associate Professor of Ecology at the University of Exeter's Penryn Campus. He visits Kenya annually with students from the University's Conservation Science and Policy Field Course. He wrote this piece with the help of Enoch Mobisa, Sue Rodway-Dyer, Chris Laing, Josie Bridges, and Sophie Davison.*

Photographs: Dave Hodgson

# Quest to find an elusive snail

I will remember the smell of fishing harbours for a long time to come.

It threatens to overwhelm at first. Then, it jostles for competition with other sensory assaults: shouts of fishermen auctioning their fish and people declaring their bids; loud colours of saris, lungis and fishing trawlers; the cries of fishermen on their boats passing crates of fish to each other and the 'thud!' as the crate lands on the floor of the harbour, hundreds of people busily doing things. My thoughts are interrupted, suddenly— a group of fishermen obscure my view and hastily tell me to move out of the way as they haul a large yellow-fin tuna away from their boats. The floor of the harbour is wet, parts of it speckled with fish-scales that glimmer dimly. The wetness clings to my sandals.

I am with Bharti DK, a PhD student of the Indian



A morning at Shaktikulam harbour

Institute of Science and Sajan John, a researcher with nuggets of wisdom about everything under the sun and the sea. Bharti's quest to find an elusive, unassuming marine animal has brought us to the fishing harbours of Kerala. She wants to find out how this animal disperses and how such dispersal might shape its populations.

Bharti holds a shell in her hand, a conical shell with spirals and a delicate minaret. It is the former home to a snail called *Conus*, one of the species that she is interested in. *Conus* is usually found ten metres into the sea and sometimes caught as by-catch by the fishermen.

"Have you seen this shell?" we ask the fishermen. Some of them peer curiously at us from their boats and ask us what we are there for.

They point us in the direction of heaps of fish and other marine life they are not interested in. There are people sorting these heaps. Fish that can be sold go in one pile, the rest go in another. A few of these people enthusiastically look for *Conus*, throwing us any shell that vaguely resembles it. For a short while, our quest becomes their quest. I am easily distracted. Above us, the sky is a blur. There are crows, brahminy kites and egrets circling the boats. Every now and again, one of them swoops and steals a fish from the boats. Sometimes a fight breaks out between the birds as they pilfer each other's catch.

We prod the heaps of marine refuse with a stick, looking for *Conus*. Some of the heaps still writhe with life. Hermit crabs stumble out in a daze. Sajan points out some beautiful creatures called sand dollars. They are flat and round and fit in the palm of my hand. I look closer and notice patterns of petals etched on them. I quickly pocket them to add to the growing hoard of nature's treasures in my room, little knowing that the pretty creatures would gently fill my bag with a putrid odour and metamorphose into a brown, unrecognisable slush.





An auction of rays in progress

In one of the harbours, a big, burly fisherman followed by an entourage of his colleagues, towers over us and asks us what we want. Sajan explains at length. The fisherman disappears into his cabin and comes out holding a shell. It is a species of *Conus* called Textile Cone which looks like porcelain etched with fine zigzag lines. However, like most other shells we found, its inhabitant is absent.

Back in her laboratory in Bangalore, Bharti will extract DNA from *Conus* snails from different locations. From its DNA, she will be able to understand the genetics of each population, and find out how related populations are to each other. Some *Conus* species travel long distances as larva, while others are sedentary. Bharti wants to find out why this is so, what it is about each species that determines how far its young travel. She will use the genetic relatedness of populations to estimate how far a species' larva travels. The logic is simple:

the further the larvae travel, the more will be the genetic relatedness of separated populations.

The fishermen sometimes ask us to come aboard their boats where fish are still being sorted. Picking our way across boats, we see fishermen lolling on their sides, tired from their sojourn at sea. Some of these boats have spent many days at sea, going as far as Pakistan. Not bothering to get up or shift from their reclining positions, the fishermen ask us what we want, and pass around the *Conus* shell that we show them. Often they make us run in circles; fishermen of the smaller fishing boats tell us to go to trawlers; the men of the trawlers send us back to the small fishing boats.

This has been the general routine in the six fishing harbours we have gone to from Thiruvananthapuram to Kozhikode. Each time we near the harbour our driver announces, "The smell has come!" We don our hats, roll up our pants and let ourselves be enveloped by the bustling masses of people.

*Each time we near the harbour our driver announces, "The smell has come!" We don our hats, roll up our pants and let ourselves be enveloped by the bustling masses of people.*

The harbours are intriguing with all their activity, but it is sad that my first introduction to many beautiful creatures of the sea is when they are lying lifeless on the harbour floor. Here are marlins with their enormous, jagged fins which look like they jumped straight out of someone's imagination; here lie eagle rays with little heart-shaped depressions on their bellies; sharks that look sinister even in death; pearly-white, translucent squid oozing out their black ink; plump yellow-fin tunas—their tiny yellow fins contrasting sharply with the grey of their bodies.

Before the fishermen return in their technicolor boats when the sun's rays are still only an hour old, the harbour is in a lull. Then, in a few hours, the activity in the harbour touches fever-pitch and then lapses again into a sleepy restfulness. People from big hotels, exporters and fishmongers arrive at the scene and wait for the arrival of the fishing boats. Some of them form little knots and watch the sea. A few fishermen sit by their boats and mend their fishing nets as the sun rises over the harbour. Once the boats dock, a flurry of activity ensues. Boats are cleaned; barnacles scraped off; smaller fish sorted out; bigger fish bodily dragged out of boats, pulled through a mass of humanity and then auctioned. As soon as a new load of fish is brought to the harbour, a crowd of people surround it and an auction starts without preamble. Once done, the crowd dissolves and forms at another site.

We stand out amidst the throng. The fishermen allow us to interrupt them to ask them about the shell.

"Have you seen this shell?" We ask over and over again. "Do you know where we can find it?"



Fishermen scraping barnacles off their boats

After this frenzy of activity the pulse of the harbour slows. Fishermen laze in their boats, tell each other about the day's happenings and catch a few snatches of sleep. Some gather for a game of cards in the shade of the harbour.

As we come away from the harbour, I am reminded of the fishing markets in Asterix comics, always bustling with activity and incident. We learn towards the end of our quest, that there is a separate fishing season just for *Conus* and other ornamental shells, and we had come at the wrong time. That may be another chapter in Bharti's quest. As for me, I am content with the opportunity this quest allowed me, to peek into the lives of fishermen, entwined as they are with those of the fish in the ocean.

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# Sharing spaces with feathered friends



Welcome to Subirdia  
Sharing Our Neighborhoods with  
Wrens, Robins, Woodpeckers, and  
Other Wildlife  
John M. Marzluff; With Illustrations  
by Jack DeLap  
  
ISBN-9780300197075  
  
Yale University Press, September 30,  
2014

Your enjoyment of John Marzluff’s new popular science book *Welcome to Subirdia* will likely be determined by your familiarity with the issues that he discusses within its ten chapters. The book, subtitled *Sharing Our Neighborhoods With Wrens, Robins, Woodpeckers, and Other Wildlife*, serves as a primer on the role that developed spaces—cities, suburbs, and the “exurbs” that often connect the two—can play in conserving wildlife and preserving or enhancing local ecosystem function. The word “subirdia” reflects the idea that these human-disturbed environments act as “a bridge that connects the more urbanized parts of the city to the wilder country beyond the metropolis”, thereby providing space for birds and other wildlife.

Marzluff, Professor of Wildlife Science in the University of Washington’s School of Environmental and Forest Sciences, draws heavily from his own research in and around Seattle over the past many years. He and his students have studied everything from the hefty pileated woodpecker down to the diminutive Pacific wren. In the process, they have developed a detailed understanding of which avian species are avoiders, adapters, and exploiters—or, in other words, those that flee from human disturbance, those that modify their behavior so as to cope with it, and those that thrive in it, respectively.

Unfortunately, the first seven chapters of the book pass in a blur. The author mentions a range of interesting research, but doesn’t really describe it in a satisfying amount of detail; he provides tantalizing glimpses into his team’s methodologies, then leaps straight into simplified summaries of the findings that will feel shallow and insufficient to readers who have any previous knowledge of the intricacies of the relationships between wildlife and anthropogenic spaces. On the other hand, those who are seeking exposure to this information for the first time will find *Welcome to Su-*

*birdia* to be a useful review that will quickly bring them up to speed on the basics.

The book improves greatly in the final four chapters. In chapter seven, Marzluff eloquently explains the processes of adaptation and evolution, emphasizing how humans can—often unknowingly—act as a selective pressure on the wildlife with which they share their habitats. In the next chapter, the author broadens his focus in order to explore the many other types of organism that are threatened by, or can make themselves at home in, human spaces. This important section emphasizes that the feathered subjects of the first several chapters are only a portion of the many species of wildlife that encounter humans; like their avian relatives, mammals, invertebrates, fish, and herps also either adapt, exploit or avoid. The final two chapters provide useful advice to readers who have been inspired by the preceding pages and would like to join citizen science efforts, landscape in a bird-friendly way, or lobby for more eco-friendly practices in their neighbourhoods.

Marzluff writes in an accessible, jargon-free way, making the findings of academic research easily comprehensible to the average reader. In fact, some portions of the book are unexpectedly poetic, as in the following passage from the last page:

*Cutting our ties to the [ecological] web is like cutting the belay line climbers rely upon as they stretch for a distant handhold. As we stretch to live within a rapidly changing world, are we ready to gamble on an unprotected, solo climb? My hope is that we forego a lone ascent and instead seek creative ways to coexist with a wide diversity of birds and other creatures.*

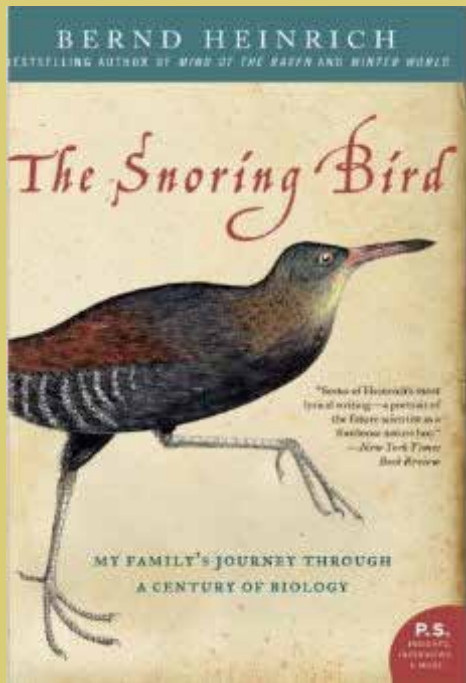
However, Marzluff’s desire to write in a straightforward manner also sometimes means that he is overly simplistic, to the point that he is also sometimes inaccurate. For example, he writes about a fellow scientist who has “a passion for forests and their nemeses: fire, bugs, and climate change.” Any reader with a basic understanding of ecology will know that wildfires can actually be a boon for forests, providing the conditions necessary for the germination of seeds and the growth of new saplings; insects, likewise, may play an essential role in promoting decomposition and pollinating flowers. Although pedantry can get in the way of a good read, inaccuracies like these may actually defeat the purpose of a conservation-minded popular science book like this one.

The release of *Welcome to Subirdia* was accompanied by many lengthy, heated discussions on Internet chat boards, where wildlife-lovers expressed surprise at the author’s support of suburbs and built-up habitats—areas that ecologists have typically dismissed as wasted space. However, most modern conservationists agree that anthropogenic areas are a vital resource in conservation efforts, and Marzluff’s book helps explain why this is so. It’s a shame that the book doesn’t provide more details to back up this central thesis, but it still takes an excellent first step towards changing the way that the average reader views the urban jungle and the non-human creatures that can make their homes within it.

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# Following wasps through a war



Even before I finished reading *The Snoring Bird*, I had another book of his lined up. Such is Bernd Heinrich’s mastery of words in a language he adopted, while being adopted by a country that promised freedom in many ways. I have not read a memoir as beautifully evocative as this one, fast-paced yet detailed, one that seamlessly intertwines a family’s intrepid journey through the brutalities of war by escaping into the vast curiosities of nature.

The idea for the book grew out of Heinrich’s wish to tell the stories of his family to his children, but the resources for it lay out of sight “covered in chicken shit”. You can see the author in the old Maine house’s dusty barn loft, rediscovering a letter he had sent to his father about making the cross-country team at college—an impossible dream at the time. In that same cobweb-covered pile, you can see Heinrich’s eyes brighten and soften as he reads the fond correspondence that his father regularly shared with his own mentor and lifelong friend, the late Professor Erwin Stresemann, filled with rich details of his latest expedition to distant Dobruja, or even one of his father’s ‘love letters’ to one of his wives.

*The Snoring Bird* is a memoir not of one person, but an entire family. The author’s father, Gerd Heinrich’s skill as an ornithologist, and a bird and mammal collector was unparalleled, as was his love for Ichneumon wasps. He relied greatly on his wives, at least one of whom always accompanied him on his many strenuous expeditions, multi-tasking efficiently as taxidermist, trapper, cook and assistant. The author does not mince words when he writes about his father’s need to control, his expectancy of obedience and strict adherence to ‘duty’. But he also portrays the honesty and simplicity that defined his father, his quick-thinking and instinctive actions, one of which miraculously saved the author and his mother from being drowned in the Baltic Sea with hordes of other

refugees fleeing war-torn Poland. Even though the author and his father were “more apart than together”, this book is testimony to the unintentional influence and impact that a parent has on his child personally, professionally, for the rest of their lives.

The pages are filled with plenty of natural history tidbits, either in a backyard or in untraversed far-away lands, both equally exotic and riveting. Heinrich appreciates his good fortune, albeit belatedly, to be part of the “last classical zoological expedition” in Africa. The tedious work of hunting tiny birds in dense jungles, and skinning and preparing specimens that still exist today in museums across the world severely paled in comparison to the feeling of rejuvenation he experienced, his senses stimulated in new ways as if reborn in a new paradise waiting to be explored.

Placed right in the middle of the narrative is a short and quick telling of their family’s escape to America during the second world war. You almost miss the brevity of this portion because you are busy pursuing the trails of members of the family, temporarily broken up as they leave their cherished Borowke estate in Poland. It is this very human part of the book that had my hands glued to it. Each and every winding step of their journey seems nudged by a stroke of luck. An ominous ‘What if?’ almost every night could have, and probably tormented the author years later when he was old enough to comprehend the gravity of

that particularly cruel reality. Heinrich has managed so well to keep this track of the story just out of focus, as he weaves natural history through the entire book. Or, perhaps by keeping it crisp, he has in a masterstroke of brilliance given the reader just enough information that you can choose to dwell in the astonishing turn of events for a moment, like I did, or continue to read with a mild sense of disbelief (which the author lightly warns against in the preface).

Heinrich has judiciously sprinkled the text with paragraphs that exude the beauty and thrill of nature, woven with his deeply personal emotions as he lies on his belly and crawls through the jungles of east Africa. Even while he tracks his own life from being his father’s boy overturning rocks to look for wasps, to being a graduate student in California and eventually a professor in Vermont, not to mention the author of several books, you can still see that young excited boy sitting in nature’s lap, filled with limitless curiosity.

The story behind the intriguing title, one as exciting as the rest of the book, I leave for you to discover. Heinrich is a world-class story-teller, and anyone interested in history, war, nature or just a great read should wake up to *The Snoring Bird*.

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