In March, as major cities across Europe went into lockdown and the global economy almost came to a halt, many observed that the disturbing, apocalyptic scenario also had its upsides. The usually turbid water in the canals of Venice cleared. Neighbourhoods normally humming with traffic noise got to hear birdsong instead. Wild boars were seen ambling on Las Ramblas in Barcelona, goats took over the Welsh seaside town of Llandudno and foxes got more adventurous on the streets of London. Meanwhile, animals held in zoos were beginning to feel the boredom as they no longer had any human visitors to look at.

Changes to our world were even noticeable from space. Pollution data released by the European Space Agency (ESA) showed a dramatic decrease of NO2 in the urban areas under lockdown, beginning in Wuhan, then extending to Milan in northern Italy in February and to other European cities in March. In an interesting feedback mechanism, the cleaner air may help patients overcome the virus, and the lockdowns will spare the lives of many who would otherwise have died from the effects of air pollution, which is causing close to 9 million deaths annually, a quarter of which are in China.

Environmentalists like the UK writer George Monbiot interpreted the global pandemic as a warning from nature. Indeed, it has been caused by humans violating the habitats and lives of wild animals such as bats and pangolins, which are suspected as the likely source and transmitter of the infection, respectively (Curr. Biol. (2020) 30, R191–R194).

Conversely, with much of the economy shut down and travel banned, many rediscovered their local parks as a place to escape cabin fever and be among humans keeping at a respectful distance.

**Comeback species**

Although the comeback of wildlife in deserted cities will remain a temporary exception and we are still in the middle of a global extinction crisis, some species are in fact returning thanks to many years of conservation efforts. In times of crisis, these silver linings can offer comfort to many.

The black rhino, for instance, which has narrowly escaped extinction, is very slowly making a comeback. In March the IUCN reported a modest annual growth rate in estimated population size from 4,845 animals in the wild in 2012 to 5,630 in 2018. This corresponds to an average annual increase of 2.5%. Of the three subspecies of black rhino, one is now only near threatened, while the other two remain critically endangered.

Many of the largest whale species have made encouraging recoveries since industrial whaling ceased in the 1970s. While they are still at populations below those before their decimation by whalers, conservation science has the luxury of studying population growth rather than decline. This was highlighted by a recent report from Greta Dalle Luche at Griffith University, Brisbane, Australia, and colleagues, who investigated biomarkers for establishing pregnancy in humpback whales (*Megaptera novaeangliae*). The long seasonal migrations of these animals make it impractical to follow individuals and observe their reproductive success. ‘Roadside’ pregnancy tests of marine mammals so far have used progesterone, but Dalle Luche and colleagues find that this measure is unreliable and that androstenedione and testosterone levels may be better biomarkers (Sci. Rep. (2020) 10, 2954). Still, in the broader context of megafauna conservation, choosing a pregnancy test is a good problem to have.

Further encouraging news came from the group of Kyle Van Houtan at Monterey Bay Aquarium, USA, who, after successfully releasing dozens of rescued sea otter pups in their local estuarine nature reserve, wanted to...
reintroduce sea otters in other habitats where they have disappeared. In order to identify case studies of successful reintroduction efforts that they could use as a model in developing their strategy, the researchers used artificial intelligence with natural language analysis, which was able to establish without human intervention whether a reported introduction event was successful.

As a side effect of their AI-boosted literature analysis covering 4,313 abstracts, the researchers found that, across the period studied (1987–2016), the introduction projects appear to have become more successful. Provided that this trend represents real-life change, and not, for instance, changes in acceptance criteria operated by journals, it could mean that conservation science has over the last few decades been learning from past mistakes and improving its success rate. It certainly means that Van Houtan and colleagues will have no shortage of success stories to draw on when it comes to planning reintroduction projects for their sea otters.

Positive news can also emerge from a simple change of outlook. For instance, species introduced by human interventions, such as the raccoon in Europe, or the rabbit in Australia, were widely seen as an insult added to the injury of extinctions. However, Erick Lundgren at the UTS at Sydney, Australia, and colleagues have now analysed the trait diversity of large herbivores to establish whether introduced species could in some cases replace the traits that have been lost through extinctions since the late Pleistocene. They found that, globally, extinction losses were offset by 39% by introduced species. This is because the majority of the introduced herbivore species are more similar to the extinct species than to the survivors. The replacement may not be a complete match, so a given introduced species may replace some function of one extinct herbivore, and others of another species. It adds up, however, to a significant positive effect.

Examples highlighted by the authors include several introductions that have previously had a bad press. A famous case is the population of hippopotamuses that spread in South American rivers after the notorious drug cartel leader Pablo Escobar imported animals for his private zoo. Escobar was shot dead in 1994, leaving his hippos unattended — they made it to the nearest river and are now believed to have a thriving population of hundreds of animals. Although they used to be regarded as a pest by local residents and ecologists alike, the hippos get good marks from Lundgren and colleagues.

While they can’t offer a complete match for one specific extinct species, “the feral hippos in South America are similar in diet and body size to extinct giant llamas, while a bizarre type of extinct mammal — a notoungulate — shares with hippos large size and semiaquatic habitats,” co-author John Rowan, from the University of Massachusetts Amherst, USA, explained. “So, while hippos don’t perfectly replace any one extinct species, they restore parts of important ecologies across several species.”

Meanwhile, feral horses in North America offer a straight replacement for extinct wild horses, which had shaped the savannah for 50 million years. In Australia, wild donkeys can to an extent stand in for the missing giant wombat.

**Saving nature that saves us**

As the zoonotic disease both caused and spread by human violations of the natural world continues to run its devastating course, it is also worth reflecting on other ways in which saving nature can ultimately help to save our own kind.

One important nexus where wildlife can mitigate the damage caused by human activities is the thawing of permafrost due to climate change, which represents a strong positive feedback mechanism, as thawing the frozen soils is bound to release locked-in carbon on a scale comparable to human emissions (Curr. Biol. (2019) 29, R39–R41).

Since the extinction of the woolly mammoth and the disappearance of all other herbivores except small populations of reindeer, the vast expanses of the Siberian tundra are underpopulated. The Pleistocene Park experiment, established in 1996 in a 2,000 hectare area in the Kolyma river lowland, in the far east of Russia, is looking into ways of bringing back the benefits of megafauna. Even the revival of the woolly mammoth, possibly in the lowland, in the far east of Russia, is looking into ways of bringing back the benefits of megafauna. Even the revival of the woolly mammoth, possibly in the shape of a genetically modified Asian elephant, is being considered (Curr. Biol. (2016) 26, R1–R5).

Christian Beer from the University of Hamburg, Germany, and colleagues have now used data from Pleistocene Park to model how the reintroduction of large herbivores can save permafrost soils and thus reduce the feedback acceleration of the climate catastrophe (Sci. Rep. (2020) 10, 4170).

The most significant effect, the researchers found, was that of animals
disturbing and compacting fresh snow, which would otherwise be a better insulator. On a typical Siberian winter day, the air may be as cold as –40°C, while the frozen ground under snow cover may retain a higher temperature, such as –10°C. Thus, an undisturbed layer of snow will stop the ground from cooling any further. Animals disturbing this insulation will effectively enable the ground to go into a deeper freeze, which has a better chance of surviving to the summer.

The calculations from Beer and colleagues, applying experience from Pleistocene Park to the permafrost soils across the entire Arctic, suggest that, in a scenario where without animals 80% of the permafrost would thaw by the end of this century, the presence of large herbivores would reduce the loss to 50%. Even though other impacts of the animals, such as grazing on insulating mosses in the summer, may reduce this beneficial effect, the calculations suggest that these effects would be on a smaller scale and a substantial net benefit would remain.

In warmer climes, mangroves are an important natural barrier protecting us from the effects of climate change, in this case sea-level rise and flooding (Curr. Biol. (2014) 24, R51–R53). Further ecosystem services of mangroves include protection from coastal erosion, natural filtering of pollution and sediment, carbon sequestration, and fisheries resources, since mangroves act as nursing grounds for many coastal fishes.

Daniel Friess from the National University of Singapore and colleagues conducted a large scale metastudy presented at a conference in Singapore last year and summarised in a letter in this journal (Curr. Biol. (2020) 30, R153–R154). Their results suggest that, thanks to conservation efforts and growing awareness, the annual loss of mangrove wetlands has dropped from 1–3% in the late 20th century to 0.3–0.6% in the early 21st century.

Despite this encouraging slowdown in the losses, the analysis still identified deforestation hotspots, such as Southeast Asia, where efforts to expand aquaculture and agriculture are motivating the destruction of mangrove wetlands. The authors also note that many rehabilitation projects are already underway, but are risking failure if they don’t follow best practice procedures. Thus, the right choice of intertidal location and of the species to be planted is crucial for a successful regeneration of the mangrove ecosystem and its benefits. Sustained monitoring of the success of any such measures and continuous improvement of methods is also essential.

**Viral warning**

Heightened awareness of the natural world, of the fragility of human endeavours, and of the poor sustainability of our globalised economy as it ran until the end of 2019 may well have beneficial effects long after the pandemic subsides.

The case of climate change is instructive even though that crisis proceeds on a very different timescale. In both cases, warnings issued by scientists have been widely ignored by risk-denialist political leaders. In the United States, particularly, the awareness of the threat posed by COVID-19, much like the belief in climate science, is dramatically split along partisan lines, with supporters of the Republican party being much slower to recognise a serious danger approaching. Even though the danger from climate change doesn’t double every three days, like the coronavirus infection, it may ultimately cause even more suffering and death. If the pandemic teaches voters not to believe the misleading statements of risk denialists, it may very well save lives in the long term.

The pandemic has also been educational in terms of which parts of our economy are essential, and which parts can be shut down if lives are at risk. In the discussion around climate change it has always been taken for granted that people will not stop taking flights. Now, suddenly, entire airports are being mothballed and it turns out that most flights weren’t essential. An environmental campaign, FlightFree2020, launched in the UK last year to encourage people not to fly in this year, is finding that 2020 rather exceeds its wildest dreams.

As planes stay grounded, pollution subsides, and blue skies and wildlife become more visible, we are becoming aware that many good things can happen that previously didn’t. State interventions are cool again and there is such a thing as society after all. Formerly maligned immigrants are suddenly respected key workers at the frontline of the disease — which is wherever workers face customers or patients.

Once the pandemic is over, we need to remember these lessons and apply them to address other equally dangerous challenges, including climate change and antibiotics resistance. A tiny little RNA virus is teaching us that we actually can change our ways and make things more sustainable.

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