the weekly anthropocene

dispatches from the wild, weird world of humanity and its biosphere

by Sam Matey

Monkey Puzzle Forests. Monkey puzzle trees (*Araucaria* spp, pictured) cover vast swaths of Brazil, Chile, and Argentina, where their nuts provide food for animal and human communities. Unfortunately, they are under threat from logging. Now, a new study in *Scientific Reports* has found that monkey puzzle forests expanded to their current area due to human management. The research began when experts noticed that the forests were more widespread in areas with extensive archaeological findings, and further excavations and soil analysis found that the little known Southern Jê people, a complex pre-Columbian society, were responsible for expanding the range of monkey puzzle forests. "This study shows the Araucaria forests were expanded beyond their natural boundaries, they were used sustainably for hundreds of years, and conservation strategies must reflect this so they balance protection, heritage and economic development." said Professor José Iriarte, coauthor of the study. This is an incredible example from history of how human and natural systems can live, and grow, in harmony and to their mutual benefit. For the full story, check out goo.gl/58KF47. Fascinating news!

Madagascar. A team of researchers from Columbia Engineering have discovered that the cocoon fibers of Madagascar's comet moth (*Argema mittrei*, adult on cocoon pictured) are a biological treasure trove. The comet moth caterpillar spins its cocoon using natural fibers that have incredible properties. Each fiber contains numerous tiny nanoscale air voids that allow them to both be extremely reflective (scattering light away from the fibers) and extremely propagative, allowing light to move along the fibers. "The comet moth fibers are the best natural fibrous material to block sunlight we've ever seen. Synthesizing fibers possessing similar optical properties could have important implications for the synthetic fiber industry," said Dr. Nanfang Yu, nanophotonics expert and leader of the research team. "Another amazing property of these fibers is that they can guide light signals or even transport simple images from one end to the other end of the fiber. This means we might be able to use them as a biocompatible and bioresorbable material for optical signal and image transport in biomedical applications." One early idea for how to use the fibers' sunlight-blocking properties is to create ultra-thin "air conditioning" clothing, an innovation that could be extremely valuable in an age where global temperatures are warming. For more, see goo.gl/5ogShT. Great news!

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Northeast Canyons and Seamounts National Marine Monument. Known as "Northeast Canyons" for short, the national marine monument established by President Obama in 2016 protects three underwater canyons and four seamounts located over 100 miles off the coast of New England. A team of marine biologists from the New England Aquarium recently used aerial surveying to analyze the area's biodiversity. They found an incredible treasure trove of wildlife. During a 4.5-hour survey, the researchers sighted 169 bottlenose dolphins, 44 Risso's dolphins (pictured), 44 dolphins of other species, 4 sperm whales, and, most intriguingly, 13 Sowerby's beaked whales (a notoriously rare species). This is an incredible diversity of wildlife for such a relatively small area of ocean. For perspective, the Northeast Canyons monument protects about one-tenth of one percent of American territorial waters. "This area was declared protected because it is a fragile ecosystem with a wide diversity of corals, deep water fishes, and invertebrates around these pristine canyons and seamounts that support a vast array of whales, dolphins, and large fish," said Dr. Ester Quintana, lead scientist on the aerial team. "As new policies recommend opening more waters off the US coast to offshore drilling, it is incredibly important to have areas that remain protected." Indeed. For more, check out goo.gl/7nmbkQ.

World Protected Areas. An astounding new study published in the journal *Science* has found that one-third of the world's protected areas, an area collectively about 2.3 million square miles (or twice the size of Alaska) are now under intense human pressure. A team from the University of Queensland (UQ), the University of Northern British Columbia, and the Wildlife Conservation Society (WCS) analyzed global maps to determine the level of land-degrading activities such as road building, grazing, and urbanization. Unsurprisingly, this degradation was most common in areas with a high human population. The good news, however, is that protected areas that have received substantial investment in conservation (such as Ecuador's Yasuni Biosphere Reserve or Cambodia's Keo Seima Wildlife Sanctuary) are still thriving. "We know protected areas work -- when well-funded, well-managed and well placed, they are extremely effective in halting the threats that cause biodiversity loss and ensure species return from the brink of extinction." said senior author Professor James Watson of WCS and UQ. "There are also many protected areas that are still in good condition and protect the last strongholds of endangered species worldwide. The challenge is to improve the management of those protected areas that are most valuable for nature conservation to ensure they safeguard it." This research reinforces the importance of working to find solutions where humans and wildlife can coexist on the same land. For the full story, see goo.gl/pZnVUk.

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China. The Chinese giant salamander (pictured) is the largest amphibian in the world and is critically endangered due to years of hunting for the exotic food trade. Recently, conservationists have been endeavoring to breed them in captivity. Now, new research has found that the Chinese giant salamander is in fact at least five different species-meaning that current conservation efforts treating them as one species may be harming their genetic diversity. "We were not surprised to discover more than one species, as an earlier study suggested, but the extent of diversity -- perhaps up to eight species -- uncovered by the analyses sat us back in our chairs," said Dr. Jing Che, coauthor of the study. As current conservation efforts are based on the view that only one species exists, all of these different species are being encouraged to breed with each other, potentially resulting in the loss of vital local adaptations. "Conservation strategies for the Chinese giant salamander require urgent updating," said Dr. Che. For more information, check out goo.gl/nm4Ptu. Photo credit: Robert Murphy.

African Cities. In an inspiring step, nine African cities have pledged to reduce their climate-changing emissions (like carbon dioxide) to zero by 2050. The cities of Accra (in Ghana), Addis Ababa (in Ethiopia), Cape Town, Durban, Johannesburg, and Tshwane (all four in South Africa), Dakar (in Senegal), Dar es Salaam (in Tanzania), and Lagos (in Nigeria) have all signed on to reduce their net emissions to zero by decreasing emissions from fossil fuels and increasing investment in renewable energy, among other actions. “We cannot ignore the implications of what will befall us if we do not act now,” said Mohammed Adjei Sowah, Accra’s mayor. Although reaching this goal will doubtless be difficult, it is extremely heartening that these cities recognize the importance of climate action to themselves and the world as a whole. For more, see goo.gl/4aDZYA.

Quebec, Canada. A new study published in *Scientific Reports* has found that in the last 30 years of the 21st century, southern Quebec could become a refuge for North American species being global warming. The research team calculated potential changes in the ecological niche of 529 species and found that climate change could drive many of them northwards into Quebec’s protected areas, with 49% of the province’s protected areas potentially experiencing an 80% or higher species turnover. The researchers note that Quebec could become a refuge of “continental” importance and advise future park managers to consider this. This is a fascinating example of the ecological changes being wrought by the Anthropocene, and how, increasingly, it is up to humans to determine what their outcome will be. For more, check out goo.gl/oWVnnP.