the weekly anthropocene

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

by Sam Matey

Singapore/China. In China, smooth-coated otters (*Lutrogale perspicillata*) are on the verge of extinction, with fur trapping and polluted rivers driving the species to the point where it's unclear whether any are left in the country at all. However, in the tiny island nation of Singapore, smooth-coated otters are thriving. Singaporeans have been working to clean up their environment for decades, with their city-state now boasting the highest density of greenery of any city in the world and restored, healthy waterways. Smooth-coated otters returned to Singapore in 1998, and there are now 70 otters happily living in the city. One family, the Bishan 10 (pictured), is so popular that Singaporeans voted to name them as a new national symbol! The story of the smooth-coated otters shows that it is possible for human cities to work and grow while maintaining a healthy ecosystem in their territory. It also offers hope that once China cleans up its own rivers, otters can rebound there as well. Spectacular news! (Thanks to Mongabay for the awesome picture! For more information, check out goo.gl/njTevr).

Perovskites. As discussed in the last Weekly Anthropocene, perovskite solar cells are a promising new type of highly efficient solar cell. Now, researchers from the US Department of Energy National Renewable Energy Laboratory (NREL) have created an unusually stable perovskite cell, that kept 94% of its starting efficiency level after 1,000 hours of continuous use. This new discovery brings perovskite solar cells a step closer to being ready for market. For more info, copy goo.gl/dWTNEz. Great news!

China. On February 7th, scientists published the results of a five-year survey of plant diversity in over 60 remote caves in southwestern China. The study recorded 418 different vascular plant species from caves in the Guangxi, Guangzhou, and Yunnan provinces, with 7% of the plants only found in caves and 37% only found in China. The researchers hypothesize that these caves may have served as a refuge for forest species otherwise wiped out by China's rapid industrialization. The lead researcher, Alexandre Munro of the Royal Botanic Gardens, Kew, said "Before we started we had no idea of the diversity of plants in caves, or that so many species are known only from caves." Fascinating news!

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Tasmania (1). Shy albatrosses (*Thalassarche cauta*, pictured) are picky about mating, preferring the same place and partner every year. One of their preferred mating and chick-rearing spots is Bass Island, off the coast of Tasmania. However, Bass Island's viability as a home for albatross chicks is under threat. Climate change-induced rising temperatures are causing the chicks to overheat, and rising sea levels and increasingly violent rainfall are making it harder for the adult albatrosses to build nests that stay undamaged. Now, a team of conservationists from the World Wildlife Fund, the Tasmanian Albatross Fund, and the Australian government have found a way to buy the albatrosses time to adapt to a warming world. Last year, the team built 120 artificial nests, reinforced with concrete or coconut fibers, and flew them onto the island for the albatrosses to use. Now, the results are in: albatross couples that used the artificial nests had a 20% higher chick survival rate. They also personalized their artificial nests, adding mud and plants to the human-made substrate. WWF is optimistic about the results. "Some species can adapt to changes in climate but, in order to do that, they have to have good habitat," said Nikhil Advani, WWF climate and biodiversity specialist. This conservation project is a spectacular example of how humans can help other species survive in the Anthropocene. Great news!

Tasmania (2). Tasmanian devils (*Sarcophilus harrisii*), a marsupial predator endemic to Tasmania, have been devastated by devil facial tumor disease (DFTD). This contagious cancer, that only affects Tasmanian devils, has killed 95% of wild devils since 1996, raising fears that the species will soon be extinct in the wild. Now, a University of Queensland team led by Dr. Deanne Whitworth has successfully generated Tasmanian devil induced pluripotent stem cells in the lab, a necessary first step to developing a cure for DFTD. "Our work is moving us closer to finding a strategy to prevent the spread of DFTD and to cure animals already infected with the disease." said Dr. Whitworth.

Spain. In an amazing new discovery, researchers from the University of Alicante in Spain have invented a solar-powered desalination system, with the capability to supply drinking water to poor, off-grid areas. Their new, stand-alone system works through the chemical process of electrodialysis, and requires no external energy to operate, making it an ideal source of drinking water for developing countries or areas devastated by natural disasters. According to research group director Vicente Montiel, "the new system requires no batteries and has none of the economic and environmental costs involved in managing empty batteries. Furthermore, it can be adapted and applied for treating water of many different origins, such as seawater, wells containing brackish water, treatment plants, industrial processes, etc., which makes it particularly well-suited to remote, off-grid areas." This is an absolutely wondrous new discovery that has the potential to save millions of lives in the coming centuries. For more information, copy and paste goo.gl/ta59uA. Excellent news!

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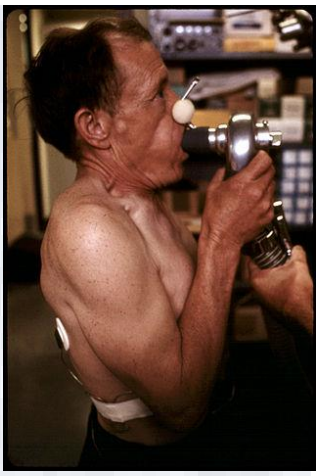

USA (1). A new research letter in the Journal of the American Medical Association reveals a new cluster of black lung disease. 416 cases of progressive massive fibrosis, the most severe type of black lung, were found in three Virginia clinics between 2013 and 2017. Black lung (pictured, a sufferer) is a deadly disease caused by inhaling coal dust and has killed over 76,000 miners since 1968. The only cure is a lung transplant, which few Appalachian coal miners can afford. PMF cases reached historic lows in the 1990s but are rebounding. To add insult to industry, the Trump Administration is currently reviewing the Obama-era Respirable Dust Rule, a regulation that attempts to protect coal miners from coal dust. Even if burning fossil fuels did not have immense consequences for the climate, the health problems alone are reason enough to move to renewable energy.

USA (2). The American Great Lakes were long some of the most polluted freshwater ecosystems in the world, ravaged by decades of heavy industry on their shores. Environmental regulations and anti-pollution efforts have left them much healthier, but they now appear to be facing a new threat: human antidepressants. Dr. Diane Aga, a chemist at the University of Buffalo, has tested the brains of fish from the Niagara River (the link between Lakes Erie and Ontario) and found high levels of the active ingredients in antidepressants like Prozac, Celexa, Sarafem, Zoloft. As humans don't generally eat fish brains, this isn't a major health threat. However, the antidepressants appear to have a similar effect on fish as on humans, making them more likely to take risks and apparently happier. In a wild environment, this means that a large proportion of Great Lakes fish are now more likely to be eaten, and to pass on their load of antidepressants, with potentially far-reaching consequences for the ecosystem. This is another example of the unforeseen impacts of humanity in the Anthropocene, an age where even seemingly innocuous activities can have surprising consequences.

USA (3). On January 23rd, a 7.9 magnitude earthquake struck Alaska. Its effects were minimal-except 2,000 miles away, in a tiny Nevada pond named Devil's Hole, where it caused small one-foot waves in the isolated water-filled cave. Devil's Hole is the entire natural range of the Devil's hole pupfish (pictured) a critically endangered species that evolved in this one pond in Death Valley National Park. The earthquake-triggered waves induced the fish to spawn, stirring up the self-contained ecosystem. "Spawning behavior increases after disturbance events such as earthquakes and floods. This is inherent in the pupfish," said Kevin Wilson, aquatic ecologist for Death Valley National Park. The quake also stirred up silt on the rocky "spawning shelf," leaving more places for the future young pupfish to hide. This tale is an amazing reminder of nature's interconnectivity. Great news!

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Ecuador. Ecuador has just created Rio Negro-Sopladora National Park, a 30,616-hectare chunk of pristine Andean plateaus and forests (pictured). Scientists are excited about the region's biological potential: the park protects an estimated 546 species of plants and animals, and a 12-day expedition there in July 2017 found three new species: a frog, a salamander, and a caecilian. Now, the park's treasures will be protected for future generations. For more info, copy goo.gl/fLWT18. Thanks to Mongabay for the image. Great news!

Atlas. A new online atlas from the University of Pennsylvania identifies future hotspots of human-biodiversity conflict. The melodramatically named "End of the World Atlas" highlights 33 cities of over 300,000 people that are growing rapidly into areas of high biodiversity. This group includes cities like Houston, USA, Lagos, Nigeria, and Osaka, Japan. The website also includes pages on new animals of the Anthropocene and world protected areas, available at atlas-for-the-end-of-the-world.com/.

Superwood. Researchers at the University of Maryland have invented a new method of wood treatment that makes ordinary wood ten times stronger and tougher than its natural state, creating a natural, renewable resources that is stronger than steel and six times lighter. The research team tested the wood's strength and found that it is strong enough to stop bullets. The potential applications of this new technology are innumerable. "This kind of wood could be used in cars, airplanes, buildings-any application where steel is used," said Liangbing Hu, leader of the research team. This new technology's commercial applications are being investigated by Inventwood LLC, a new spinoff company of the University of Maryland. This is an astonishing example of human ingenuity and could reshape the fields of architecture and design. For more information, copy and paste goo.gl/txmrtW. Great news!

Opossums. University of Michigan graduate student Lisa Walsh is investigating the northward spread of the Virginia opossum, with her research highlighting the opossum's adaptation to the Anthropocene. The cat-sized opossums, the only marsupial native to North America, are responding to rising temperatures and increased food available in urban areas by moving north. They are now common as far north as southeastern Ontario, and Ms. Walsh is analyzing why. "There are more than 100 American opossum species, but the Virginia opossum is the only one to make it into the United States," she said. "I want to know more about how they were able to spread north into temperate America and whether their diet shifted as humans changed the landscape." Interesting news!