



the weekly anthropocene

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

by Sam Matey

Indonesia: Orangutans. The Tapanuli orangutan (*Pongo tapanuliensis*, pictured) is the world's rarest great ape. It lives only in the Batang Toru forests of northern Sumatra, and the total population is estimated at fewer than 800 individuals. Now, a new study published in the journal *Current Biology* reports that one-quarter of the orangutan's remaining habitat is under threat, from factors including road building, agricultural expansion, and a proposed new dam that could flood a critical forest area that connects different subpopulations. For the full story, see goo.gl/UZCzMi. More news as it develops.



Indonesia: Reef Fish. Scientists studying the waters of Indonesia's West Papua province have discovered nine new species of fish, all native to the coral reefs in the area's marine conservation zones. The new species include a pipefish, two damselfish, three gobies, a wrasse, a sand-diver, and a blenny (pictured). Awesome news! For more, check out goo.gl/6U1cFL.



Chad. On May 4th, the NGO African Parks and its partners reintroduced black rhinos (*Diceros bicornis*) to Chad's Zakouma National Park, the nation's oldest. Hunting had wiped out Zakouma's rhinos by the early 1970s, but the six rhinos newly introduced are protected by a team of rangers specifically tasked with keeping them safe. As Zakouma is already home to elephants, rhinos, and giraffes, black rhinos could make it a top-shelf ecotourism destination, boosting the local economy. For more, see goo.gl/WnBJCi.

Russia. The Amur leopard (*Panthera pardus orientalis*, pictured) is a critically endangered subspecies native to southwestern Russia and northwestern China. In 2000, surveys revealed that only 32 wild Amur leopards were left, sparking an intensive conservation program culminating in Russia's establishment of the Land of the Leopard National Park in 2012. Now, it appears that these efforts have paid off, with a new survey estimating the Amur leopard population at 103 individuals, its highest level in decades. Great news! For more, check out goo.gl/XsXfnh.



Japan. Most of the world is turning away from fossil fuels, especially carbon-intensive coal, and investing in renewable energy. Unfortunately, Japan appears to be bucking the trend. A new national energy plan abandons a goal of reducing coal's share of Japanese power generation to 10%, and instead plans for coal to provide 26% of Japan's electricity by 2030. For more, see goo.gl/4yBUZo.



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Antarctica. The fate of Antarctica's Thwaites Glacier (pictured) will have profound effects on the rest of the world. The Thwaites Glacier is the "linchpin" of the West Antarctic Ice Sheet but is gradually melting due to warming waters. If it falls, the entire West Antarctic Ice Sheet could be destabilized, potentially raising world sea levels much faster than expected. Now, a joint US-UK expedition is planning a five-year effort to gather as much data as possible about the glacier. The International Thwaites Glacier Collaboration will set out in October 2018 and is already planning to use tools ranging from autonomous underwater drones to seal-mounted sensors to learn what makes the glacier tick, and what will eventually happen to it. For more, see goo.gl/9cjaCs. More news as it develops.



Animal Ranges. A new study published in *Current Biology* has found that a wide range of animals are colonizing "novel" habitats, possibly recolonizing areas that humans drove them out of long ago. For example, sea otters are normally thought to live near-exclusively in kelp forests, but they've recently been thriving in estuaries' seagrass beds. Alligators are normally thought of as a freshwater species, but they've been turning up in salt marshes and on beaches. "The assumption, widely reinforced in both the scientific and popular media, is that these animals live where they live because they are habitat specialists. Alligators love swamps; sea otters do best in saltwater kelp forests; orangutans need undisturbed forests; marine mammals prefer polar waters. But this is based on studies and observations made while these populations were in sharp decline. Now that they are rebounding, they're surprising us by demonstrating how adaptable and cosmopolitan they really are," said Dr. Brian Silliman, lead author of the study. This is excellent news and reminds us just how surprising and adaptable the natural world can be. For more, check out goo.gl/1hJdpb and goo.gl/yknKfq.

India. In a previous issue of this newsletter, we shared the amazing exploits of Jadav Payeng, India's "Forest Man." Mr. Payeng (pictured) has been planting trees on an island in the Brahmaputra River since the 1980s, transforming it from a barren sandbar into a vibrant forest now home to tigers, rhinos, and elephants. Now, the Indian government is considering assigning the new forest legal protected status, in order to safeguard the endangered rhinos now living there. However, Mr. Payeng is worried that this would deprive the local peoples of their traditional, sustainable uses of the land, such as medicinal herb collection and small-scale grazing. Mr. Payeng favors a middle ground, giving the forest "community reserve" status, saying that "If the community reserve model serves both purposes, conservation and indigenous peoples' forest rights, I'll certainly welcome it." For more on this incredible man and his forest, check out goo.gl/zJm5tg.



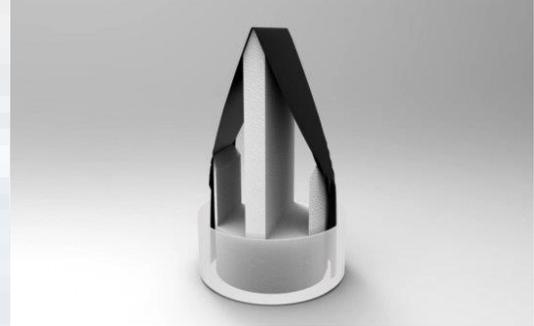


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New Inventions: Solar Still. An international team of researchers have invented a low-cost, highly efficient spin on an ancient technology: the solar still. Solar stills use the sun's heat to evaporate water, leaving impurities behind, and then let the water condense into a clean container. It's an ancient and cheap system, but it's normally quite inefficient, producing little water. The researchers' solar still (pictured) uses a sheet of carbon-dipped paper to soak up water from the base of the still and absorb heat from the sun at the same



time. The paper's sloped shape also helps it conserve more of the sun's energy. The researchers' new still can purify 2.2 liters of water per hour per square meter of area—considerably higher than the former theoretical limit of 1.68 liters. "Most groups working on solar evaporation technologies are trying to develop advanced materials, such as metallic plasmonic and carbon-based nanomaterials," said Dr. Qiaogong Gan, lead researcher. "We focused on using extremely low-cost materials and were still able to realize record-breaking performance." The researchers are now looking to bring their technology to developing nations and disaster areas in need of water and have already created a new startup to bring the technology to the world. Check it out at sunnycleanwater.com. For more, see goo.gl/K7KrLZ.

New Inventions: Manganese-Hydrogen Battery. One of the major challenges still facing renewable energy is the difficulty of storing that energy. It's easy to burn more fossil fuels if energy demand spikes, but it's hard to urge more power from the wind or the sun. This problem has inspired widespread research into more efficient battery technologies. Now, a team of researchers at Stanford have created a prototype battery with the potential to become a cheap, long-lasting way to store energy for the national grid. The battery stores energy through a reversible electron exchange between manganese sulfate, a common salt, and water. "What we've done is thrown a special salt into water, dropped in an electrode, and created a reversible chemical reaction that stores electrons in the form of hydrogen gas," said Professor Yi Cui, senior author of the paper describing the battery. Professor Cui is currently working to scale up, patent, and commercialize the new technology, with hopes of providing a new way to store renewable energy. Spectacular work! For more, check out goo.gl/2k1SX9.

New Inventions: Plastic-Lithium-Sulfur Battery. In another battery breakthrough, a team of researchers at Purdue have found an innovative way to stabilize a promising new type of battery. Lithium-sulfur batteries are cheaper and can store more energy than lithium ion batteries (the current industry standard for products from smartphones to electric cars). However, they don't last very long, generally no more than 100 charging cycles. The Purdue researchers found that adding sulfur-soaked low-density polyethylene plastic (LDPE) stabilizes the batteries, extending their lifespan to over 200 charging cycles. As LDPE is also a major waste product (it's found in plastic bags) this innovation could reduce waste while increasing energy efficiency. Great work! For more, see goo.gl/5V23TB.



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USA: California. In an inspiring act of forward-thinking policymaking, the California Energy Commission has voted unanimously to require all new homes built in California to include solar panels, starting in 2020. (Pictured, solar panels in Berkeley). This commonsense plan will help homeowners generate their own electricity, create more solar energy jobs, and help stop climate change. It's also cost-effective. "Any additional amount in the mortgage is more than offset," said Andrew McAllister, California Energy Commission member. "It's good for the customer." This move has the potential to spark similar actions in other forward-thinking states and is a spectacular example of the kind of policies that humanity needs to adapt to the Anthropocene. "I'm really happy to get this to the finish line," said McAllister. "One big step for mankind." For more on this story, check out goo.gl/7rk9WV.



USA: Hurricane Harvey. In August 2017, Hurricane Harvey devastated the Gulf Coast, displacing over 30,000 people and costing over \$125 billion in damages. Now, a new analysis from the National Center for Atmospheric Research has found that the Gulf of Mexico's waters at the time were the warmest on record, "supercharging" the hurricane with vast amounts of moisture. The researchers warn that climate change will make such supercharged hurricanes more and more common. Sobering news. For the full story, see goo.gl/2hWw66.

Sea Slug. In an astonishing discovery with the potential to lead to incredible new developments, scientists have confirmed the abilities of a sea slug that steals plants' photosynthesis organelles to provide energy for itself. Native to the intertidal zone of eastern North America, *Elysia chlorotica* (pictured) eats algae and steals their plastids (the cell organelles that conduct photosynthesis) to use them to generate power for itself. Scientists were previously aware of *E. chlorotica*'s plastid-stealing habits but disagreed on whether it was truly benefiting from photosynthesis or simply storing the plastids to digest later. Now, a new study has confirmed that *E. chlorotica* is indeed sustaining the plastids to photosynthesize for itself, a feat akin to installing millions of tiny solar panels inside its own body. "It's a remarkable feat because it's highly unusual for an animal to behave like a plant and survive solely on photosynthesis," said Professor Debashish Bhattacharya, senior author of the study. "The broader implication is in the field of artificial photosynthesis. That is, if we can figure out how the slug maintains stolen, isolated plastids to fix carbon without the plant nucleus, then maybe we can also harness isolated plastids for eternity as green machines to create bioproducts or energy." This amazing story underscores one of the most undervalued components of biodiversity: its contribution to new technological development. For more on this story, check out goo.gl/ErXaVz. Photo credit: Karen N. Pelletreau/University of Maine.





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South Georgia. South Georgia, a British-administered island in the South Atlantic Ocean, is a biological treasure, home to fur seals, elephant seals, and four species of penguin. However, invasive rats introduced by sealers and whalers in the nineteenth century, eating the eggs and chicks of the native birds. In 2011, a rat eradication project was launched, with poisoned bait dropped from helicopters killing the rats and teams of rat-detecting dogs and their handlers verifying that no more rats were present. Now, the final stage of monitoring has found that South Georgia is completely free of rats, allowing its native wildlife to live and breed in peace. Great news! Pictured: rat detection team with king penguins in the background. For more info, see goo.gl/uyWYff.



River Dolphins. The Amazon basin is home to two enchanting river dolphin species: the boto (*Inia geoffrensis*) and the tucuxi (*Sotalia fluviatilis*). Until recently, little was known about either species' conservation status. Now, a new study analyzing years of survey data has found that the populations of both species are dropping sharply, halving every ten and nine years. These are some of the sharpest rate of decline for cetacean species since the end of modern whaling and mean that both species are likely critically endangered. For more, see <https://goo.gl/qXn68B>.

University of Southern Maine. In addition to coursework and writing this newsletter, one of my major projects in early 2018 has been co-founding the Emissaries, a grassroots sustainability organization based at the University of Southern Maine (USM). The Emissaries' last project of the Spring 2018 semester, the Books Don't Die! Used Textbook Collection Campaign, has just been completed. I am happy to report that after initial problems, our final result was a huge success! With the help of the USM Bookstore and the USM Libraries, we have collected no less than 176 textbooks. All textbooks go to USM's Glickman Library, where they will be sorted into books destined for the library's Reserve Collection (where students can access them) and books to be sold to Better World Books (all proceeds to the USM Libraries). Attached are pictures of some of the books we collected and of myself in Glickman next to a stack of book-filled boxes. The Emissaries will be taking a hiatus during the summer, but we will return with more projects in Fall 2018. More news as it develops!

