the weekly anthropocene

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

by Sam Matey

Mongolia. Life is getting harder for the traditional livestock herders of the Mongolian steppe. Economic pressures are luring young Mongolians to city and mining jobs, reducing the number of herders who retain traditional knowledge. Poaching is increasing, causing predators like wolves and snow leopards, deprived of their natural prey, to hunt herders' livestock. This causes herders to invest in larger livestock herds that move less often, instead of the traditional nomadic herds, which strains the grasslands' carrying capacity. Herders are also forced to kill endangered species like snow leopards to protect their animals. Worse, all of these problems are exacerbated by creeping desertification and increasingly severe drought, both caused by climate change. Now, one group thinks they can save the steppes…with dogs. The bankhar (pictured) is an ancient Mongolian landrace of dog that historically was employed as a livestock protector. However, Mongolia's long period of communist occupation (from the 1920s to the 1990s) led to a dark age for bankhars, as their pelts were highly valued by the Russian dog coat industry. Bankhars are now rare. Since 2014, the Mongolian Bankhar Dog Project has been breeding and training bankhar dogs and placing them with Mongolian herder families. The bankhars protect the livestock from the predators, reducing conflict between humans and animals like snow leopards. This allows the herders to spread their herds out more and move them around, as the bankhars will keep their livestock safe. This, in turn, reduces pressure on the grassland ecosystem and helps keep the steppes resilient. This kind of community-based, solution-oriented conservation effort is exactly what we need to maintain ecosystems in the Anthropocene. Excellent news! For more information on this innovative program or to donate to this worthy cause, visit www.bankhar.org.

Scotland. The white-letter hairstreak butterfly (pictured) was last seen in Scotland in 1884. Then, in summer 2017, one was spotted by Iain Cowe of the nonprofit Butterfly Conservation. Now, white-letter hairstreak eggs have been found on a Scottish elm tree, confirming that the species is truly established in Scotland. "Last year was an impossible find, but this year's egg discovery is beyond anything we thought possible," said Cowe. The butterfly's northward spread is potentially due to climate change's warming of the land. Interesting news!

Wood Biomass. An international team of researchers has discovered that a family of enzymes found in fungi (lytic polysaccharide monooxygenases, if you're interested) are capable of breaking down wood to be more easily refined into biofuels. Use of these enzymes could greatly increase the efficiency of the "biorefineries," that make this sustainable fuel. For more info, see goo.gl/RRFFnc. Great news!

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Borneo. A new study in the journal *Cell Biology* analyzed data from 38 different research organizations to determine the status of the Borneo orangutan (*Pongo pygmaeus*). The researchers found that nearly 150,000 orangutans have been lost since 1999, cutting the population of the critically endangered species in half. This decline is likely due to killings by humans for food or to prevent them from eating crops. "Ten percent of villages [in Borneo] are in orangutan range. They may kill no more than three to four animals per 100 each year, but this is enough for the population to decrease," said Maria Voigt, lead researcher of the study. This extremely disturbing news comes on the heels of a particularly gruesome orangutan killing: police in the Indonesian part of Borneo recently arrested four farmers charged with shooting an orangutan over 100 times. (For more information on this case, see goo.gl/xyps1P). Orangutans are compassionate, sentient beings closely related to humans. If we allow them to become extinct through this death of a thousand cuts, it will be a species-level failure.

Bahamas. The queen conch (*Strombus gigas*, pictured) is a vital part of Bahamian culture, featured on the national coat of arms and a staple of local cuisine. Now, new research has found that populations have declined rapidly over the last 20 years, despite marine protected areas set up to preserve the conch's habitat. Researchers hypothesize that illegal upstream fishing of juvenile conch is gradually depleting the park's population. For more information, check out goo.gl/zs6BaP.

Tonga. On February 12th, Cyclone Gita struck the Pacific island nation of Tonga, levelling the Tongan Parliament Building and damaging or destroying about 1,400 homes. The storm, which was the costliest in Tongan history, also claimed two lives and displaced thousands of people. Although it is difficult to definitively attribute a natural disaster to climate change, waters in the Pacific have been abnormally warm recently (January 2018 was the hottest month ever recorded in New Zealand), meaning that it is quite likely that Gita was fueled by climate change-warmed waters. Sobering news.

Australia. A new species of intertidal spider (pictured) has been discovered in Australia. Intertidal spiders are a unique genus of spiders that have evolved to live in the intertidal zone, hunting tiny crustaceans during low tide and sheltering in web-sealed air pockets during high tide. The new species is named *Desis bobmarleyi*, after the famous reggae singer. Fascinating news!

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Coral Reefs. A new bill introduced by Maine Representative Chellie Pingree has the potential to harm the world's coral reefs. Pingree, who normally is a reliable vote for environmental protection, recently introduced a bill to deregulate shipments of sea cucumbers moving through the US. Sea cucumbers (pictured), a type of soft, reef-dwelling echinoderm, are vital to keeping coral reefs healthy, as they eat debris and secrete chemicals that help protect corals from ocean acidification. They are also under threat, increasingly exploited for expensive dried seafood products. Pingree's bill, which has already passed the House and is under committee in the Senate, will weaken protections for endangered species of sea cucumber, making it easier to collect them and harming the world's coral reefs. Readers of this newsletter should contact their representatives and senators (get their contact info at contactingcongress.org) to urge them to withdraw support for this bill.

North Atlantic. A new study published in Frontiers in Marine Science, found that 73% of mesopelagic fish caught in the Northwest Atlantic have microplastics in their stomachs. "We recorded one of the highest frequencies of microplastics among fish species globally," said Alina Wieczorek, lead author of the study. This is worrying, as microplastics often bind to other pollutants and "bioaccumulate" up the food chain, moving from the small fish that originally ate them to a larger fish that eats the small fish to a large mammal predator like a dolphin-or, sometimes, a human. This research underscores the importance of banning microplastics. For more information, check out goo.gl/bRTkiq.

Evolution. A new study published in *Science* has identified evolutionary hotspots that could help color-changing species adapt to climate change. Many animals, like hares, ptarmigan (pictured), and weasels, turn white in the winter and brown in the summer. Now, in the age of climate change, snow is melting earlier, leaving these animals with bright white coats on a brown background, making them vulnerable to predators. The new study identifies areas where populations are divided between brown and white individuals. "These areas hold the special sauce for rapid evolutionary rescue," said Professor L. Scott Mills, lead author of the study. "Because they contain winter-brown individuals better adapted to shorter winters, these polymorphic populations are primed to promote rapid evolution toward being winter brown instead of white as climate changes." Fascinating news!

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Weather & Climate. A new study, published in Science Advances, uses an array of climate models to determine the impact of global temperature rise on the probability of extreme weather events. The researchers found that a rise of 3 degrees Celsius above preindustrial levels (we are already 1 degree Celsius above preindustrial levels) will increase the risk of extreme weather events like wildfires (pictured), floods, and droughts by as much as fivefold in some parts of the world. Up to 60% of locations in North America, East Asia, Europe, and southern South America would see at least a threefold increase in extreme weather events. This is highly disturbing, as we are currently on track for at least 3 degrees of warming, even if the Paris Agreement targets are met. For more information, see goo.gl/hGZZcf.

USA: Overview. Since the election of President Trump, the United States government has turned its back on environmental protection. Trump scorns international efforts to fight climate change, his EPA Administrator Pruitt strips away regulations designed to protect American waterways, and the Republican Party attacks the very concept of science and independent reality. However, not all is lost in the USA. This four-part series will examine positive actions, trends, and innovations in America.

USA (1): Paris Agreement. Researchers from Carnegie Mellon University have calculated that the US can meet or exceed its Paris Agreement emissions reductions targets, despite President Trump's pro-fossil fuels policy. Cheap natural gas replacing coal, as well as growth in renewable energy, means that we are on track for our 2025 emissions reduction target even without political action. Great news!

USA (2): BECCS. At Montana State University, and around the world, intense discussions are underway regarding a promising new technology that could mitigate climate change: BECCS. BECCS, short for bioenergy with carbon capture and storage, is the process of farming fast-growing plants to suck CO_2 out of the atmosphere, then burning them to generate energy-and then sequestering that carbon in the ground. Thus, BECCS would be a negative emissions technology that also generates power-a "silver bullet" for fighting climate change. The technology has great potential, but is untested. It would require mass cultivation of plants that grow quickly and suck in a lot of carbon dioxide, such as poplar trees and switchgrass (pictured). Switchgrass is also projected to spread northward due to climate change, making it an excellent BECCS candidate in places like Montana. Some concerns about BECCS are that it would require a lot of land, potentially cutting into intact habitat or farmland. However, as land-efficient vertical and urban agriculture grows, more land could be available for BECCS. The potential of this technology is too great to dismiss. For more information, check out goo.gl/TUrcYy. More news as it develops.

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USA (3): MIT. A team of scientists at MIT have invented the world's first "thermal resonator," a device that generates a trickle of power from ambient variations in temperature. One side of the device absorbs heat, which slowly disperses to the other side. The heat is stored through a phase-changing material known as octadecane wax, and the temperature differential is harvested to generate power. This new device could be a renewable, no-maintenance power source for small devices like remote sensors, or even space probes. For more information, check out goo.gl/F1dkc8. Great news!

USA (4): Pine Ridge Reservation. Pine Ridge Indian Reservation, in South Dakota, is the homeland of the Ogallala Lakota people and the second-poorest county in the United States. Now, Pine Ridge is being revitalized by one man's crusade for renewable energy. Henry Red Cloud (pictured), descendant of famed Lakota chief Red Cloud, is the founder of Lakota Solar and the Red Cloud Renewable Energy Center. 60% of Pine Ridge residents cannot afford to connect to the grid, so Red Cloud's businesses offer a vital public service as well as promoting renewable energy. Mr. Red Cloud's inventions include a portable solar trailer, to bring power to remote areas, and a solar furnace to heat homes. His Renewable Energy Center trains Lakota to design and build their own renewable energy systems, spreading the knowledge. Red Cloud also provides renewable energy to the base camps (pictured below) for local resistance efforts to stop pipelines being built across their lands. In addition to all of these excellent effects, Red Cloud's work also has a deep spiritual dimension for the Lakota. "People don't like being on the grid here," he says, "because they've been coexisting with the earth – the sun, the wind – for most of their history." Mr. Red Cloud's projects are a magnificent melding of community economic action, cultural empowerment, and renewable energy development. May his enterprises prosper! (Thanks to Mongabay for the awesome pictures. For more information on this amazing story, check out goo.gl/D1DjSR.)