



the weekly anthropocene



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

By Sam Matey, June 5 2019

Bangladesh. In a provident step for ocean management and species conservation, the government of Bangladesh has designated a massive new marine protected area around a vital biodiversity hotspot. After years of biological surveys in the area by



the Wildlife Conservation Society, last week saw the creation of the Nijhum Dwip Marine Protected Area, protecting 1,222 square miles of the oceanic and estuarine area around the Ganges/Brahmaputra/Meghna Delta. (Interestingly for local readers, that's almost exactly the size of Cumberland County, Maine). Nijhum Dwip MPA will be divided into several management zones, ranging from strict reserves with no fishing to community-managed areas. The new reserve will perform the extremely valuable economic role of safeguarding critical spawning grounds for the Hilsa shad (*Tenualosa ilisha*), Bangladesh's national fish and a coveted delicacy. The Hilsa shad fishery employs about 2.5 million people in Bangladesh, but is at risk of collapsing due to overfishing, so protecting its means of reproduction is vital. Nijhum Dwip MPA also is home to an array of globally imperiled species, including the olive ridley sea turtle, the scalloped hammerhead shark, six species of threatened rays, the endangered Irrawaddy dolphin (*Orcaella brevirostris*, pictured), and the critically endangered spoon-billed sandpiper. This is a spectacular step forward for sustainable management of the oceans of the Anthropocene! For more, see tinyurl.com/y3td8tv8.

Alabama. In a strange ecological perturbation, much of Alabama is likely to be shocked by the appearance of immense, car-sized immense yellowjacket nests this summer. Although the connection has not yet been scientifically confirmed, it is highly likely that these mega-nests are a consequence of climate change-induced warming winters. "With our climate becoming warmer, there might be multiple surviving queens producing more than 20,000 eggs each... The nests I have seen this year



already have more than 10,000 workers and are expanding rapidly," said Charles Ray, Alabaman entomologist and yellowjacket expert. A similar year of mega-nests occurred in 2006, after a warm winter (pictured: a 2006-era mega-nest), but 2019's mega-nests are popping up even earlier in the year. This superabundance of stingers is another example of the unpredictable second-order effects of climate change. For more, see tinyurl.com/y6m7juv6.



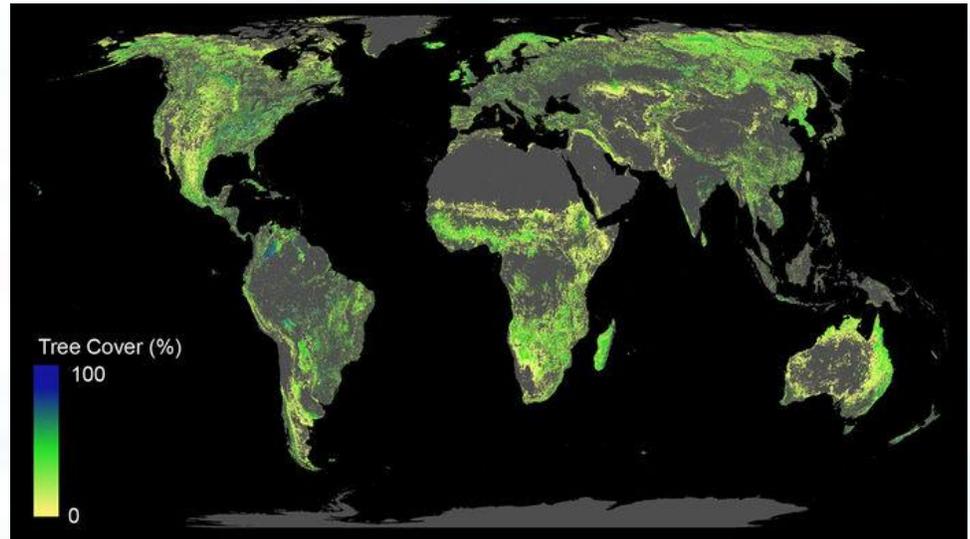
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Earth's Forests. Two recently published studies underscore the importance of forest ecosystems, not just as biodiversity hotspots and providers of ecosystem services but as vital regulators of Earth's carbon cycle that are critical to the global effort to stop climate change. The first study, published in *Science* and led by Tom Crowther of the university



ETH Zurich, used satellite image analysis of forested and recently deforested areas to calculate how much of the globe had suitable climate, soil, and land use characteristics for forests. Their work produced the above map, which shows all deforested areas that could sustain forests, minus agricultural areas, urban areas, and areas already forested. (That's why the Sahara, the ice caps, the Amazon, and heavily developed central China and India are excluded, as none of these areas could currently be planted with new forests). The researchers calculated that Earth can support 0.9 billion hectares of additional forest, an area about the size of the United States, without reducing the size of cities, farms, or existing forests. Preliminary calculations indicate that a worldwide reforestation effort of this magnitude would sequester about 205 gigatons of carbon dioxide, or about two-thirds of the estimated 300 gigatons humanity has pumped into the atmosphere—in addition, of course, to providing new habitat, water purification, recreation, and all the other benefits of forest ecosystems. While this is a simplified analysis, and the resulting numbers are approximate and disputed by other climate scientists, these results underscore the immense importance of forest conservation and reforestation as parts of humanity's climate-control toolkit. Decisions being made about the fate of disused farmland or industrial "brownfields" in Europe and North America or proposed tree-planting efforts in sub-Saharan Africa and South Asia could be as important to the fate of the climate as decisions around renewable energy standards.

A second study, published in *Science Advances* and led by Robin Chazdon of the University of Connecticut, sought to find the most valuable places to focus reforestation efforts, devising a "scoring" system for the value and opportunity of forest restoration. The researchers concluded that tropical rainforests, in nations like Brazil, Indonesia, and Madagascar, were the best places to start reforesting, due to those ecosystems' climatic and biological importance. (Keep this study in mind—we'll be publishing an in-depth analysis of a reforestation initiative in Madagascar next week!). For more on the Science-ETH Zurich study, check out tinyurl.com/yyroxqhq. For more on both studies, check out tinyurl.com/y6kx8j4x



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The Great Atlantic Sargassum Belt. A new study published in *Science* analyzed a decades' worth of NASA infrared imaging to find that since 2011, a massive new bloom of sargassum macroalgae (the defining species of the North Atlantic's Sargasso Sea) has been forming annually, to an incredible degree, in the South Atlantic. Last year, this "Great Atlantic Sargassum Belt" consisted of 200 million tons of sargassum stretching from the Gulf of Mexico to West Africa.



At first, this doesn't seem like a bad thing: in the open sea, sargassum spreads out and becomes host to an array of species, from baby sea turtles to spawning eels, in a habitat once described as a "golden floating rainforest." However, once it drifts too close to shore, the macroalgae bunches up, squeezed against the coastline, and entangles and smothers marine life from sea turtles to dolphins to coral reefs. When it piles up on beaches and rots, it also repels tourists—a deadly blow for small Caribbean nations such as Antigua and Barbuda or Barbados. In 2011, Barbados declared a national emergency over the first appearance of the "GASB," and the Antigua government is darkly warning that they will soon have to prepare for sargassum like they now do for hurricanes. (Pictured above: cleaning up sargassum).

Perhaps the most arresting fact about the Great Atlantic Sargassum Belt is that we really have no idea why it exists. Theories vary and none have enough data to be viewed as definitive. The sargassum boom might be due to deforestation and fertilizer use in the Amazon basin pumping extra soil and nutrients into the sea—or not, we don't really have enough data on Amazon nutrient outflows. It could also be partially due to an upwelling of nutrients from the seafloor off West Africa. Climate change could be involved, via changing ocean currents—or not, as the sargassum belt actually declines when ocean surface temperatures grow too warm. Just to stir the pot a bit more, a previously rare, genetically distinct sargassum variant appears to have boomed in the new belt, for unclear reasons and with uncertain effects. To quote study leader Chuanmin Hu, "The ocean's chemistry must have changed in order for the blooms to get so out of hand...This is all ultimately related to climate change because it affects precipitation and ocean circulation and even human activities, but what we've shown is that these blooms do not occur because of increased water temperature," the marine scientist continued. "They are probably here to stay."

In sum, the Great Atlantic Sargassum Belt is a quintessentially Anthropocene phenomenon: something strange and unprecedented is happening, driving immense changes in an ancient ecosystem, and it's likely to continue for decades. Humans are probably involved, given our civilization's centrality to geochemical processes on this planet at this point, but we're not quite sure how or to what extent. For more, see tinyurl.com/yxk4zrjy, tinyurl.com/yxveru8b, and tinyurl.com/y5qf6vsa.