



Dispatches From The Wild, Weird World Of Humanity And Its Biosphere

November 3 2021

New Frontiers

A [routine study of genetic records revealed something extraordinary](#) about the **California condor** (*Gymnogyps californianus*, pictured): two separate females on two separate occasions had had chicks through [parthenogenesis](#) (aka "virgin birth") without a male partner. Both mothers had previously had chicks in the normal way. [Both of the resulting parthenogenetically-born birds have already lived and died](#), one at age two in 2003 and one at age seven in 2017. It's amazing that California condors, a species where for years every living individual was monitored by scientists from birth to death, can still utterly shock us like this- and it raises the possibility that parthenogenesis in birds may be much more common than we think.



Given that we had no idea that California condors could do this at all until just now, and they've been incredibly well studied, it's entirely possible that all manner of other wild birds sometimes have biologically fatherless chicks, and humans have just never known. What a reminder of the power and complexity of life!

A maverick group of researchers are trying to use natural language processing (NLP) analysis, a form of machine learning, to [decode and translate the language of sperm whales](#) (*Physeter macrocephalus*) They have a database of 100,000 sperm whale calls and hope to increase to 4 billion, feed that to a neural network, and hopefully develop a chatbot that can generate grammatically correct whale call sentences. It's far from clear if this is even possible, but if it works, this will be an *epic* paradigm-shattering invention! Sperm whales have the largest brains on Earth; hopefully in years to come, this project can bring us into true communication with a local "alien" intelligence!



The island of Oahu, Hawaii, home to the city of Honolulu, is [pioneering an ultra-rapid transition from coal to solar](#). A new law means that the state's last coal plant, now supplying 16% of Oahu's power, must shut down on September 1, 2022. A big new battery storage facility is being built, and in a fascinatingly innovative and citizen-driven "[Battery Bonus](#)" program, ordinary households are being paid to

put up more solar panels and produce more power for the grid (and extra to store in the battery storage facility!), creating a "distributed power plant" for Oahu. (Pictured: installing rooftop solar in Hawaii). Superb news!



Behind the Scenes on Climate

As COP 26 starts in Glasgow, here are **two in-depth pieces**, from ClimateChangeNews and CarbonBrief, that chronicle some of the behind-the-scenes elements that shape world climate action, from a global network of women leaders working for net zero emissions to climate-relevant court intrigue in Xi's China.



Net zero: the story of the target that will shape our future

In 2013, a group of women sat around the kitchen table at Glen House, a country estate in the Scottish borders. Farhana Yamin, one of the lead organisers, describes them as "lionesses": a pride of around 30 lawyers,

diplomats, financiers and...

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Analysis: Nine key moments that changed China's mind...

Speaking to a diverse range of experts within China and beyond, Carbon Brief has learned....Below, Carbon Brief describes nine key moments over the past two decades that have helped to influence China's attitudinal change.

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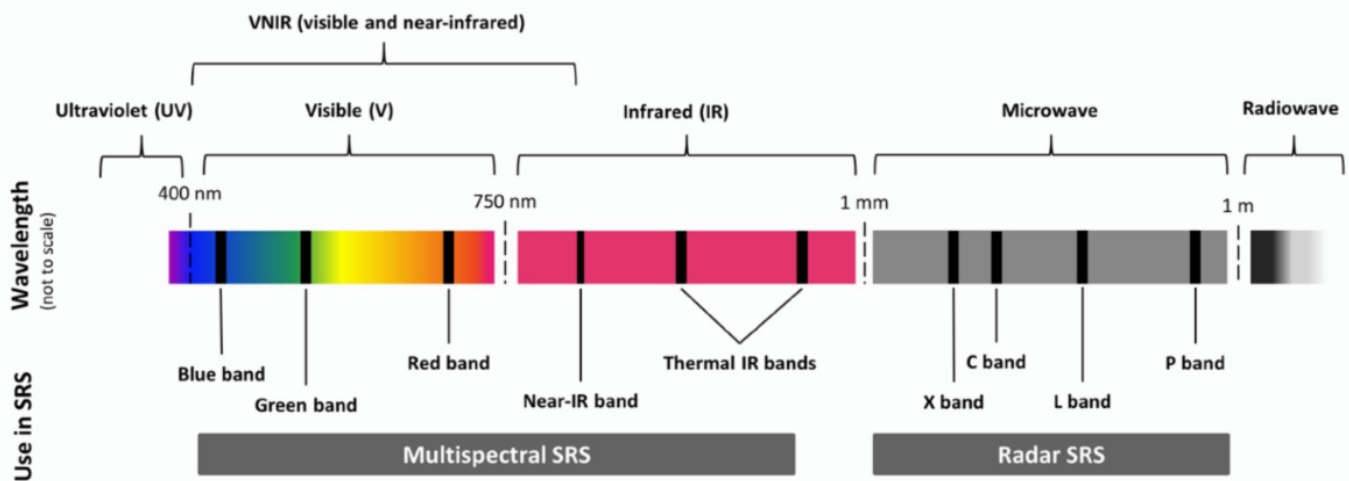
www.carbonbrief.org



Lake Mead from Space: An Ultra-Brief Introduction to Satellite Imaging and Spectral Bands & Indices.

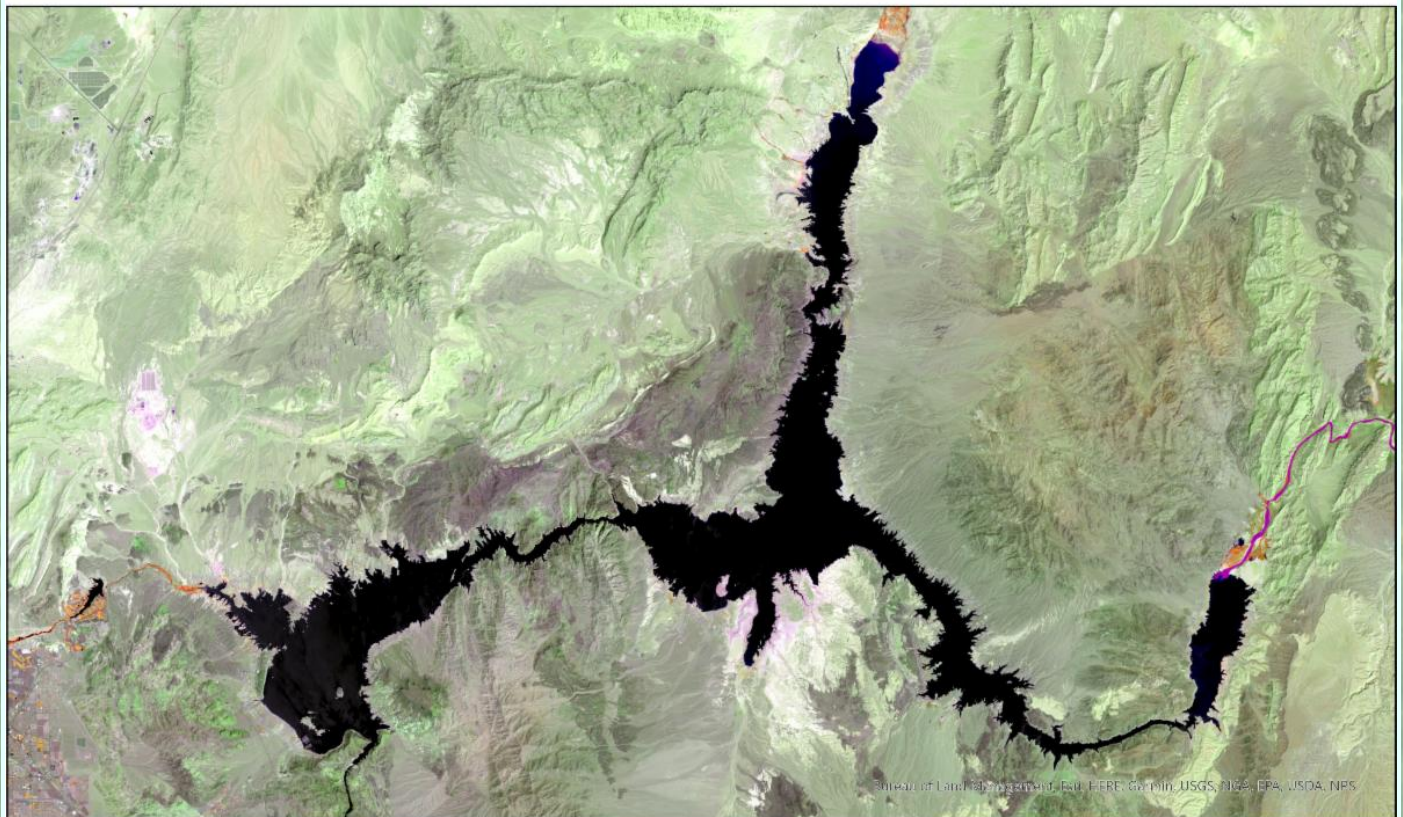
Since September 2021, this writer has been enrolled in the all-online [Master of Applied Geospatial Information Systems and Technologies \(MAGIST\) program at UCLA](#). Geospatial information systems (GIS), essentially mapping and analysis of all data with a physical location attached, is a key field for

understanding and influencing the changing world of the Anthropocene, with potential applications ranging from siting new renewable energy projects to researching temperature, moisture, and biodiversity shifts in ecosystems. As coursework continues, one project in particular seems like a good entry point to share some key concepts from satellite imaging to this newsletter's audience: spectral bands and spectral indices.



Earth observation satellites (in this example, the latest in America's venerable [Landsat program](#)) host instruments that observe, record, and measure light from Earth in specific regions or "bands" of the electromagnetic spectrum. The schematic above ([source](#)) shows several commonly observed bands: red, green, and blue in the visible spectrum,

Lake Meade in NIR, SWIR1, Red Band Composite View



Lake Meade: R=NIR, G=SWIR1, B=R

RGB

- Red: NearInfrared
- Green: ShortWaveInfrared_1
- Blue: Red

0 2.5 5 10 15 20 Kilometers

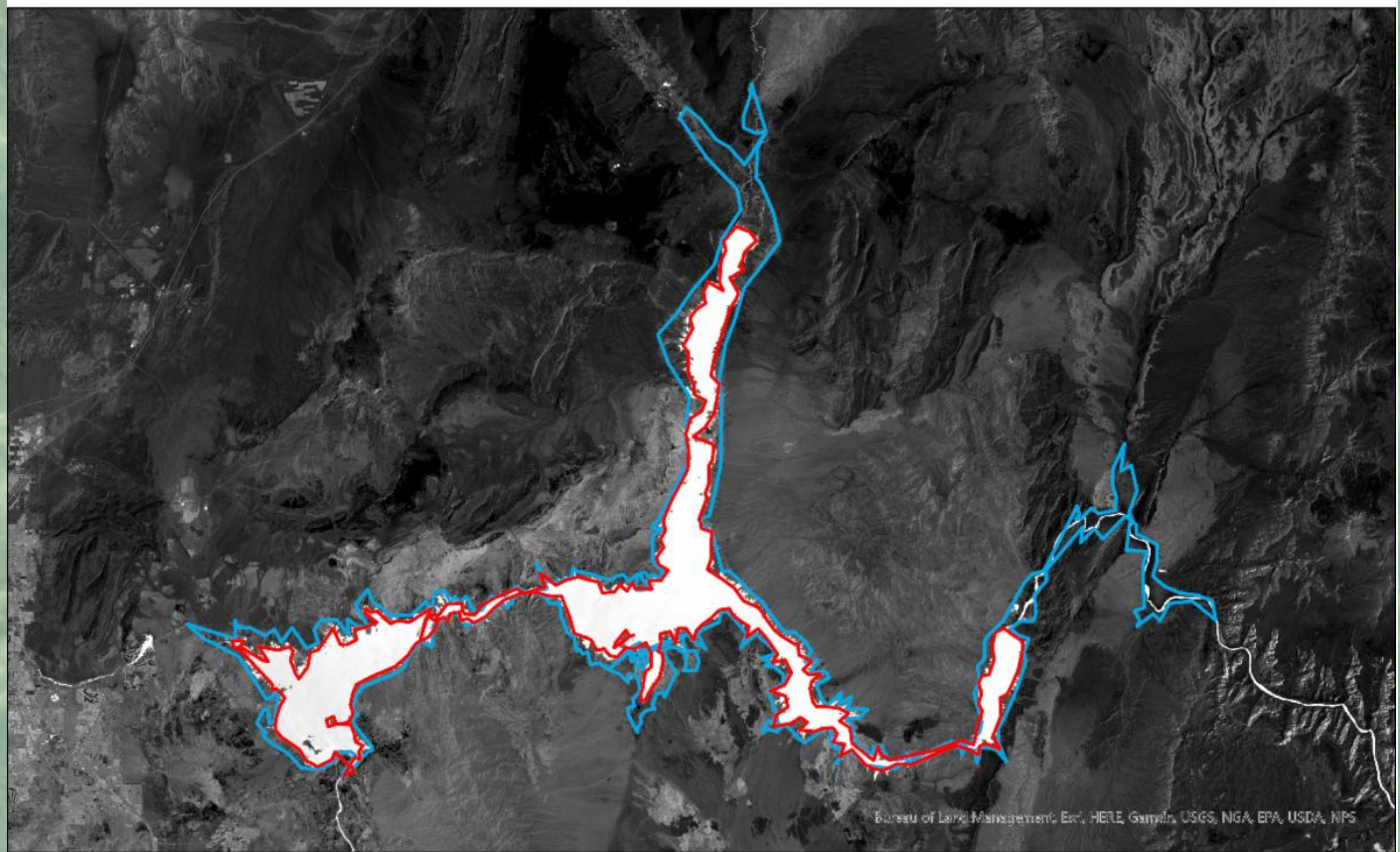
Created by Samuel Matey for GEOG 411, UCLA MAGIST, on October 15, 2021. From Landsat 8 image collected August 9, 2021.

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Above is a false-color satellite image of Lake Meade, formed by the Hoover Dam and the largest reservoir in the United States. The map above looks weird because it's showing light from the Near-IR Band, which human eyes can't see, as red, while showing light from the SWIR1 band, one of the two "Thermal IR Bands" on the spectrum schematic above, as green, and finally showing red light as blue. This sort of thing is helpful because different wavelengths of light show different things: for example, due to the physical properties of the chlorophyll molecule, living vegetation is bright in green wavelengths of light (as we see) but is *really* bright in the near-infrared, so living plants pop out unmistakably if the NIR band is viewed as red on a map. In this case, the band combination was chosen to emphasize the difference between land and water.

The image below takes it a step further, by using a spectral index, where some math is done to the results of information from different spectral bands to show new and interesting things. In this case, the project used the [Modified Normalized Difference Water Index \(MNDWI\)](#), the equation for which uses the green and thermal infrared bands to calculate a light pattern that enhances the distinctions between water and land even more. In this case, we looked at Landsat images from 2000 and 2021, applied MNDWI to both of them, and did an approximate tracing of the lake's coastlines in both years. (Measurements of water/land boundaries, no matter how good, are only ever better or worse degrees of "approximate," never exact, due to [the coastline paradox](#)).



2021 Lake Meade Shoreline
2000 Lake Meade Shoreline

August 2021 Landsat 8 MNDWI Index
Value

0.670605
-0.459895

0 3 6 12 18 24
Kilometers

Created by Samuel Matey on October 20, 2021,
for the GEOG 411 class in the UCLA MAGIST
program. Based on a Landsat 8 image collected
on August 9, 2021, and a Landsat 5 image
collected on September 16, 2000.



The map rather clearly shows a disturbing consequence of the climate crisis, made worse by [mismanagement](#) (particularly overuse by profligate local agriculture) of the Colorado River watershed. Lake Mead is shrinking, profoundly and rapidly. It's now at only 36% of its historic capacity, and rationing, the first ever, will go into effect (for industry/society sectors as a whole, not individual consumers) in 2022. [NASA's explainer](#) uses essentially the same visualization as the map above.

This example is fairly simple, but it's a good illustration of how satellite imaging, and playing around with different sorts of light, can be a source of valuable insight in the Anthropocene-likely a recurring theme in future research and reporting!



The Weekly Anthropocene

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