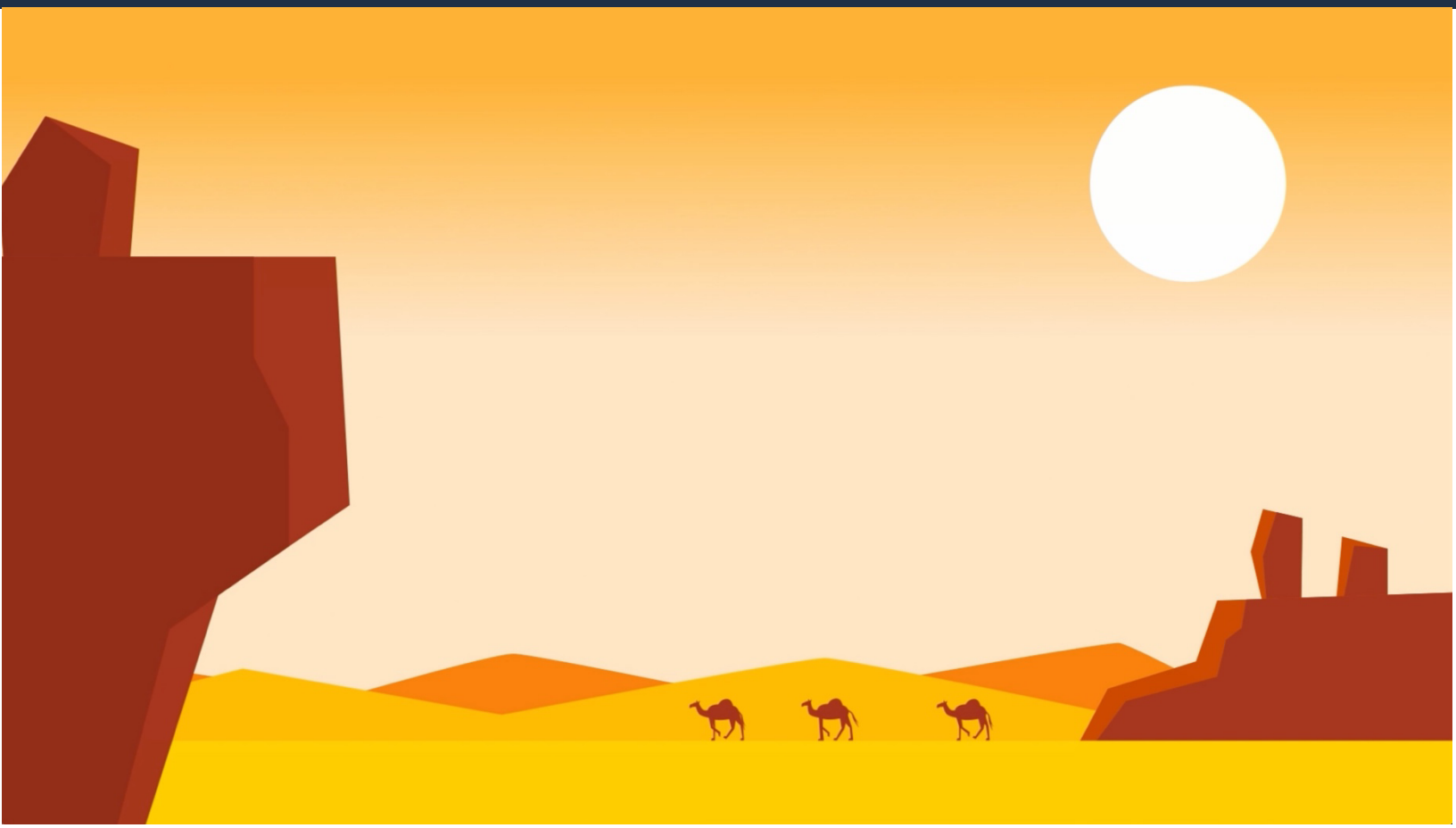

The Sahara Desert Used to be….Green?

How did the Sahara Desert form? The Sahara was once home to early humans, lakes, and diverse wildlife, so how did it become the largest hot desert in the world? Explore the natural and human-made causes of these changes to see if there are lessons to be learned for our future.

0:00

Illustration of a scorpion walking through dunes; tropical jungle with hunter-gatherers looking to the sky; camels walking through a desert with the text 'The Sahara Then & Now' overlaid; globe zooming into Africa; map showing the size of the Sahara Desert; desert with a rocky cliff and flat expanse; oasis under a blue sky with animals on the landscape.

1:04

Filled thermometer with a globe at the base; camel on a desert landscape transitioning from a sunny day to a cold night; scorpion walking amongst green plants; rock carvings of animals; fish skeleton; seashells; goat by a dry channel of water; mounds of sand transitioning to lush vegetation amongst a large body of water; rainstorm with weekly weather forecast overlaid.

2:06

Scientist with a magnifying glass examining soil horizons; rain and dust moving through a desert; swaying green vegetation with its roots in water; goats on a cliff in a desert; desert landscape with text 'The Sahara's Transformation'; lush tropical jungle with hunter-gatherers holding long sticks looking to the horizon.

3:16

Earth in starry dark space and labeled '3,000 BCE'; spinning globe changing in colors and highlighting the Sahara Desert area with three exclamation marks; scientist holding a magnifying glass over Northern

Today, the Sahara is famous for being hot, dry, and covered with sand. But what's now a dry, desolate landscape was once lush and green, and the home of complex early human societies. So, what happened?

These days, the Sahara is very clearly a desert — a type of biome that gets very little rainfall, usually less than twenty inches a year. In the Sahara's case, that's closer to only three. And spanning over three million square miles in Northern Africa, it's the largest hot desert on Earth.

The Sahara's name comes from the word sahra, which literally means "desert" in Arabic. Its landscape is covered in rocky plateaus, gravel plains, and ergs, which are those iconic broad, flat expanses of land covered with wind-swept sand. There's also the occasional oasis basin — a fertile area in a desert where freshwater is available.

The Sahara is the way it is mainly thanks to its climate. The lack of moisture in the air keeps things really hot during the day and really cold at night. It could be 100 degrees Fahrenheit by mid-morning, only to plummet to 25 degrees Fahrenheit once it's time to sleep. All of which means it's really hard for anything to grow and thrive in the Sahara, so there's not a lot of vegetation aside from shrubs and hardy grasses. But we know it hasn't always been this way.

Ancient petroglyphs**,** or rock carvings, show evidence of a green Sahara, complete with animals you'd find in a savanna; think elephants and giraffes. And the area's geography shows plenty of fossils, seashells, and buried channels — all indicating that where we now see endless oceans of sand, there used to be wetlands, vegetation, and big bodies of water like lakes. And those lush grasses and plentiful lakes make sense when you look at the precipitation patterns of the era.

Scientists can use natural archives that record climate information — things like leaf waxes or sediment core from lakes — to determine that 10,000 years ago, the world's most iconic desert used to get plenty of rain.

They've also found evidence in something the Sahara has a lot of: dust. When wind blows over a lush, vegetated area, it doesn't pull up very much dust, because that soil is held down by water and plant roots. But with an arid, barren climate, there's nothing holding the soil in place, so more is blown away by wind. And looking at dust sediments that have built up across the Sahara over thousands of years, scientists have found that the wind sweeps away about five times more dust today than it did millennia ago.

Scientists refer to this most recent era of the wetter, greener Sahara, beginning around 11,000 years ago, as the African Humid Period. And it supported not only vast plant life, but people, as nomadic, hunter-gatherers called the region home.

But then, around 3,000 BCE, things started to change for a bunch of reasons scientists are only starting to understand. Some of those reasons are totally natural environmental shifts. The truth is, the regional climate around the Sahara has always been a bit unstable. Scientists are still working out the exact causes for why this is, but the gist is that as Earth wobbles slightly on its axis, thanks to the gravitational pulls from the Sun and the Moon, the angle of the solar radiation penetrating our atmosphere shifts too. Because of Northern Africa's

Africa; the Sun, Earth on its axis, and Moon in space; rainfall in a tropical landscape; bearded man with glasses next to a mathematical formula; map of Northern Africa with a hand drawing a globe with squiggly lines over it.

location and size, the region can be deeply sensitive to these changes, leading to periods of increased rainfall…every 20,000 years or so.

But some people don't think those natural shifts tell the whole story. Some research suggests that in only one to two hundred years, Northern Africa began drying out more quickly, morphing into the more familiar ocean of sand we know today — much faster than can be attributed to a garden variety axis wobble.

4:20

Map of Northern Africa overlaid with stick figures scattered across the region; rock art of cattle and herders; cattle grazing on grass; desert landscape; footprints overlaid with text 'Humans & Change'; petroglyphs symbolizing drop in rainfall, decline in vegetation, and increase in pastoralism.

The answer lies in something we're all pretty familiar with, humans. And while human populations in the region thrived, particularly because of the Sahara's lush biome at the time, they also may have contributed to its downfall.

Sediment shows that the Sahara began drying out around the same time as humans increasingly took up pastoralism, or the practice of keeping domesticated animals. And domesticated goats and cattle grazing on all the greenery might have been just enough to push the already shifting environment over the edge. That makes sense; these days, we know that overgrazing can kill off grasses and other greenery, leading to dryness as an environment loses a critical source of moisture. So, as pastoralism cropped up across the region, it's possible it caused that dryness to accelerate.

Of course, this isn't necessarily a one-way street, and there are other factors to consider, too. After all, less rain might have decreased wild plant life, encouraging humans to increase their reliance on their domesticated herds, speeding the cycle up. The whole thing is kind of a case of which came first, the chicken or the egg, or in this case, the goat herd or the dry, arid desert.

5:38

Sign that reads 'Welcome to The Sahara Desert' showing temperature and population numbers increasing; map outlining Libya; callout bubble with DNA double helix inside pointing at a buried human skeleton; flat rock formation in a desert landscape; stick figures migrating; map of Ancient Egypt with the Nile River flowing through the center.

And as the climate of the Sahara shifted, the population began shifting with it. Entire communities disappeared, like the people of the Takarkori, a remote region in what is now Libya. According to DNA taken from recently discovered skeletons, this community was isolated and genetically distinct, able to live off the lush Saharan landscape of the time. But as the green Sahara disappeared, the Takarkori community disappeared along with it.

Other populations had to adapt for survival — and for many, that meant picking up and moving elsewhere. There's evidence that between 7,000 and 5,000 years ago, people began leaving the burgeoning desert behind, instead joining pre-existing settlements along the Nile River, a more permanent source of water; coinciding with the beginning of Egypt's golden age.

6:30

Desert landscape with text 'The Future & Us'; spinning globe zooming into the area of Northern Africa; rock art of stick figures positioned between buildings, a shining sun is above them and moving cars below them; camels walking through a desert.

Our planet and its climate have changed many times in Earth's 4.5-billion-year history, and the world's most iconic desert is one example of just how catastrophic climate change can be for human societies.

Like the people of the ancient Sahara, today we find ourselves struggling to adapt to a changing climate, interwoven with our own human actions. And our behavior now could mean the difference between protecting our diverse natural world, or whole ecosystems going the way of the Sahara.