





Things to cover

1. **What is it** – why does it matter?
2. Causes of biodiversity loss
3. What is being done about it?
4. What can WE do about it?
5. Extra material

BIOS (mode of life)
DIVERTERE (to go different ways)

Biodiversity is the term used to describe the variety of all living things.

comprising:

- **Genetic Diversity**
- **Species Diversity**
- **Ecosystem Diversity** and their

Interrelated Evolutionary and Ecological Processes

**Biodiversity makes Human Life
on Earth possible**



Our Planet-What is Biodiversity 3:05 WWF 2019

<https://www.youtube.com/watch?v=US58f-SwO0k>

Some Are Thinking-

So What? Species go extinct all the time, **right?**

Human activities are wiping out many species and it's been known for some time that we are increasing the rate of species extinction. But just how dire is the situation? According to a study pub. in *Conservations Biology*, it's 10 times worse than scientists previously thought with current extinction rates 1,000 times higher than natural background rates. Conservation Biology April 2015



[The black-footed ferret.](#) Endangered
The only ferret native to North America...



Masked bobwhite quail, the only quail in the United States considered endangered with extinction.

What does Biodiversity Do for Us?

- **Biodiversity Provides Food, Jobs and Medicines** -from pollinated food crop increased yields, to antifungal agents & medicines such as antibiotics and heart, hypertension and anticancer drugs that come from naturally occurring chemicals in plants.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3560124/>
- **Biodiversity Builds more Resilient Ecosystems** An ecosystem with high species diversity is more likely to bounce back from abrupt changes in the ecosystem
- **Biodiversity Supports Ecosystem Services** -normal functions such as the decomposing of organic waste and the cleaning of freshwater, and, using a variety of wetlands life forms species ..to clean wastewater. Plant species diversity increases above ground carbon sequestration
 - <https://science.howstuffworks.com/environmental/green-science/wetland2.htm>
- **Biodiversity is Beautiful** -supporting a huge bio-tourism industry that caters to people who value the beauty and recreation opportunities provided in a variety of ecosystems



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Contributors to the Increase in the rate of Biodiversity Loss since the beginning of the Industrial Revolution



Anthropocentrism

PHILOSOPHICAL VIEWPOINT OF THE ANTHROPOCENE EPOCH

1. HUMAN BEINGS ARE THE CENTRAL AND MOST SIGNIFICANT ENTITIES IN THE WORLD

2. HUMANS AS SEPARATE FROM AND SUPERIOR TO NATURE

3. HUMAN LIFE HAS INTRINSIC VALUE WHILE OTHER ENTITIES* ARE RESOURCES THAT MAY JUSTIFIABLY BE EXPLOITED FOR THE BENEFIT OF HUMANKIND.

* (ANIMALS, PLANTS, MINERAL RESOURCES, WATER, AND SO ON)



18:15

<http://www.igbp.net/globalchange/anthropocene.4.1b8ae20512db692f2a680009238.html>

https://en.wikipedia.org/wiki/Will_Steffen

Will Steffen is honorary professor at the [Copenhagen University](#)'s Department of Geography and Geology and visiting researcher at the [Stockholm Resilience Centre](#).¹

Anthropocentrism

CRITICAL QUESTIONS

DO WE HAVE THE RIGHT TO EXPLOIT ANY OR ALL OF
OUR NATURAL RESOURCES?

HOW IS THAT BELIEF WORKING OUT?

Do We Have to Choose Between

A GROWTH ECONOMY BASED ON EARTH'S
RESOURCES (inherently limited)

VS. THE PLANET? **or**

CAPITALISM VS. CLIMATE? **or either?**

Habitat Loss

```
graph TD; Climate[Climate] --> PG[Population Growth]; PG --> HL[Habitat Loss]; HL --> IS[Invasive Species]; IS --> OH[Over Harvesting]; OH --> Climate;
```

Population Growth

Invasive Species

Climate

Over Harvesting

Everything is Connected to Everything Else

Habitat Loss

news.nau.edu



Climate 101: Deforestation | National Geographic
<https://www.youtube.com/watch?v=Ic-J6hcSKa8>

Search: Land Use Phoenix AZ



Habitat destruction renders entire habitats functionally unable to support the species present; biodiversity is reduced in this process when existing organisms in the habitat are displaced or destroyed.

<E Elliot Rd (west of I-10) Phoenix

Wild Horse Advocates: New Fence Will Cut Off Salt River Herd From Vital Resources

The Tonto National Forest is installing nearly four miles of fencing along the banks of the lower Salt River. It's intended to prevent horses from crossing Bush Highway and keep nearby livestock from joining the herd.



Is it Habitat access vs. safety vs. money ???

But ...[Wild Horse Mgt Group][advocating for an overpass] says this new [4 mile] section will keep horses away from the road and block them from almost half of their habitat.

<https://kjzz.org/content/1394676/wild-horse-advocates-new-fence-will-cut-salt-river-herd-vital-resources> 1-14-2020

Invasive Species

Almost any species potentially can become invasive, but.. generally have 3 things in common that allow them to be successful in a new environment

- They are generalists

They do not need special food or places to reproduce

- They are highly competitive for resources

- They have lots of offspring at one time

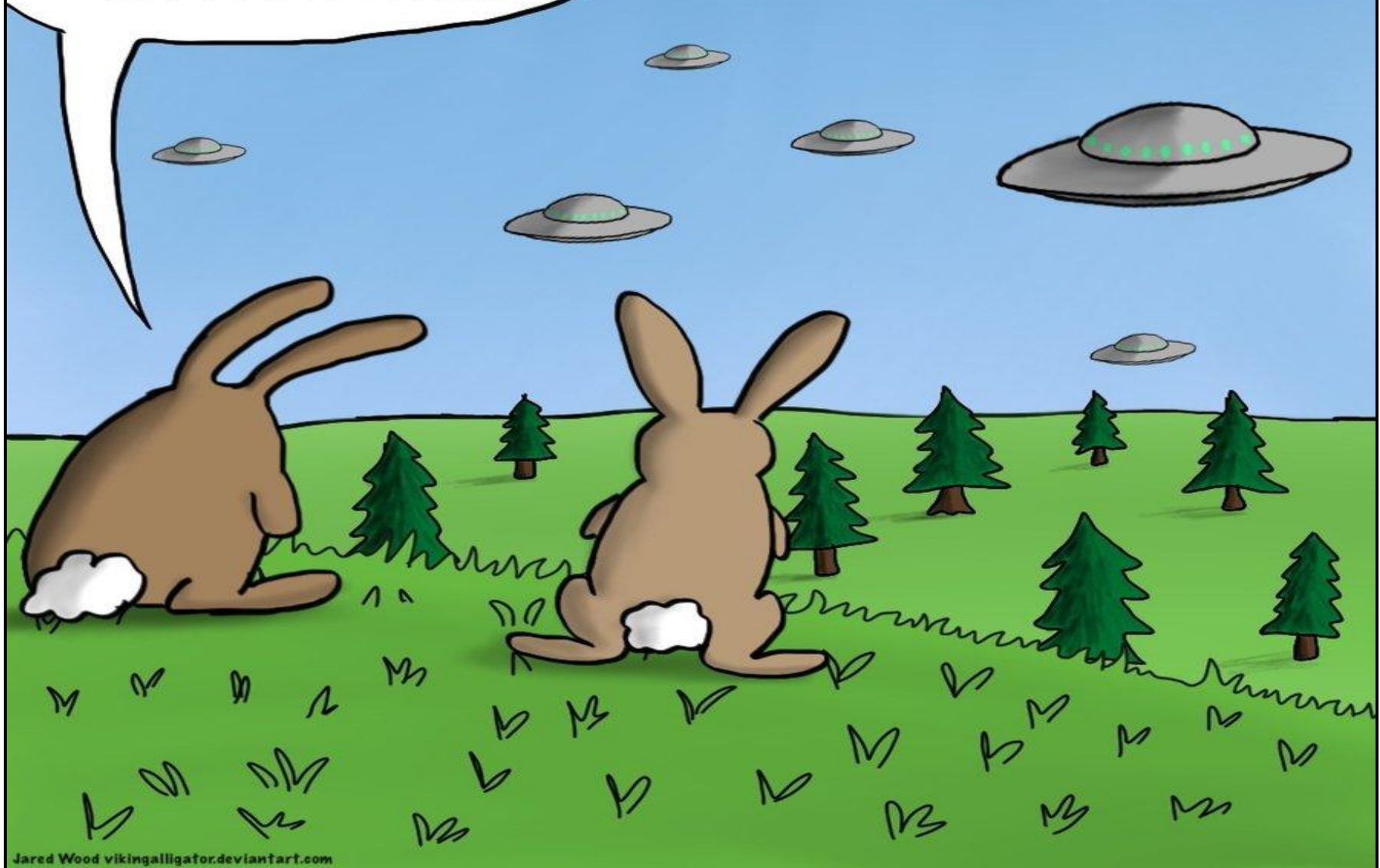
& short turnover time between pregnancies [therefore] excluding large species- substantially limiting their adaptive capabilities during eras like the planet is in now: more rapid and severe climate events

Can non-native species benefit an ecosystem??

Random/Accidental Introductions or Intended?



OH I JUST KNOW THIS
IS GONNA MESS WITH
THE ECOSYSTEM.



What Measures to Control Invasive Species are There?? Are they Sustainable?? or Desirable??

WANTED
FOR HARMING FLORIDA

**NON-NATIVE
FISH ROUNDUP**

Sat, April 8, 2017 | 7 a.m. to 3 p.m.



Help native fish by catching invasive species like Mayan cichlids, Oscars, Spotted Tilapia, and more. All fish must arrive at the Gazebo located at the Conservancy of Southwest Florida by 3 p.m. for measurements and weigh in. Stay for the cook out and awards!

{ **JUST FOR KIDS! FISHING BLITZ** }

3 pm to 4 pm at the Gazebo Pond!

Target Fish, Awards, and More Info at
www.floridainvasives.org/Southwest
Hosted by the Southwest Florida Cooperative Invasive Species Management Area.



Sustainable Management Options



Over Harvesting

Overharvesting stems from several factors

- including: expanding markets,
- increasing demand, and
- improved access and techniques for capture.
- and an exponential increase in the human population

Comments?

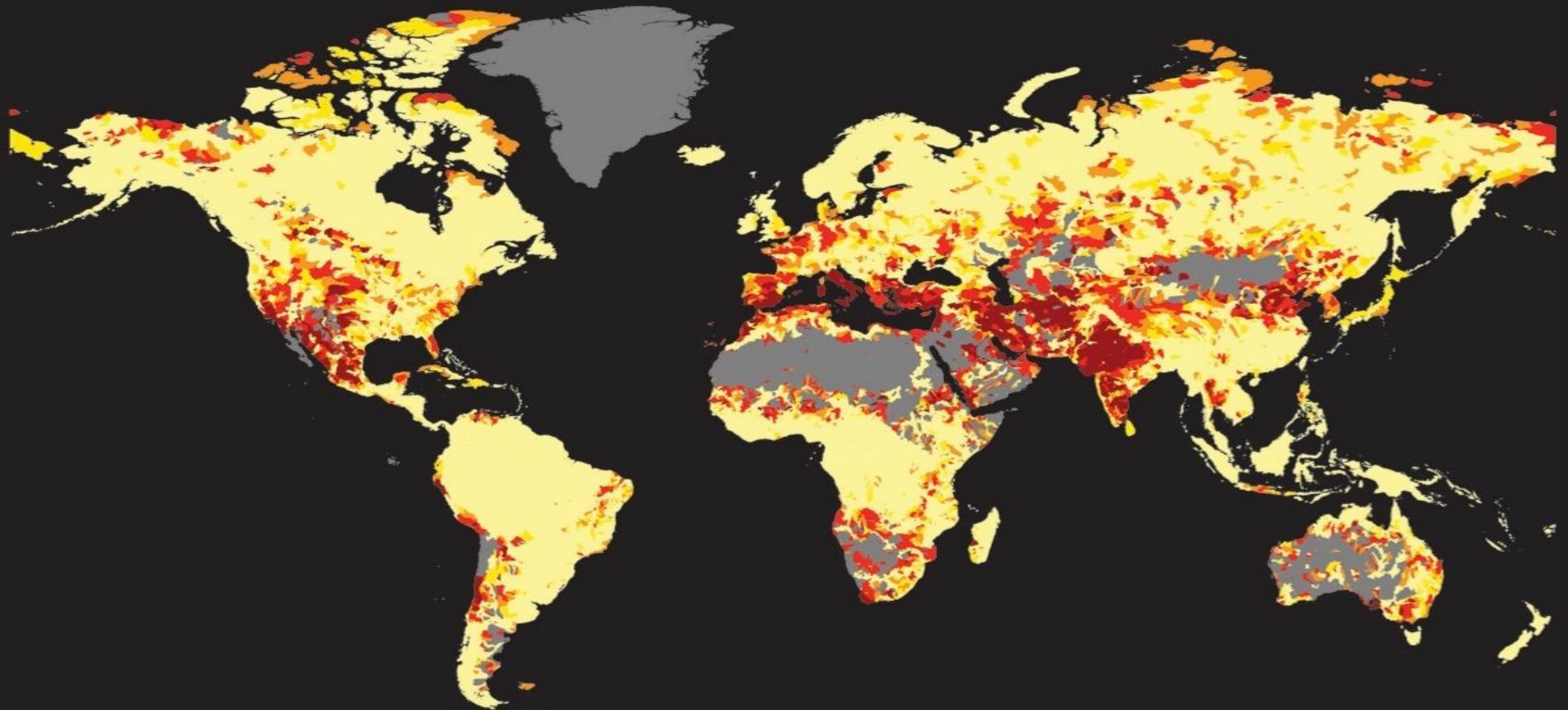
Overharvesting natural resources for extended periods of time depletes these resources until they cannot recover within a short period of time; some may never recover.



OVERFISHING



BASELINE WATER STRESS



Map of baseline water stress showing that 17 countries face extremely high water stress. Source [wri.org/aqueduct](https://www.waterpeacesecurity.org/info/about-wps) <https://www.waterpeacesecurity.org/info/about-wps>

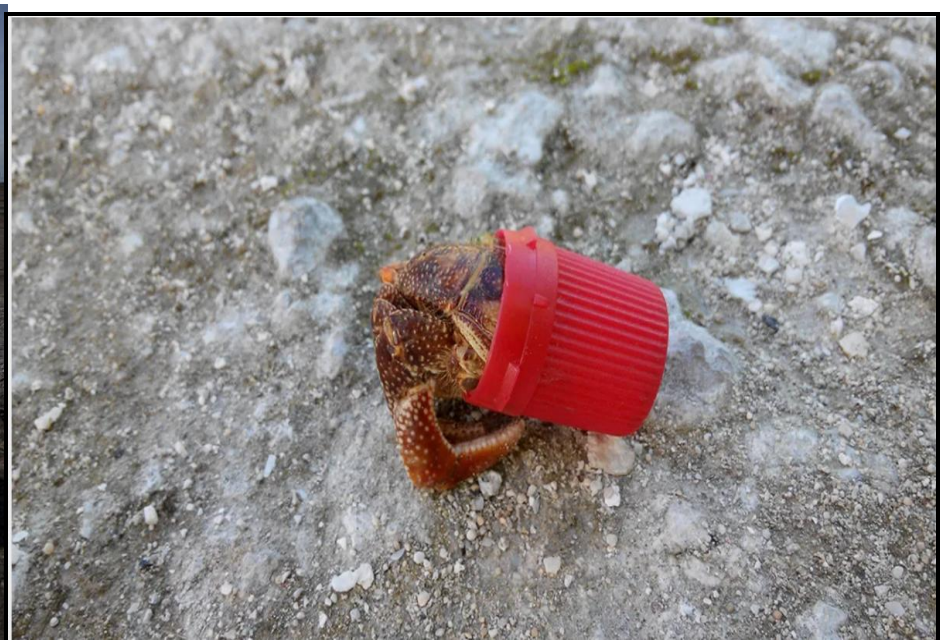
Climate Change

17 U.S. cities that will have unprecedented
climate conditions by 2050**

Atlanta | Baltimore | Boston | Charlotte | Cincinnati |
Columbus | Indianapolis | Las Vegas | Louisville | Memphis |
Monrovia | Nashville | Phoenix* | Pittsburgh | Salt Lake City
| St. Louis | Washington, D.C. |

<https://crowtherlab.pageflow.io/cities-of-the-future-visualizing-climate-change-to-inspire-action#213121>

***By 2050**, the climate of **Phoenix** will be most similar to that of current-day **Baghdad**. The maximum temperature of the warmest month is likely to increase by **2.2°C**, resulting in a mean annual temperature change of **1.8°C**.

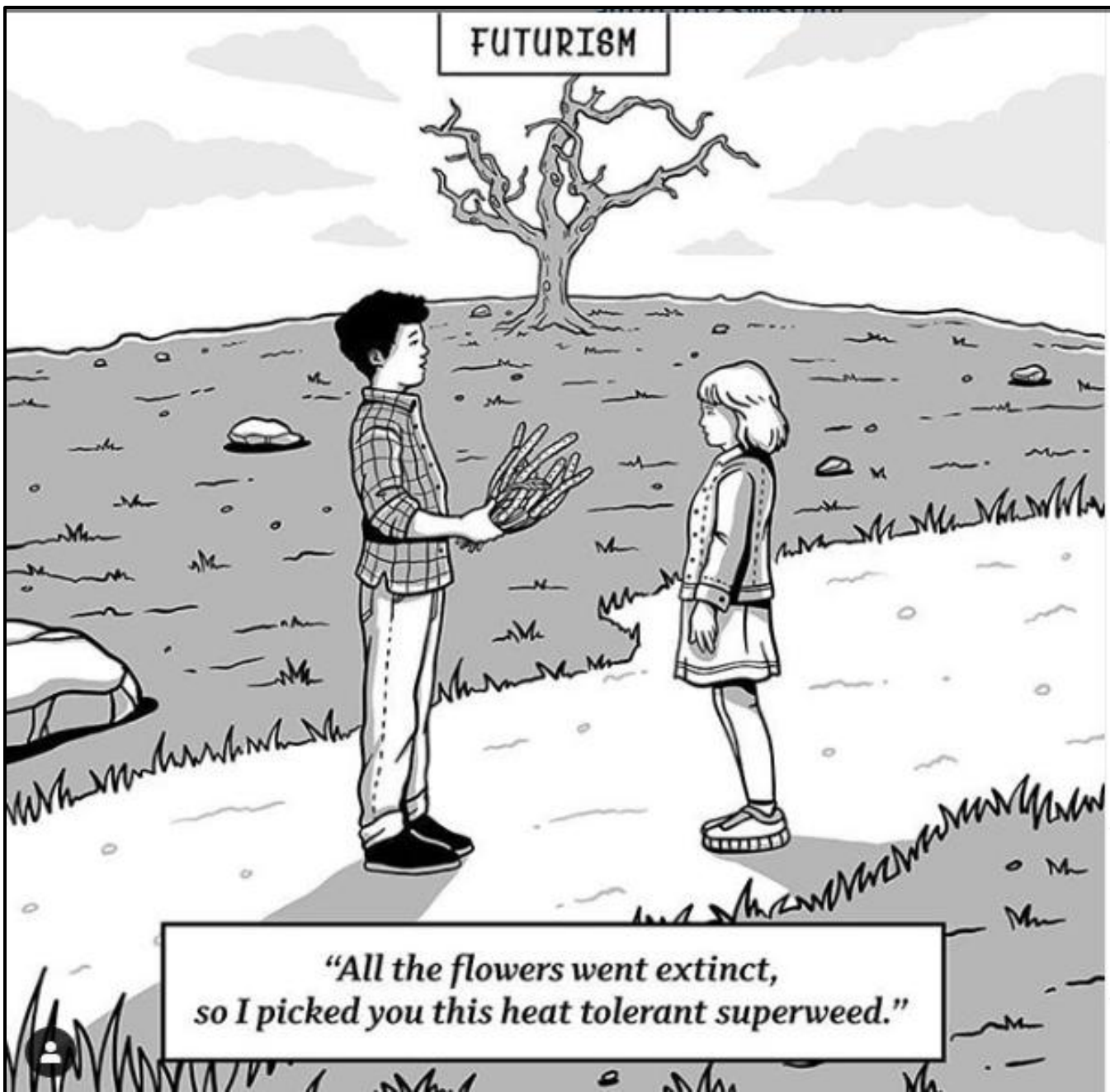


Earth's most biodiverse ecosystems face a perfect storm



A combination of climate change, extreme weather and pressure from local human activity is causing a collapse in global biodiversity and ecosystems across the tropics, new research shows.

FUTURISM



*"All the flowers went extinct,
so I picked you this heat tolerant superweed."*

Pollution



BREAKING RECORDS

How the World Passed a Carbon Threshold and Why It Matters

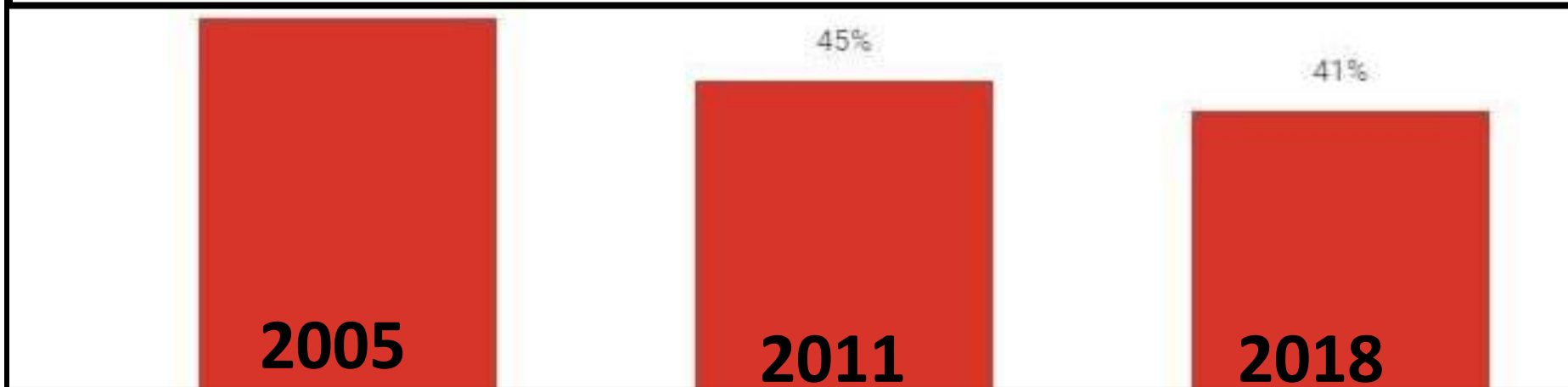
BY NICOLA JONES · JANUARY 26, 2017



<https://e360.yale.edu/features/how-the-world-passed-a-carbon-threshold-400ppm-and-why-it-matters>

A study of U.S. deaths from air pollution shows a decrease in the proportion of deaths due to emissions crossing state lines.

A Study of U.S. deaths from air pollution due to emissions crossing state lines



- Federal regulations—such as the
- [Cross-State Air Pollution Rule](#) and its predecessor, the [Clean Air Interstate Rule](#) – enabled this improvement by mandating reductions in power plant emissions of sulfur dioxide and nitrogen oxides

https://phys.org/news/2020-02-secondhand-youre-state.html?utm_source=nwletter&utm_medium=email&utm_campaign=daily-nwletter

Exponential Increases in Population





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BENHAM, Ky. — Inside the **Kentucky Coal Museum**, visitors can peruse plenty of memorabilia on mining and the commonwealth's coal camps. But on the roof, they'll find a display dedicated to an unexpected industry:
Solar power.

XPRIZE Announces New \$10 Million Competition to Preserve Rainforests Across the Globe

Nov 19, 2019 XPRIZE

<https://www.youtube.com/watch?v=tMw-ykS5690>

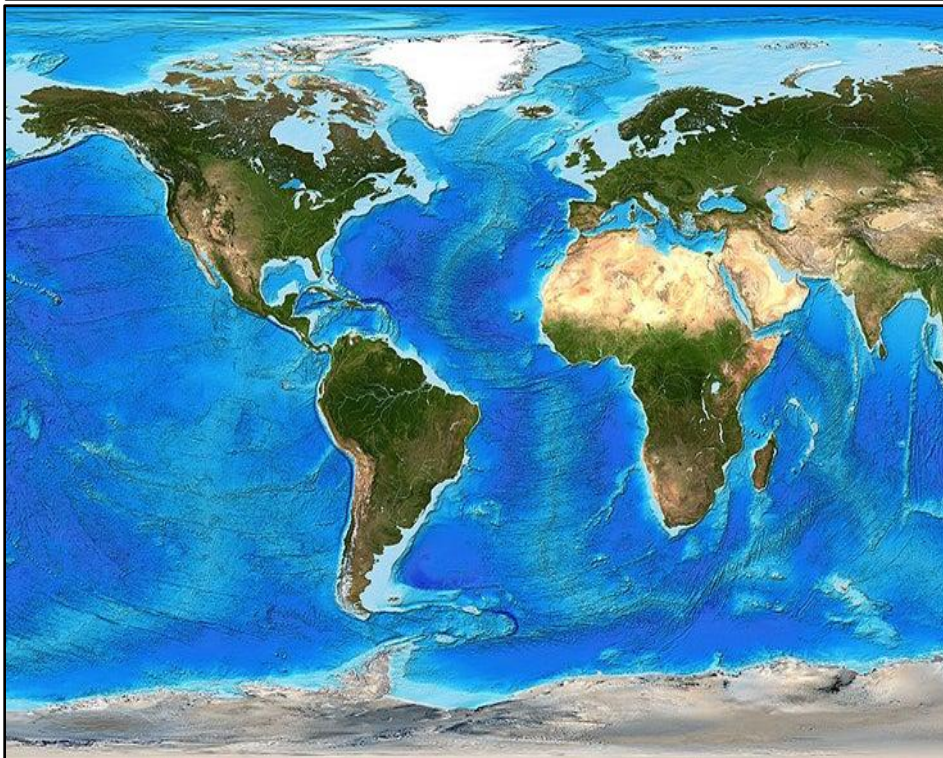


<https://www.cbsnews.com/video/complicit-the-amazon-fires/#x>

Winners Announced in \$7M Shell Ocean Discovery XPRIZE for Advancements in Autonomous Ocean Exploration

+ \$1M National Oceanic and Atmospheric Administration (NOAA) Bonus Prize

<https://www.youtube.com/watch?v=g9vht3mJtSA&list=PLPZMGqJRslR4fu1gj5XJuScxDk3GcbFW1&index=2>



San Jose Students Vie for \$1 Million Prize for Ocean Research

<https://www.youtube.com/watch?v=kY7Ysfav5JU>

77 Health Organizations* Call for Climate Action to Fight Public Health Emergency



***AMA**

**American Academies of:
Pediatrics, Nursing,
Family Physicians**

**American Lung Association
American Heart Association
Physicians for Social
Responsibility, Arizona**

**Full list of signatories, policy
agenda, resources at link
below**

"We are here today to declare that climate change is a health emergency. Climate change is already harming the health, safety and wellbeing of every American living today and if it is not addressed, will bring untold harm to all our children and grandchildren,"

<https://climatehealthaction.org/cta/climate-health-equity-policy/>

**Boris Lushniak: former Acting Surgeon General &
Retired U.S. Public Health Service Commissioned Corps Rear Admiral**

Social tipping dynamics for stabilizing Earth's climate by 2050



Safely achieving the goals of the Paris Climate Agreement requires a worldwide transformation to carbon-neutral societies within the next 30 y.

Feb. 2020

<https://www.pnas.org/>

Nobel Laureate Dr. Eric Chivian on Biodiversity, Health, and Climate Change





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Should you just give up?



NO!! Changes start with you! Seriously. Every human on earth—
even the most indifferent, laziest person among us—
is part of the solution

<https://www.un.org/sustainabledevelopment/takeaction/>

https://phys.org/news/2019-11-climate-crisis.html?utm_source=nwletter&utm_medium=email&utm_campaign=daily-nwletter



Me? What Can I Do?
I'm too busy (Do I care enough?)
It's too late!
It's someone else's job?
I don't know WHAT to do! HELP!

At Home/Property? **the Grocery Store /Farmers Market?**
On Your Roof? (Solar) **Investments> Sustainable?**
In your Recycle/Trash Bins? **For your Neighborhood?**
In your Community? **At the Ballot Box?** **For your State?**

<https://dbg.org/research-conservation/research-conservation-programs>

<https://www.amwua.org/what-you-can-do/landscape-and-garden>

<https://www.lung.org/our-initiatives/healthy-air/sota/key-findings/what-you-can-do.html>

https://www.youtube.com/results?search_query=biodiversity

<https://www.nationalgeographic.org/idea/citizen-science-projects>

<https://libguides.asu.edu/citizenscience>

Biodiversity

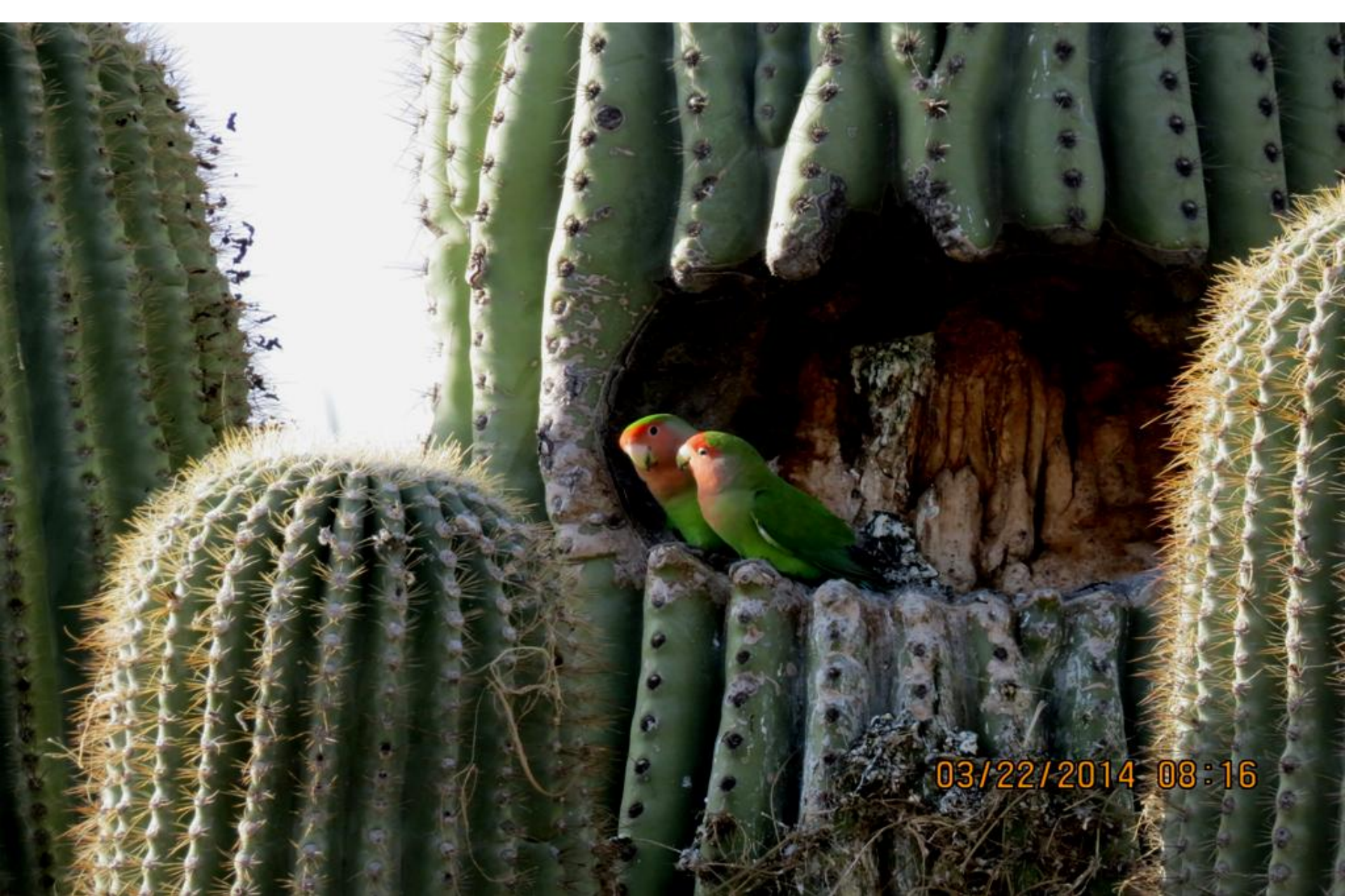
Everything Is Connected to Everything Else

NOW is the time to **Discuss**,
to **Learn** what we can and should do,
and to **Act**,

let's **Begin** to be part of the solution

*“Every individual has a role to play.
Every individual makes a difference.”*

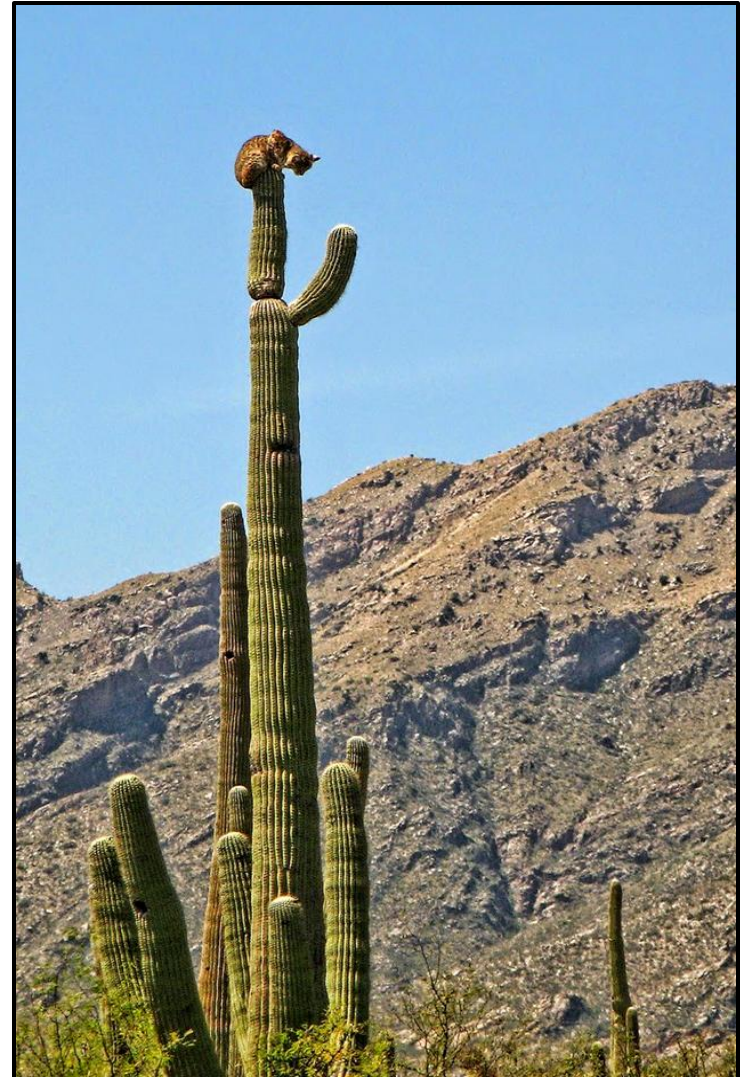
– Dr. Jane Goodall



THANK YOU

Biodiversity in Arizona

Keystone species in Arizona



Biodiversity Loss in Arizona: What We Can Do About It



VOLUNTEER:

**Adopt a Park
Social Media**

**Education
Grant Writer(s)**

**Sustainable Food
Systems
Sow It Forward**

Arizona volunteers plant hope for the future of monarch butterflies



Help us track monarchs and
milkweed across the west

Monarch populations across North America are in serious decline. To preserve and protect populations in western states, we need to better understand where monarchs and their milkweed host plants occur in the landscape.

Your help is critical in collecting data to better inform conservation efforts in the Western U.S.

[Learn More](#)

The milk weed planting project was set up by the AZ Game & Fish Dept. as it's part in the overall Western Monarch Butterfly Conservation Program

<https://www.azgfd.com/category/events/>

**In a land of wild cats and scarce water,
a battle over mining heats up
The federally-approved
Rosemont copper mine could dry up a
wet spot in Arizona rich with biodiversity,
but faces precedent-setting lawsuits.**

<https://www.nationalgeographic.com/environment/2019/04/rosemont-copper-mine-arizona-environmental-impact/>

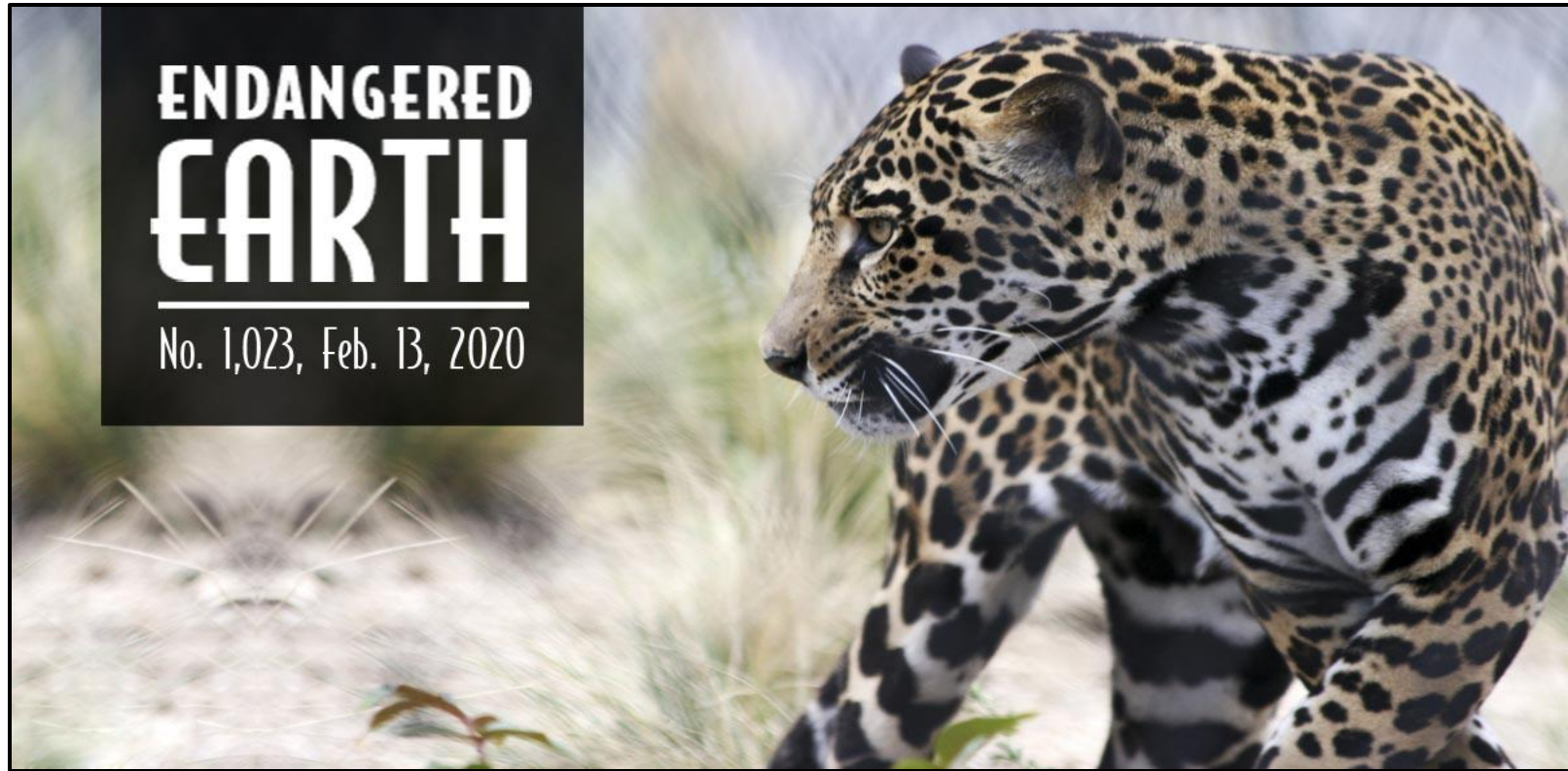


<https://www.ecowatch.com/native-tribes-copper-mine-arizona-2641382305.html>



Judge Rules Against Copper Mine in a Win for Wildlife

Chalk up another win for jaguars in southern Arizona.



https://www.azcentral.com/story/news/local/arizona-environment/2020/02/11/court-ruling-arizona-rosemont-copper-mine-overturms-wildlife-analysis/4719690002/?utm_term=EndangeredSpecies&emci=d41240cb-cb4d-ea11-a94c-00155d039e74&emdi=81883d12-934e-ea11-a94c-00155d039e74&ceid=1858350



BLACK-FOOTED FERRET

**Between 1991 and 1999, about 1,200 ferrets
were released in Wyoming, Montana, South Dakota, Arizona and along the
Utah/Colorado border**

**AN ENDANGERED SPECIES ACT
SUCCESS**

Enter a city or zip code to add location to map

Add to Map Clear All

The U.S. Drought Monitor (USDM) is a map that shows the location and intensity of drought across the country. The data is updated each Tuesday and released on Thursday. This map shows the drought conditions on November 12, 2019.

Learn more about the US Drought Monitor



D0 - Abnormally Dry

- Short-term dryness slowing planting, growth of crops
- Some lingering water deficits
- Pastures or crops not fully recovered

13.4% of State 91.8% D0-D4



D1 - Moderate Drought

- Some damage to crops, pastures
- Some water shortages developing
- Voluntary water-use restrictions requested

32.8% of State 78.4% D1-D4



D2 - Severe Drought

- Crop or pasture loss likely
- Water shortages common
- Water restrictions imposed

45.6% of State 45.6% D2-D4



D3 - Extreme Drought

- Major crop/pasture losses
- Widespread water shortages or restrictions

0.0% of State 0.0% D3-D4



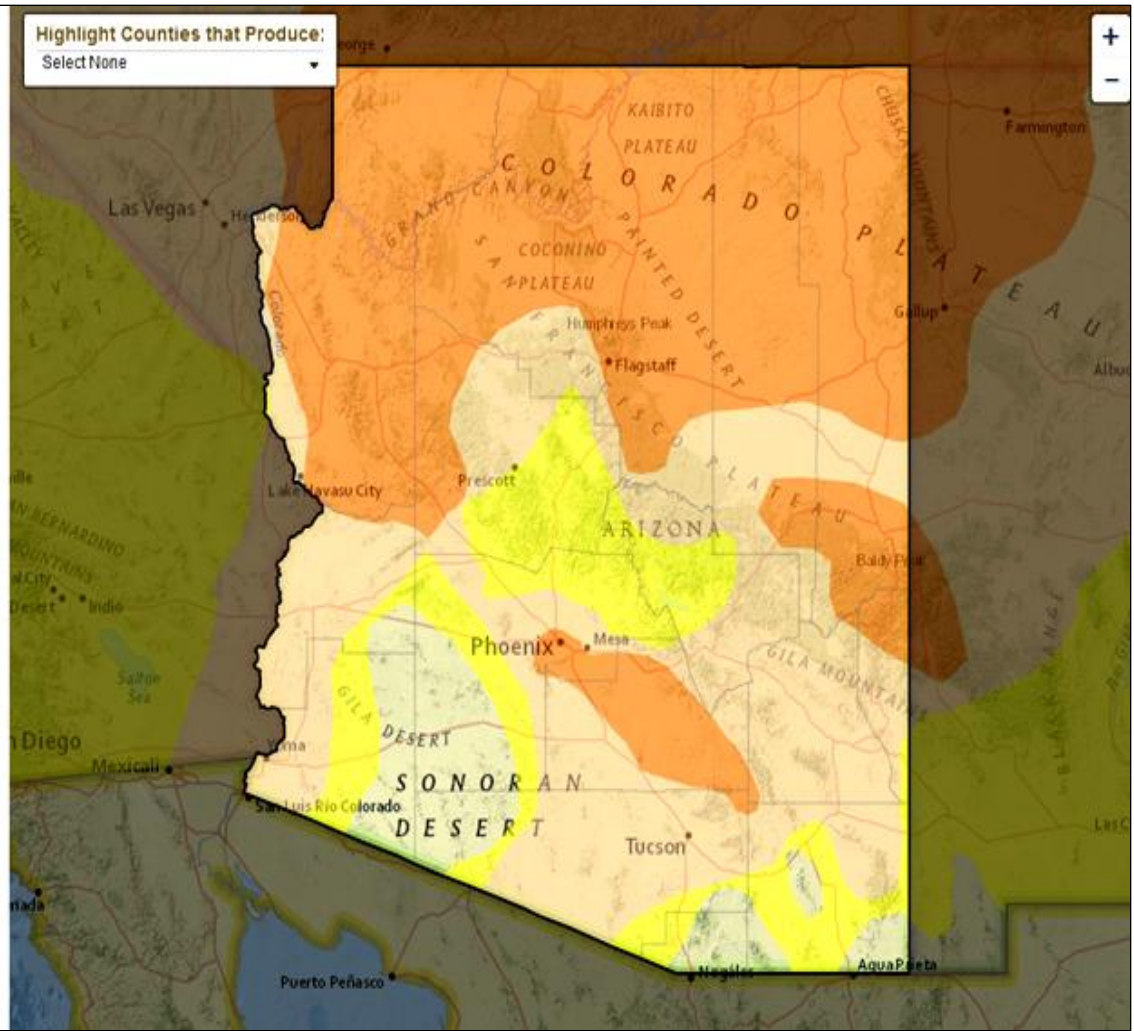
D4 - Exceptional Drought

- Exceptional and widespread crop/pasture losses
- Shortages of water creating water emergencies

0.0% of State



Highlight Counties that Produce:
Select None





Bartram's Stonecrop

Threatened by collection, grazing, the global climate emergency and a proposed copper mine near Tucson

WATER for FARMING IN ARIZON'S FUTURE

Arizona's water supplies are drying up. How will its farmers survive?

As the mighty Colorado River dwindles and cropland dries out, farming families face a grim choice: give up or somehow adapt.

<https://www.nationalgeographic.com/science/2019/11/arizona-water-drying-up-how-will-farmers-survive/#> 8 minute read



Cotton now planted seven weeks earlier

By 2100, due to human-caused climate change, the Southwest is expected to see 85 more days each year [with temperatures over 100 degrees.](#)

Bringing Policy and Law Into Fight Against Buffelgrass

Using Buffelgrass as the subject of a new study, University of Arizona researchers hope to develop the tools and knowledge to enable proactive management of emerging threats from **invasive species.**



The research team is focusing on buffelgrass, which **increases fire risk and threatens native saguaros.**

(Photo: National Park Services)

The team, consisting of faculty from the College of Social and Behavioral Sciences and the College of Agriculture and Life Sciences, received a **\$1.58 million grant from the National Science Foundation's CNH2: Dynamics of Integrated Socio-Environmental Systems program.**

Climate 2020: Seven Generations for Arizona Conference held 11-15/16/2019

....a theme that draws on the Iroquois principle of **making decisions on resources** that will be **sustainable seven generations** down the line.



- Climate Change in Arizona: Global Connections and Cause for Concern
- The Future of Water in Arizona
- Preparing for a Hotter, Drier World: Wildfire, Infrastructure, and Emergency Management

- Is Climate Still One of the “5 Cs?” How Arizona’s Urban Centers are Contending with Climate Change
- Impacts of Climate Change on Arizonans’ Health

Healthy ecosystems provide enormous carbon capture and sequestration benefits that can help stave off the worst effects of climate change, and when we protect and restore nature, we can simultaneously address rapid biodiversity loss.

United Nations Summit 2019



Climate Action Summit 2019 A Race We Can Win

<https://www.un.org/en/climatechange/un-climate-summit-2019.shtml>



Acting Now Could Save Bugs From Insect Apocalypse

Insects play a vital role in ecosystems and humans are particularly dependent on them for food. The IPBES report estimated that up to \$577 billion (€522 billion) in annual crop output is at risk as a result of [pollinator loss](#) alone

<https://thehoneybeeconservancy.org/how-to-save-the-bees/>

Effect on Human Life



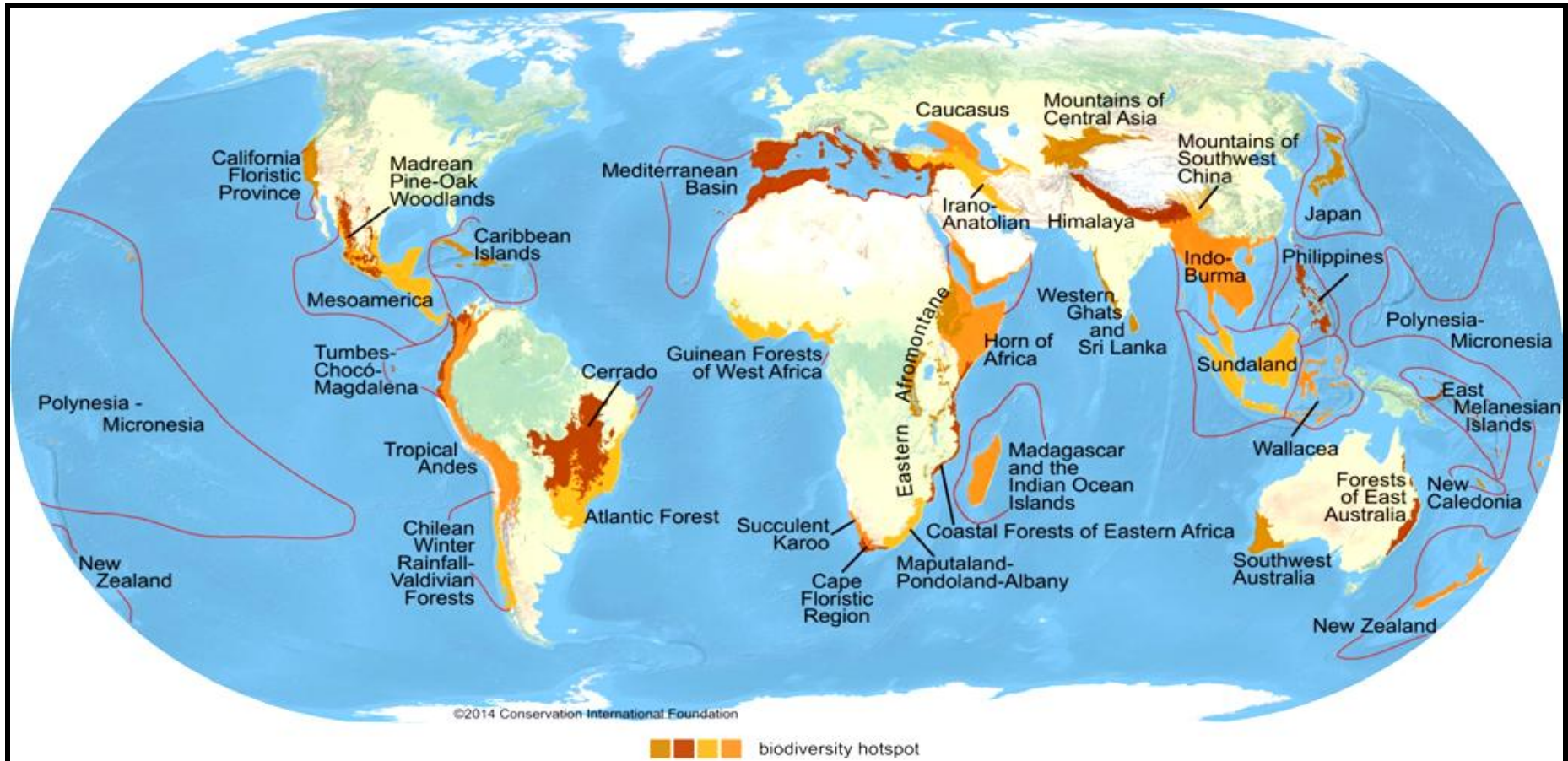
Oil Spill Prevention Law* Helps Contain 11-15-19 Leak at Shell Puget Sound Refinery



Around 20 gallons spilled (11:45 P.M.), of which five** [gal] entered the water, and that oil was **contained within an area that was *boomed before the transfer began**. The cleanup was completed by 8:30 a.m. Sunday, the dept. said.

State Laws or Federal Laws: Pros & Cons???

What Defines a Biodiversity Hotspot?



Conservation International (conservation.org) defines 35 biodiversity hotspots — extraordinary places that harbor vast numbers of plant and animal species found nowhere else. All are heavily threatened by habitat loss and degradation, making their conservation crucial to protecting nature for the benefit of all life on Earth.

Biodiversity Matters to All of Us

Biodiversity loss can have significant direct human health impacts if ecosystem services [ecological processes] are no longer adequate to meet social needs.

Indirectly, changes in ecosystem services affect livelihoods, income, local migration and, on occasion, may even cause political conflict.

Biodiversity Loss 101



<https://www.youtube.com/watch?v=vCkDxD0DV0Q>

7:24

2-8-2016

Photo credit: Joel Sartore w/ Nat Geo

*Biological Diversity - Biodiversity.
Biodiversity sustains life on
earth. It is a result of millions of
years of evolution and
coevolution. It provides humanity
with food and medicine.
Moreover, biodiversity constitutes
ecosystems and provides ecosystem
services such as atmospheric and
climatic regulation, pest control and
pollination. These are only a few of
numerous examples. Without
biodiversity - we wouldn't be here.*



Biodiversity The Future is in Our Hands

[HTTPS://WWW.YOUTUBE.COM/WATCH?V=KSN4QY8PDJ4](https://www.youtube.com/watch?v=KSN4QY8PDJ4)

6:40 MIN

Nobel Laureate* Explores Links Between Climate Change, Biodiversity

PBS News Hour aired in 2009

<https://www.youtube.com/watch?v=kU7N2Fu4sCY>

10:27 min



***Eric S. Chivian** is the founder and director of the Center for Health and the Global Environment (CHGE) at [Harvard Medical School](#). 1985 recipient of Nobel Prize in Medicine

UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating'

May 6 2019

- **Current global response insufficient;**
- **'Transformative changes' needed to restore and protect nature;**
- **Opposition from vested interests can be overcome for public good**
 - **Most comprehensive assessment of its kind;**
 - **1,000,000 species threatened with extinction**

“This loss is a direct result of human activity and constitutes a direct threat to human well-being in all regions of the world.”

<https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

If Smart Old Money was in Oil and Gas, Smart New Money is in Renewable sources of Electricity

quoting from [BREAKPOINT](#) Reckoning with America's Environmental Crises



[EARTH & ENERGY](#)

The Kentucky Coal Mining Museum Will Be Powered by Solar Energy

"It is a little ironic," admits the museum's spokesperson.

April 7th 2017



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5. Extra slides: Arizona biodiversity; UN 2019 Report on Sustainable Development; Climate 2020: seven Generations for Arizona Conference 11-15-19; Restoration Success Stories; State Laws & Private Research w/ Federal Funds

What we do individually is counted collectively

