

HONR 229L: Climate Change: Science, Economics, and Governance

Discussion #2: Prologue & The Maya

Ross Salawitch

rjs@atmos.umd.edu

Class Web Site: <http://www.atmos.umd.edu/~rjs/class/honr229L>

ELMS Page: <https://myelms.umd.edu/courses/1269254>



<https://www.locogringo.com/wp-content/uploads/2015/06/mayan-ruin-tour-in-mexico-riviera-maya.jpg>

5 September 2019

Discussion Lead Selections

| Student | Pick 1 | Pick 2 | Pick 3 | Pick 4 | Pick 5 |
|-----------------------|-----------|-----------|-----------|-----------|-----------|
| Emma Eklund | 2 | 3 | 13 | 4 | 5 |
| Thomas Ersevim | 15 | 16 | 5 | 9 | 17 |
| Eric Festa | 16 | 7 | 6 | 8 | 20 |
| Hillary Griffin | 2 | 3 | 4 | 5 | 11 |
| Edison Hatter | 3 | 8 | 19 | 2 | 1 |
| Cristy Ho | 9 | 8 | 14 | 2 | 3 |
| Ryan Lau | 8 | 5 | 19 | 20 | 14 |
| Anna Liberatore | 5 | 12 | 2 | 14 | 6 |
| Rhea Lieberman | 10 | 14 | 12 | 6 | 4 |
| Luke Lu | 11 | 3 | 19 | 6 | 1 |
| Peter Marx | 6 | 9 | 10 | 11 | 12 |
| Ammar Masood | 9 | 13 | 11 | 10 | 16 |
| Aaron Mendelsohn | 14 | 16 | 12 | 8 | 19 |
| Michelle Njinguet | 1 | 2 | 3 | 4 | 5 |
| Amanda Oyler | 2 | 3 | 11 | 17 | 18 |
| Abhay Patel | 15 | 12 | 2 | 3 | 4 |
| Samuel Robinson | 16 | 17 | 18 | 15 | 5 |
| Nyah Stewart | 6 | 3 | 4 | 17 | 14 |
| Anne Vicari Fernandez | 8 | 2 | 4 | 5 | 20 |
| Eliza White | 2 | 6 | 7 | 19 | 11 |
| Sijing Yu | 21 | | | | |

Discussion Lead Selections

| Discussion | Pick 1 | Pick 2 | Pick 3 | Pick 4 | Pick 5 |
|-----------------------------------|----------------------------------|--------------------------------------|--------------------------|--------------------|-------------------|
| 1. Easter Island | Michelle | | | | Luke Edison |
| 2. Maya | Emma Amanda Hillary Eliza | Michelle Anne Ryan | Abhay Anna | Edison Cristy | |
| 3. New Guinea, Tikopia, and Japan | Edison | Emma Amanda Hillary Luke Nyah | Michelle | Abhay | Cristy |
| 4. D.R. and Haiti | | | Hillary Anne Nyah | Emma Michelle | Rhea Abhay |
| 5. China | Anna* | | Thomas | Hillary Anne | Emma Michelle Sam |
| 6. Roadmaps | Peter Nyah | Eliza | Eric | Rhea Luke | Anna |
| 7. Business and Environment | | Eric | Eliza | | |
| 8. Intro. To Climate Change | Anne Ryan | Edison Cristy | | Eric Aaron | |
| 9. CMs: Physical Sci. | Ammar Cristy | Peter | | Thomas | |
| 10. CMs: Social Sci. | Rhea* | | Peter | Ammar | |
| 11. Impacts of Climate Change | Luke | | Amanda Ammar | Peter | Hillary Eliza |
| 12. Solar | | Abhay Anna* | Aaron Rhea | | Peter |
| 13. Biofuels | | Ammar | Emma | | |
| 14. Hydro, Geo, and Wind | Aaron | Rhea | Cristy | Anna | Ryan Nyah |
| 15. Nuclear | Abhay Thomas | | | Sam | |
| 16. Capitalist Greed | Eric Sam | Aaron Thomas | | | Ammar |
| 17. Econ. Of Renewable Energy | | Sam | | Amanda Nyah | Thomas |
| 18. Econ. Climate Change | | | Sam | | Amanda |
| 19. Solutions | | | Luke Ryan Edison | Eliza | Aaron |
| 20. Paris Climate Agreement | | | | Ryan | Anne Eric |
| 21. Implementation | Sijing | | | | |

* Person included a comment with a special request for the discussion

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AT 1, Q 1:

Jared Diamond states ~~Easter Island~~ Rapa Nui is the most extreme example of what?

Actually, Diamond uses “extreme example” three times in the chapter.

On page 107 he writes “The overall picture for ~~Easter Rapa Nui~~ is the most extreme example of **forest destruction** in the Pacific, and among the most extreme in the world: the whole forest gone, and all of its tree species extinct. Immediate consequences for the islanders were losses of raw materials, losses of wild-caught foods, and decreased crop yields.”

On page 115 he writes “We still have not faced the question why ~~Easter Island Rapa Nui~~ ranks as such an extreme example of **deforestation**”

On page 118, he writes “~~Easter’s Rapa Nui’s~~ isolation makes it the clearest example of a society that destroyed itself by **overexploiting its own resources**”

At times an AT question will bear specific reflection to a key phrase in the reading. Therefore, might want to have a look at the AT questions before starting the readings 😊

Full credit for either deforestation, forest destruction, or overexploitation of resources.

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AT 1, Q 2:

In 2 to 3 sentences describe the main points Jared Diamond is trying to convey about Rapa Nui in this chapter?

Diamond is trying to sell the audience on the similarities between the history of Easter Island and our modern world. Easter Island began with a fragile environment, and despite warning signs, the islanders refused to change their ways in order to save it. This relates to our world because we are experiencing problems such as deforestation, but are still able to follow the environment's warning signs.

Notice:

the succinctness and completeness of the reply
the richness of the 3 sentences

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AT 1, Q 3:

Describe in a sentence or 2 something new you learned upon reading this chapter.

From reading this chapter, I learned just how big of an impact that the extensive deforestation had on the people of Easter Island. There were way more consequences of the deforestation than I would have thought, including no ability to cremate bodies, no ability to move completed statues, an inability to build watercrafts to obtain food, and soil erosion.

Deforestation will be a recurrent theme of numerous readings

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AT 1, Q 3:

Describe in a sentence or 2 something new you learned upon reading this chapter.

In this chapter, I learned more about the history and customs of Pacific Islands, specifically that of Easter Island, and the ways in which customs differ and remain the same. I learned about the many possible different ways that the enormous stone ahu and moai were created and transported. I have always been intrigued by the unique cultures and ways of life that develop in islands that seem so isolated from the rest of the world, so it was interesting to look at the issue of environmental exploitation in Easter Island and applying their mistakes to the future of our current world.

The means of transporting the moai is still hotly debated, as illustrated at:

<https://www.youtube.com/watch?v=yvvES47OdmY>

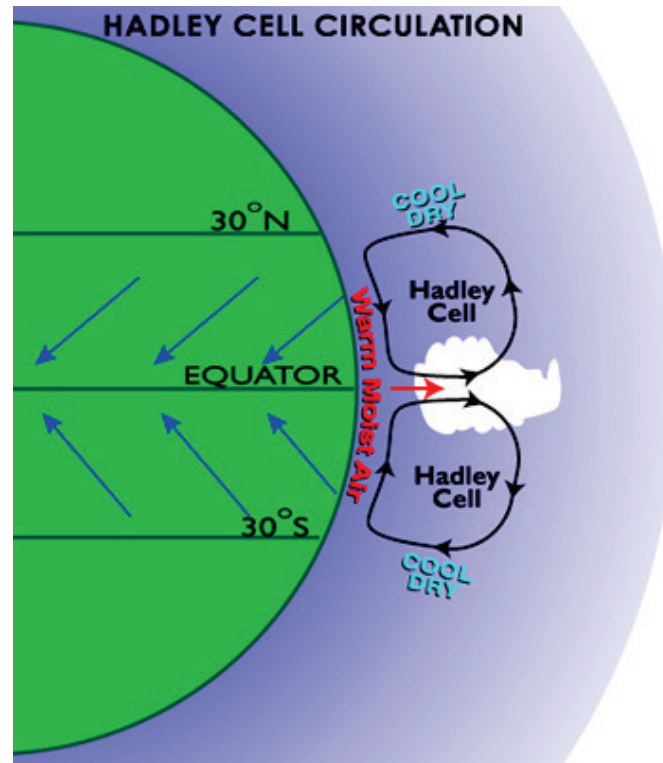


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AT 1, Q 3:

Describe in a sentence or 2 something new you learned upon reading this chapter.

I also learned that variables in climate can contribute to a more extreme rate of deforestation. In a wet hot climate it is easier for plant life to regrow, but in a cold and dry climate tree growth is much slower.



http://www.windows2universe.org/vocals/images/HadleyCell_small.jpg

HONR 229L: Climate Change: Science, Economics, and Governance

AT 1, Q 3:

Describe in a sentence or 2 something new you learned upon reading this chapter.

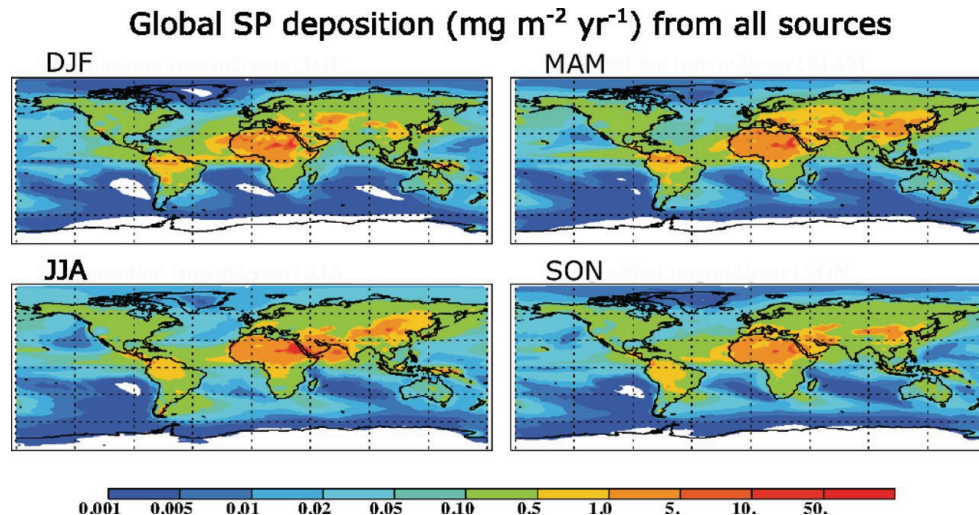
I learned that for many of the older Pacific islands, the main mechanism of soil fertilization is the deposition of atmospheric dust transported eastward from Central Asia's grasslands.

African biomass burning is a substantial source of phosphorus deposition to the Amazon, Tropical Atlantic Ocean, and Southern Ocean

Anne E. Barkley^a, Joseph M. Prospero^a, Natalie Mahowald^b, Douglas S. Hamilton^b, Kimberly J. Popendorf^a, Amanda M. Oehlert^a, Ali Pourmand^a, Alexandre Gatineau^c, Kathy Panechou-Pulcherie^c, Patricia Blackwelder^{a,d}, and Cassandra J. Gaston^{a,1}

^aRosenstiel School of Marine and Atmospheric Sciences, University of Miami, Miami, FL 33149; ^bDepartment of Earth and Atmospheric Sciences, Cornell University, Ithaca, NY 14853; ^cATMO Guyane, 97343 Remire-Montjoly, Guyane (French Guiana), France; and ^dCenter for Advanced Microscopy, Department of Chemistry, University of Miami, Coral Gables, FL 33146

PNAS August 13, 2019 116 (33) 16216-16221; first published July 29, 2019 <https://doi.org/10.1073/pnas.1906091116>



Computed deposition of soluble phosphorus (SP) from all aerosol sources during boreal winter (DJF), spring (MAM), summer (JJA), and fall (SON).

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AT 1, Q 4:

Describe, in 2 to 3 sentences, something stated in this chapter that you might challenge, should you for instance be on a debate about Rapa Nui and the chapter you have just read is the opening argument from the other side?

In the end of the chapter Diamond concludes that climate change cannot be deemed a factor for the collapse of Easter. While I agree that more concrete evidence of climate change affecting Easter could emerge, I would also argue that events like El Niño and droughts had a negative social effect on the people of Easter (more so than on the tree species which had survived the various environmental

Deep thought! Kudos!!!

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AT 1, Q 4:

Describe, in 2 to 3 sentences, something stated in this chapter that you might challenge, should you for instance be on a debate about Rapa Nui and the chapter you have just read is the opening argument from the other side?

The main striking difference between our current ecological crisis and the crisis on Easter Island that Diamond fails to mention is the abundance of information that we have on what we are doing wrong and how we can fix it. When the islanders cut down their last tree, they couldn't have had the tools and technology to fully understand the environmental impact that would have nor may they have had any viable alternatives to the methods they were using. In contrast, we are observing the serious damage we are causing to the planet but actively choosing not to fix it.

Sadly true. And it is rather pressing that meaningful actions happen sooner rather than later.

First Paper

- First Paper (**25 %** of final grade)
 - due **14 Nov** **BUT** can be completed well before due date!
 - 5 to 8 pages single spaced; must include references & can include figures, both of which are excluded from the page count
 - expands upon the topic of any class meeting, *other than* class meeting you have or will lead, or explores some other topic related to class
- Various stages for first paper:
 - Thurs, 19 Sept: **description** of paper due
 - <https://myelms.umd.edu/courses/1269254/quizzes/1287072>
- We are looking for a modest amount of independent research outside of the required readings rather than a summary of the required readings
 - Paper should include citations: can consult <http://lib.guides.umd.edu/citationtools> for info on various citation managers
 - Websites can be cited by either placing URL into reference list with an appropriate descriptive label: i.e. EPA, 2016: <https://www.epa.gov/criteria-air-pollutants/naaqs-table> or by using footnotes
 - Primary sources should be articles in magazines such as *Scientific American* or *Natural Geographic*, journal articles, government reports, or book chapters



The 2017 Winston Family Honors Best Student Paper Award winners and their faculty mentors were honored at a special luncheon in the Samuel Riggs IV Alumni Center at the University of Maryland on May 5, 2017.

Best Honors Essay

<http://www.honors.umd.edu/winston.html>

Jillian Kunze

Solar Cells in Outer Space

HONR 229L Climate Change: Science, Economics, and Governance

Faculty Mentor: **Dr. Ross J. Salawitch**, Department of Atmospheric and Oceanic Science



The 2018 Winston Family Honors Writing Award winners and their faculty mentors were honored at a luncheon in the Samuel Riggs IV Alumni Center at the University of Maryland on April 27, 2018. Learn more about the [Winston Awards](#).

Short Essay Award:

<http://www.honors.umd.edu/winston.html>

Jisue Gonzales

"Environmental Racism: Industrial Dumping in Low-Income Communities"

Faculty Mentor: Dr. Ross J. Salawitch, Chemistry, Biochemistry, and Atmospheric & Oceanic Science

— MAYA SITES —



Prologue and the Maya

Discussion #2

Eliza White

9/5/19

How Lenses Distort History

- People don't like to look at the flaws of their history
- Examples?
 - Native Hawaiians and Maoris- Bird extinctions (pg.8)
 - Native Americans (Anasazi)- Deforestation (pg.8)
 - New Guinea- Shooting pigeons (pg.9)
- What about the modern world?
 - Windmills kill birds and cause cancer – Trump
 - Protects the coal industry
 - Polarization over the climate change debate

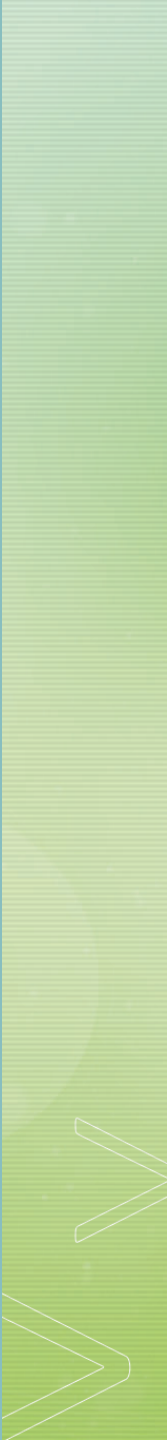


What are the five factors that Diamond follows in his analysis?



Environmental damage- human impact vs
fragility/resilience

<https://www.confectionerynews.com/Article/2018/03/15/What-is-chocolate-s-biggest-environmental-impact#>





Environmental damage- human impact vs. fragility/resilience

<https://www.confectionerynews.com/Article/2018/03/15/What-is-chocolate-s-biggest-environmental-impact#>



Climate change- volcanic eruptions, sun heat, land/sea
distribution, records

<http://www.econtalk.org/bjorn-lomborg-on-the-costs-and-benefits-of-attacking-climate-change/>



Climate change- volcanic eruptions, sun heat, land/sea distribution, records

<http://www.econtalk.org/bjorn-lomborg-on-the-costs-and-benefits-of-attacking-climate-change/>



Hostile neighbors- primary or ultimate cause?

<http://chicagopolicyreview.org/2019/02/24/how-hostile-neighbors-advance-their-domestic-and-foreign-policy-agendas-through-political-interference/>



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Friendly trade partners- trade dependence,
ripple effect

https://www.mercatornet.com/family_edge/view/a-childs-etiquette-of-sharing/19711



Friendly trade partners- trade dependence,
ripple effect

https://www.mercatornet.com/family_edge/view/a-childs-etiquette-of-sharing/19711



The response- politics, economy, culture, society

https://www.iconfinder.com/icons/3-44944/account_alert_avatar_client_contact_customer_danger_human_man_manager_member_people_person_profile_user_users_warning_icon



The response- politics, economy,
culture, society

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Environmental damage- human impact vs. fragility/resilience

<https://www.confectionerynews.com/Article/2018/03/15/What-is-chocolate-s-biggest-environmental-impact#>



Climate change- volcanic eruptions, sun heat, land/sea distribution, records

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Hostile neighbors- primary or ultimate cause?

<http://chicagopolicyreview.org/2019/02/24/how-hostile-neighbors-advance-their-domestic-and-foreign-policy-agendas-through-political-interference/>



Friendly trade partners- trade dependence, ripple effect

https://www.mercatornet.com/family_edge/view/a-childs-etiquette-of-sharing/19711



The response- politics, economy, culture, society

https://www.iconfinder.com/icons/3-44944/account_alert_avatar_client_contact_customer_danger_human_man_manager_member_people_person_profile_user_users_warning_icon

▶ “Climate change was even more of a problem for past societies ... than it is today”. (pg.12)

- Examples?
 - Short life spans- no knowledge of previous climate
 - No written record
 - No disaster relief
- What about today?
 - Population boom in good climate
 - Short-term planning

Admission Ticket #1

- What was Diamond's rationale for devoting an entire chapter to the Maya?
 - Widely known and romanticized story of collapse.
 - Affected by a large population, neighboring enemies, environmental issues, and political unrest.
 - Size and technological advancement draw parallels to the issues modern society faces today



Admission Ticket #2

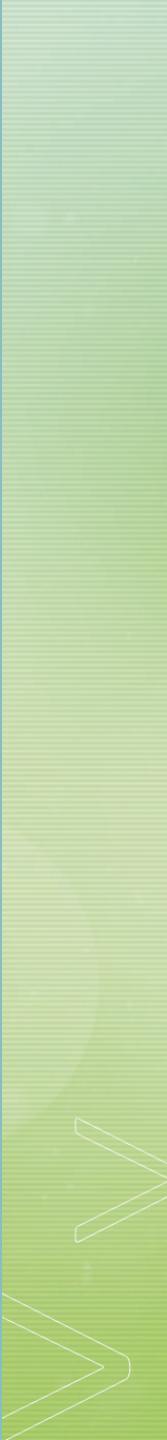
Describe the main point Diamond is trying to convey about the fall of the Maya in this chapter?



What were the main contributing factors to the collapse of the Maya?



<http://archaeosoup.com/multi-factors-including-climate-change-led-to-collapse-and-depopulation-of-ancient-maya/>
<https://nation.com.pk/13-Jun-2016/population-explosion-how-to-control-it>
<https://www.ucsus.edu/global-warming/science-and-impacts/impacts/causes-of-drought-climate-change-connection.html>
http://www.latinamericanstudies.org/bonampak/Room-2_1.jpg
<https://www.express.co.uk/news/science/1005952/Ancient-Mayan-civilisation-deforestation-science-world>
https://www.ancient.eu/Kinichilanaab_Pagal/



Which do you think was most important?



<http://archaeosoup.com/multi-factors-including-climate-change-led-to-collapse-and-depopulation-of-ancient-maya/>
<https://nation.com.pk/13-Jun-2016/population-explosion-how-to-control-it>
<https://www.ucsusu.org/global-warming/science-and-impacts/impacts/causes-of-drought-climate-change-connection.html>
http://www.latinamericanstudies.org/bonampak/Room-2_1.jpg
<https://www.express.co.uk/news/science/1005952/Ancient-Mayan-civilisation-deforestation-science-world>
https://www.ancient.eu/Kinich_anaab_Pacal/

Admission Ticket #3

- Describe something new you learned?
 - There were 3 different phases of collapse: Pre-Classic Collapse, Classic Maya Collapse, and the Mayan Hiatus.
 - Mayan society didn't collapse all at once, but in waves with some cities rising as others fell.



SO WHAT?

- Deforestation- Erosion, precipitation
- Precipitation effects on food production
- Overuse of land- nowhere else to go
- Trade partners- we're all connected
- In the United States...
 - California produces >50% of fresh produce for the U.S.
 - \$7 billion export industry
 - Climate change affects:
 - Water availability and precipitation
 - temperature
 - Pollinators

<https://www.cdfa.ca.gov/oefi/climate/>



Amazon on Fire

<https://www.bbc.com/news/world-latin-america-49433767>



Maldives Sinking

<https://metro.co.uk/2015/11/26/10-islands-you-need-to-see-before-they-sink-5527258/>

The Maya: Last Word

Ross Salawitch

Diamond (pg 169 to 170) writes:

Can deforestation really alter rainfall ?!?

At other Maya sites from the pre-Classic era, where the Maya went overboard in lavish use of thick plaster on buildings, plaster production may have been a major cause of deforestation. Besides causing sediment accumulation in the valleys and depriving valley inhabitants of wood supplies, that deforestation may have begun to cause a “man-made drought” in the valley bottom, because forests play a major role in water cycling, such that massive deforestation tends to result in lowered rainfall.

Diamond (pg 169 to 170) writes:

Can deforestation really alter rainfall ???

Yup !!!

NATURE | LETTER

Observations of increased tropical rainfall preceded by air passage over forests

D. V. Spracklen, S. R. Arnold & C. M. Taylor

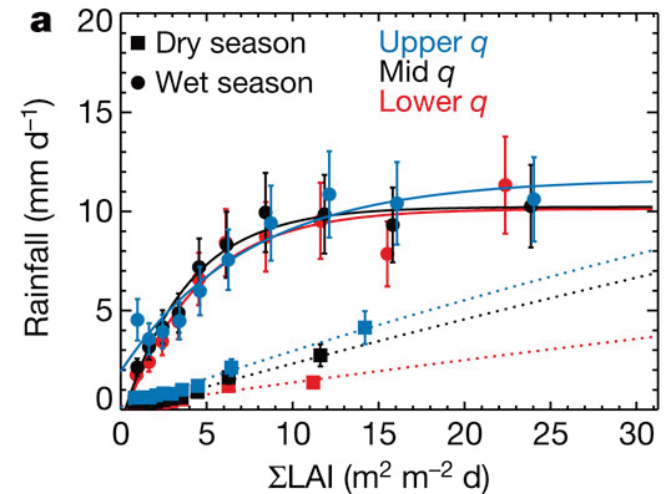
Affiliations | Contributions | Corresponding author

Nature 489, 282–285 (13 September 2012) | doi:10.1038/nature11390

Received 16 April 2012 | Accepted 29 June 2012 | Published online 05 September 2012

| Corrected online 12 September 2012

Corrigendum (February, 2013)



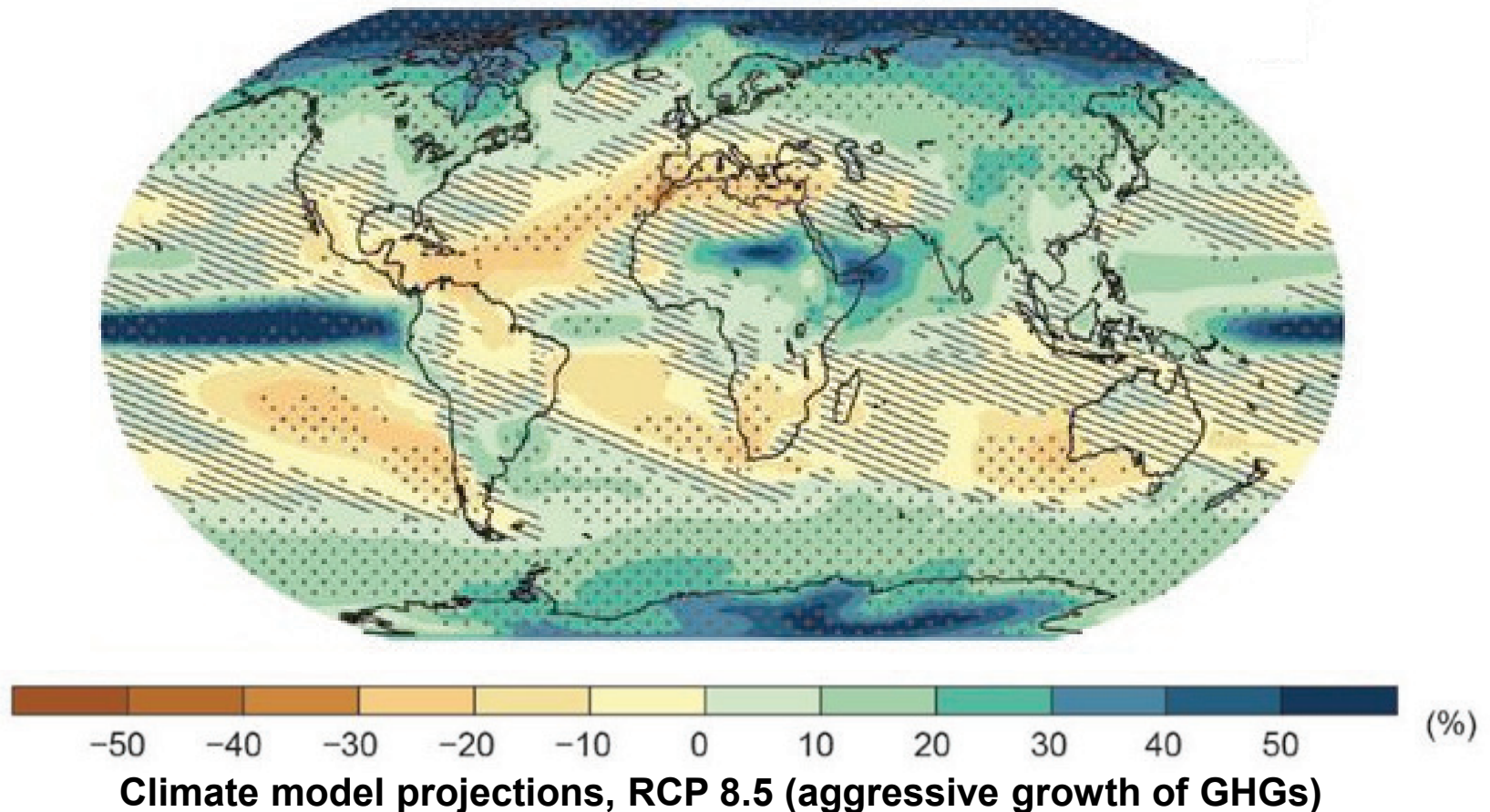
We find that for more than 60 per cent of the tropical land surface (latitudes 30°S to 30°N), air that has passed over extensive vegetation in the preceding few days produces at least twice as much rain as air that has passed over little vegetation. We demonstrate that this empirical correlation is consistent with evapo-transpiration maintaining atmospheric moisture in air that passes over extensive vegetation. We combine these empirical relationships **with current trends of Amazonian deforestation to estimate reductions of 12 and 21 per cent in wet-season and dry-season precipitation respectively across the Amazon basin by 2050** due to less-efficient moisture recycling.

<http://www.nature.com/nature/journal/v489/n7415/full/nature11390.html>

Ground Water Availability: Huge Contemporary Concern

Connection to climate change?

Projected Spatial Distribution of Precipitation Changes, 2081–2100 relative to 1986–2005

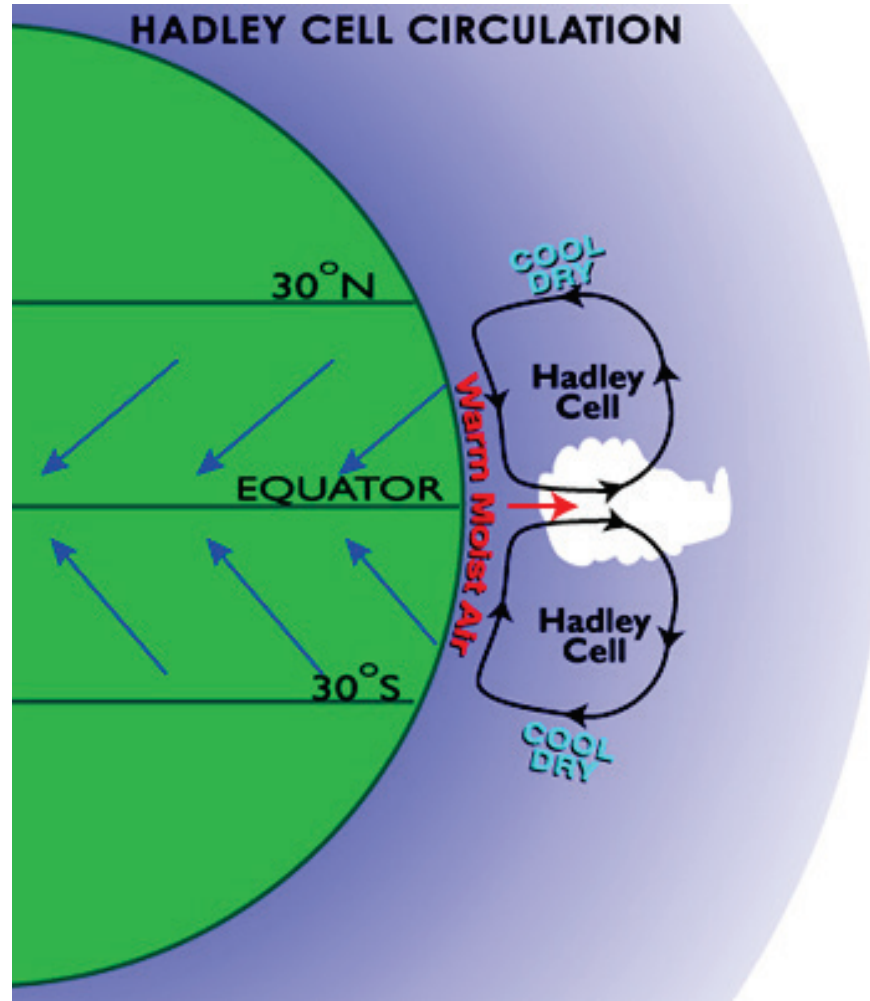


WWDD: Wet-gets-Wetter, Dry-gets-Drier

IPCC 2013

Connection to Climate Change

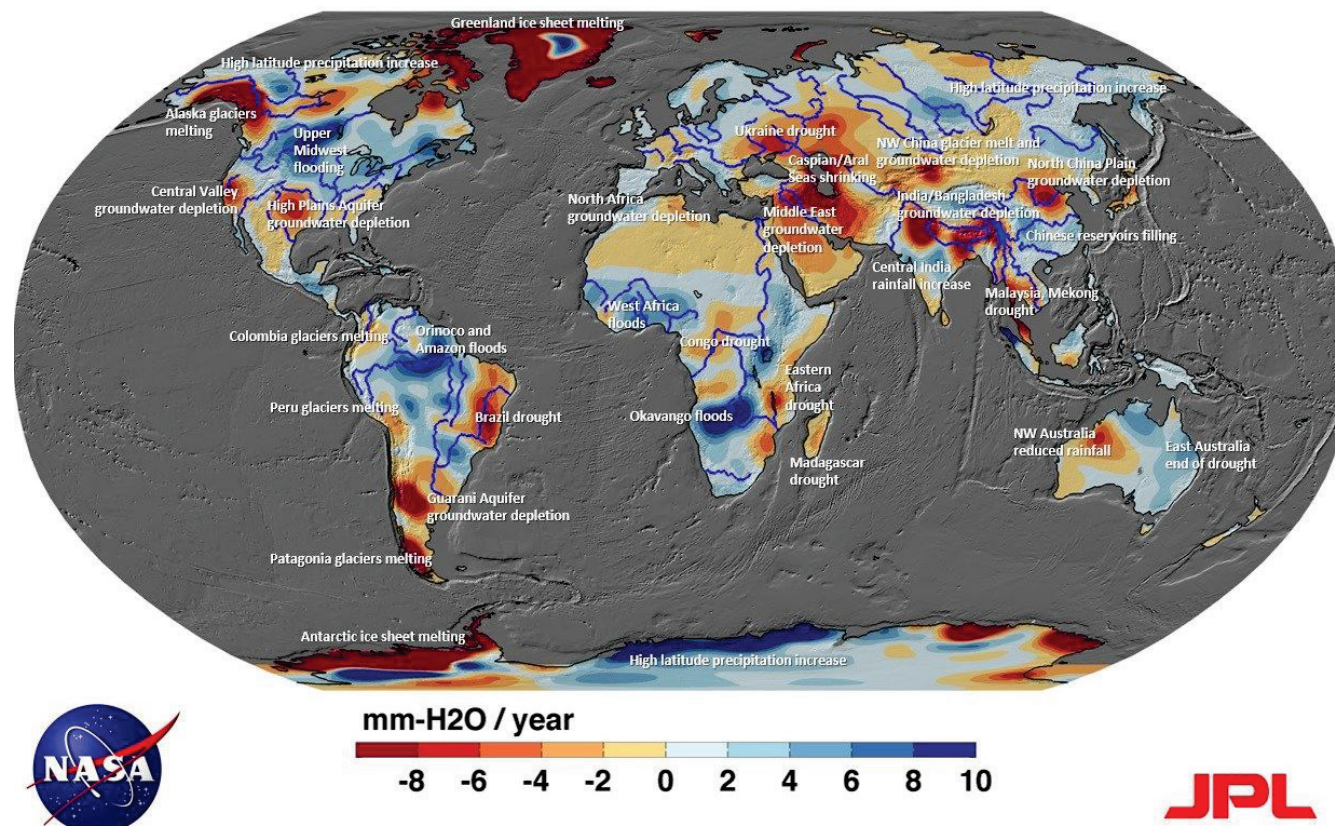
WWDD: Wet-gets-Wetter, Dry-gets-Drier (WWDD) paradigm



http://www.windows2universe.org/vocals/images/HadleyCell_small.jpg

Ground Water Availability: Huge Contemporary Concern

Changing global freshwater availability from GRACE (2002-2016)

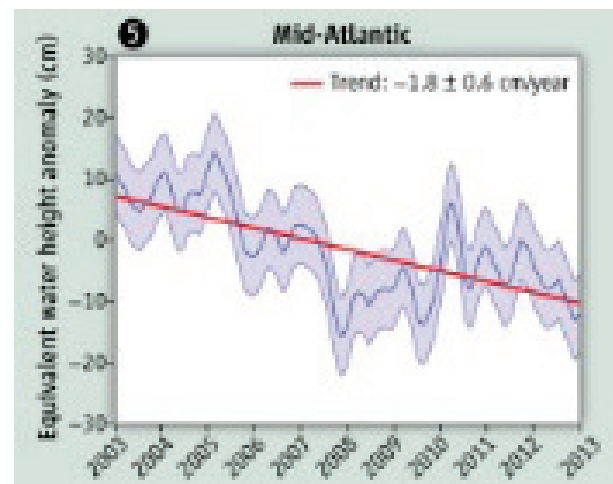
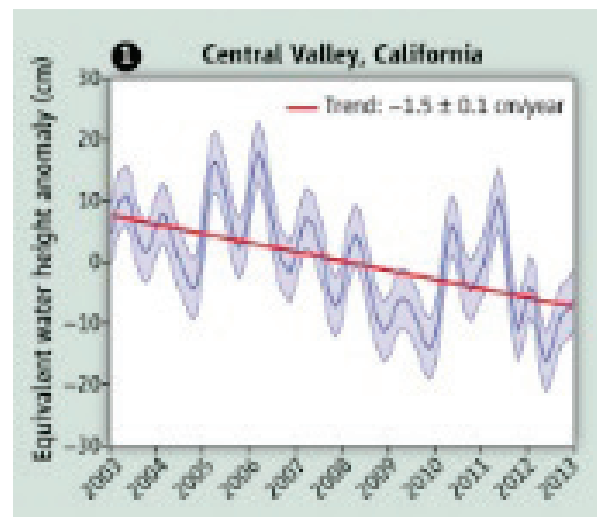
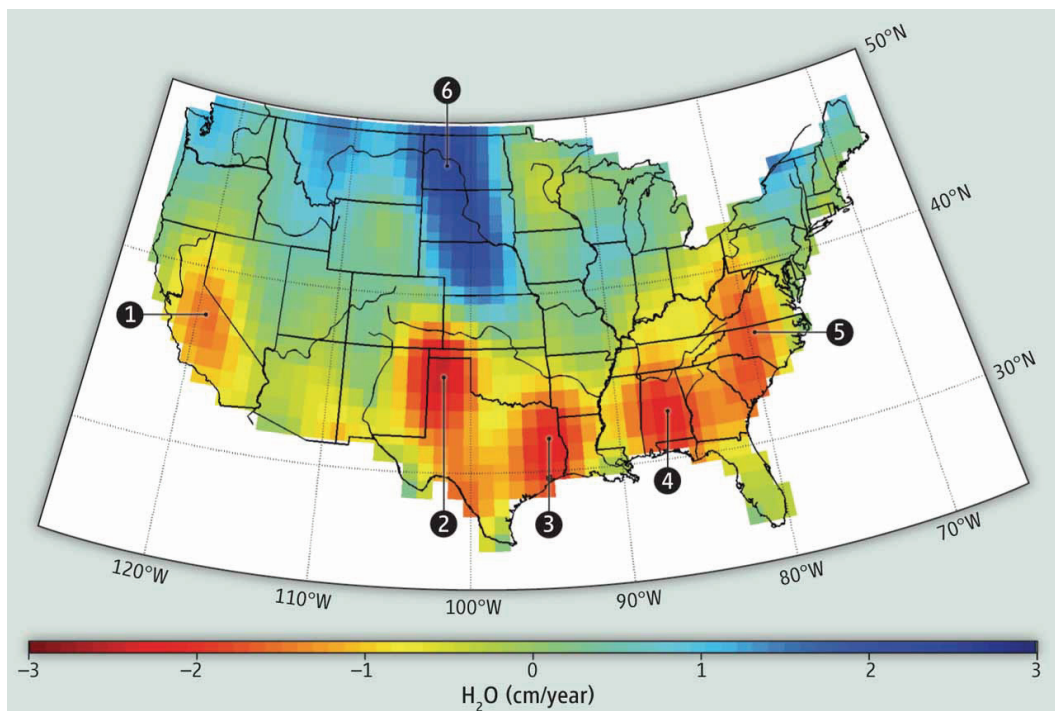


<https://www.washingtonpost.com/news/energy-environment/wp/2018/05/16/humans-are-causing-massive-changes-in-the-location-of-water-all-over-the-earth-nasa-says>
<https://www.nature.com/articles/s41586-018-0123-1>

The idea of mid-latitude drying and higher- and tropical-latitude wetting is a common feature of climate change models. “We only have 15 years of data from GRACE, but it sure as heck matches that pattern, it matches it now,” Jay Famiglietti said. “That’s cause for concern.”

Ground Water Availability: Huge Contemporary Concern

Closer look at the U.S.



Famiglietti and Rodell *Science*, 2013.

See:

<http://science.sciencemag.org/content/340/6138/1300>

<https://jayfamiglietti.com/writing/#jp-carousel-162>

WWDD: Wet-gets-Wetter, Dry-gets-Drier (WWDD)

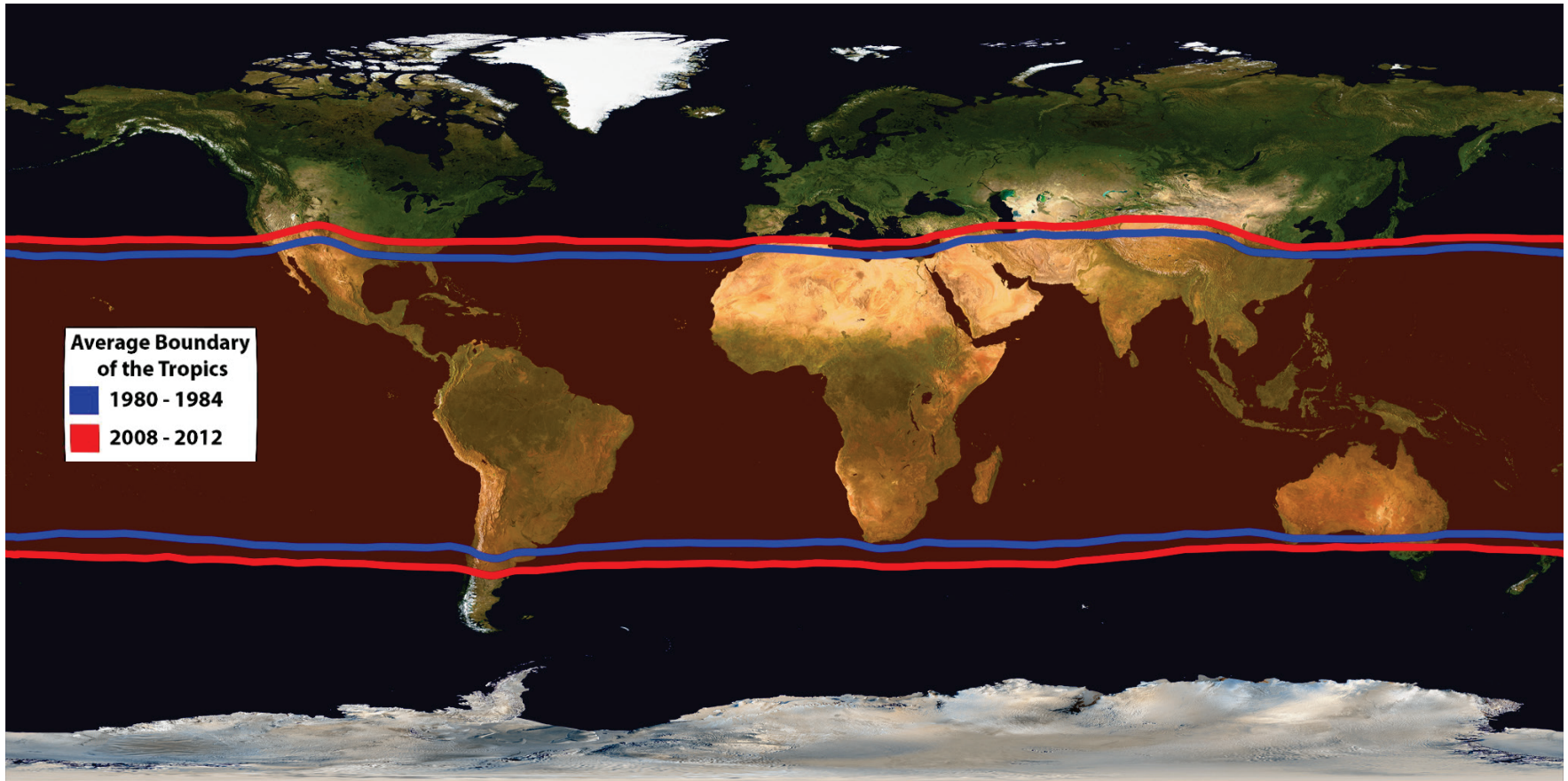
THE TAKEAWAY

The world's wet regions are getting wetter and its dry areas are getting drier much more quickly than previously thought, changes that threaten the availability of fresh water and create new risks to people's health, the food supply, and the environment.

Jay Famiglietti is a professor and the executive director of the Global Institute for Water Security at the University of Saskatchewan, where he holds the Canada 150 research chair in hydrology and remote sensing.

<https://trend.pewtrusts.org/en/archive/spring-2019/a-map-of-the-future-of-water>

Widening of the Tropics



<http://sphere.ssec.wisc.edu/20130715>
<https://www.youtube.com/watch?v=ttYnE0XjmvM>

Tuesday's Reading

Fixed Nitrogen:

Process by which molecular nitrogen (N_2) is converted into a form useful for plants (i.e., fertilizer), which means the $N\equiv N$ bond must be broken

Modern world relies in Haber-Bosch reaction $N_2 + 3 H_2 \rightarrow 2 NH_3$
conducted in steel reactors

Cyclones:

Hurricanes, cyclones, and typhoons refer to the same phenomenon, but various names are used depending on location.

Hurricanes: Atlantic and Northeast Pacific

Typhoon: Northwest Pacific

Cyclone: South Pacific and Indian Ocean