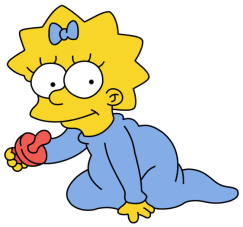
Engaging University Students as Stakeholders in Climate Change



Brian Magi
Assistant Professor at UNC Charlotte
Department of Geography and Earth Sciences

Presentation at the Carolinas Climate Resilience Conference
Morning Session B: *Climate Education for the Next Generation*
September 14, 2016

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Web: geoearth.uncc.edu and brianmagi.uncc.edu

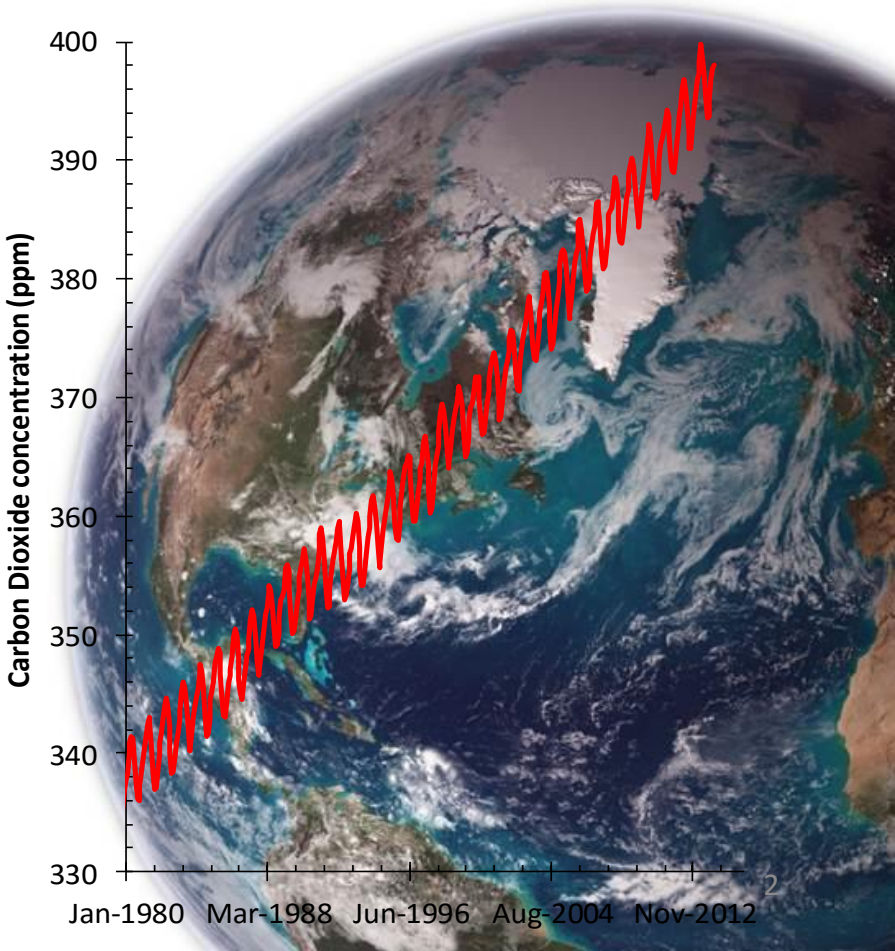
Teaching about Global Change at UNC Charlotte

Course Title: Global Environmental Change
Required for majors in: Earth and Enviromental Sciences B.S., Meteorology B.S., Environmental Studies B.A.

24 students in Fall 2012
28 in Fall 2013
50 in Fall 2014
50 in Spring 2016
50 in Fall 2016 (now!)

2012 was the initial course offering

Other courses I teach: Atmospheric Physics, Climate Dynamics, Atmospheric Thermodynamics, Applied Climatology, and Atmospheric Chemistry



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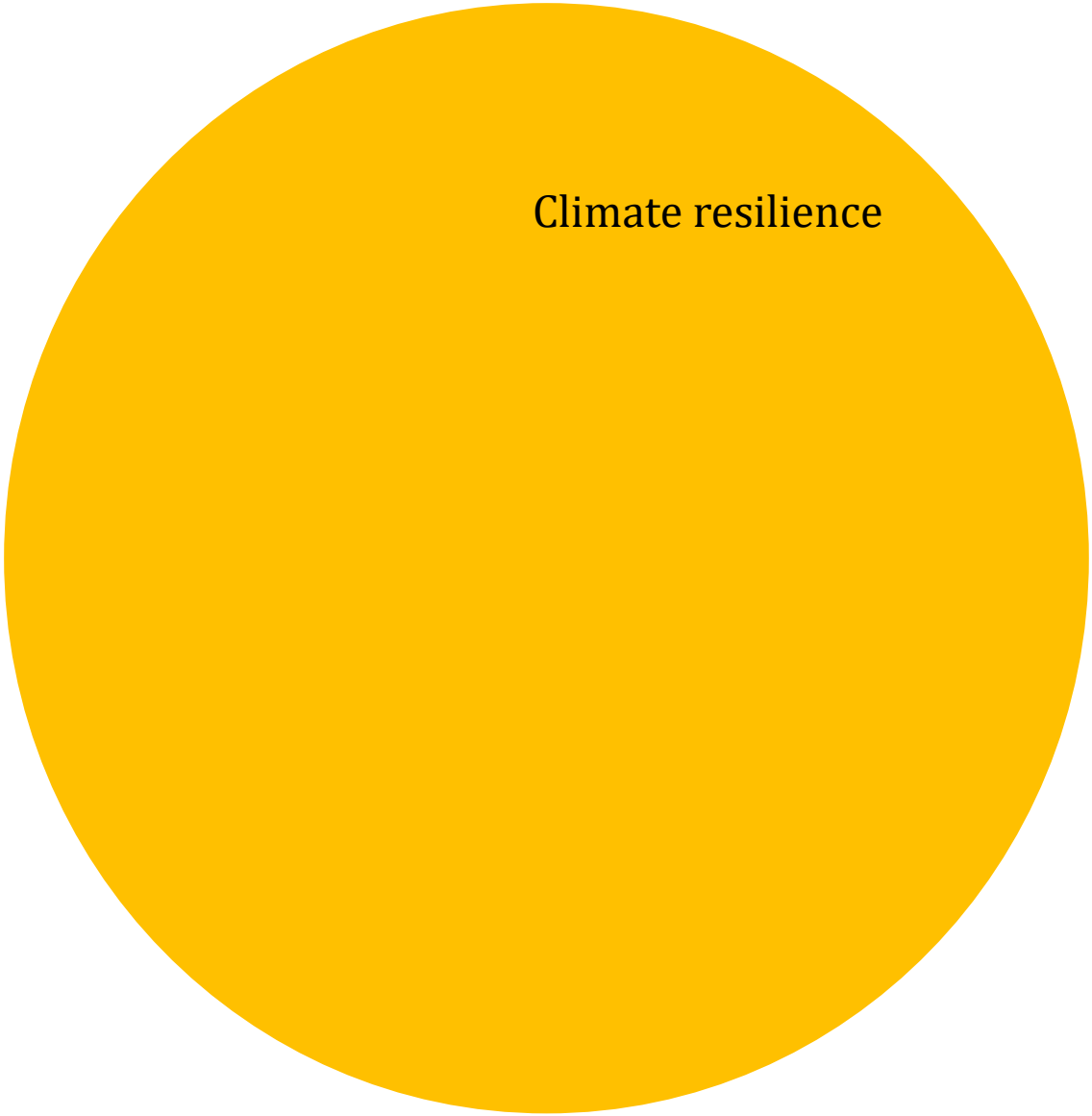
Future Resilience to Climate Change Depends on Students



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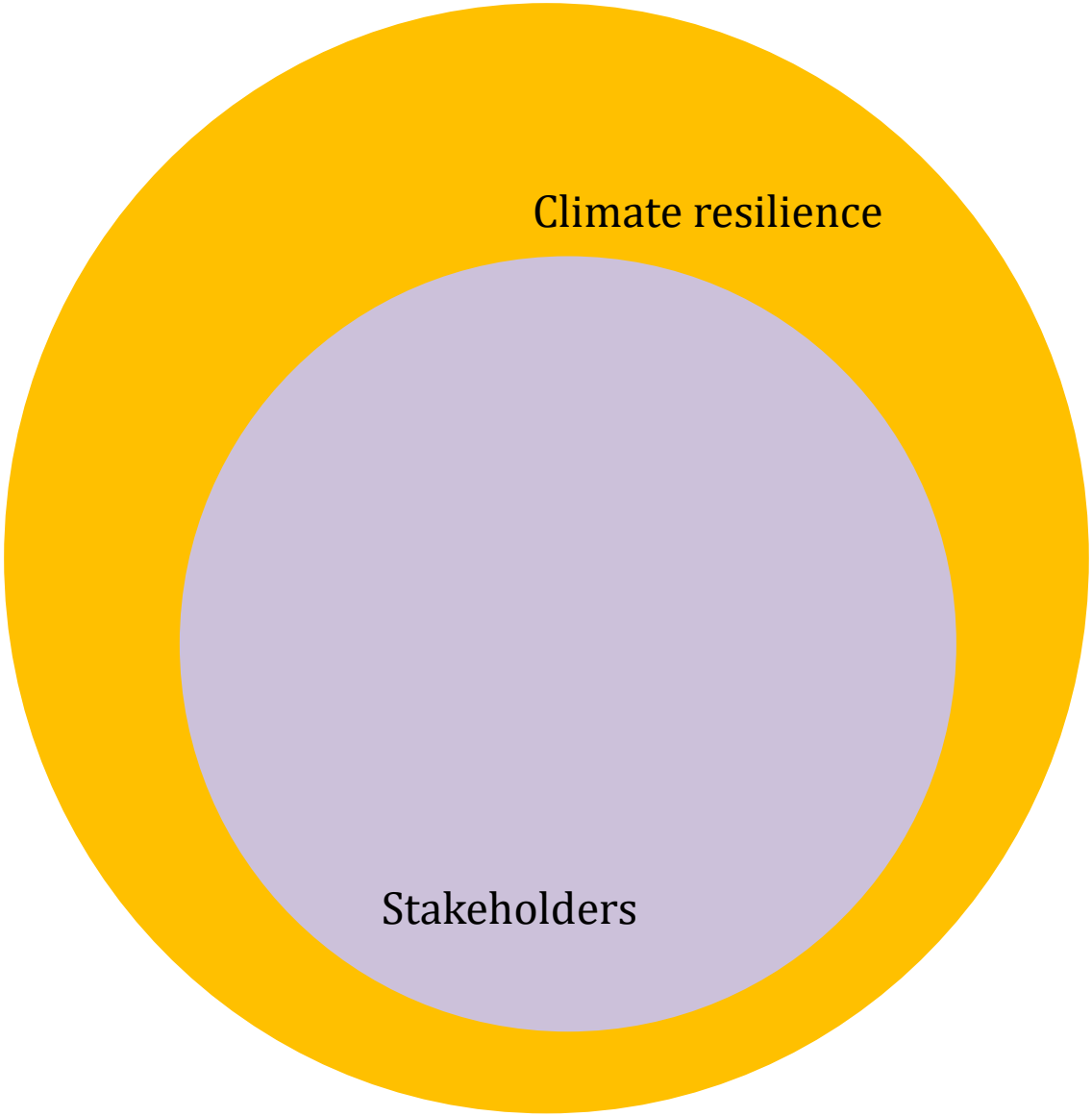

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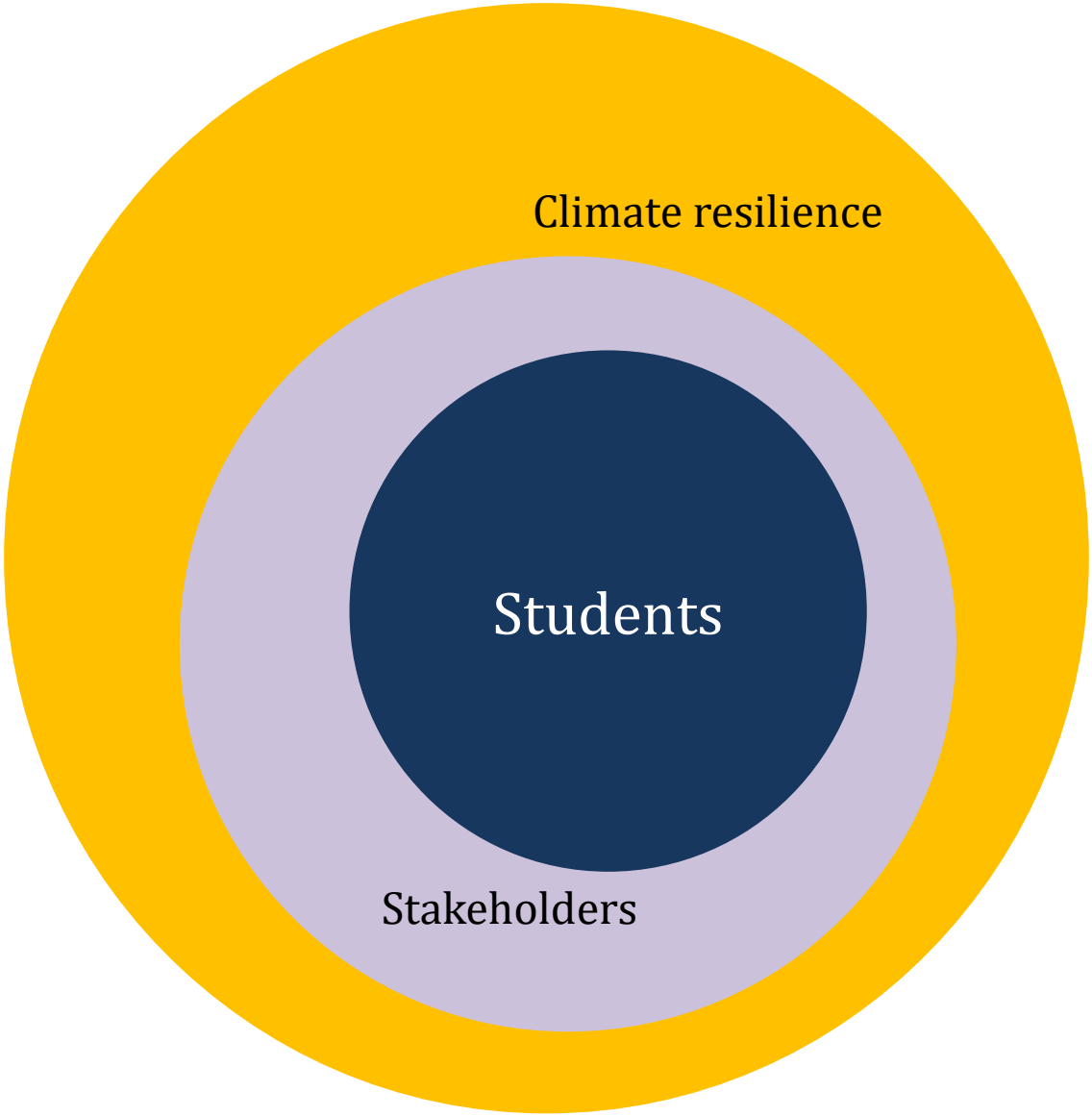
Future Resilience to Climate Change Depends on Students



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There is no time to lose and no one should be glibly dismissed because he or she is not a scientific expert. We are asking them to join in finding the solutions, not to define the scientific risks. **We shouldn't underestimate the impact of young people committed to the health of planet Earth.**

The "most important" action we can take: "Teach your children well."

Stephen Schneider, Stanford U. climate scientist (deceased), in his book *Science as a Contact Sport*

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The concept that **the atmosphere is a public trust, that today's adults must deliver to their children and future generations an atmosphere as beneficial as the one they received**, is the basis for a lawsuit in which it is argued that the U.S. government is obligated to protect the atmosphere from harmful greenhouse gases. Independent of this specific lawsuit, we suggest that intergenerational justice in this matter derives from fundamental rights of equality and justice. The Universal Declaration of Human Rights declares "All are equal before the law and are entitled without any discrimination to equal protection of the law." Further, to consider a specific example, the United States Constitution provides all citizens "equal protection of the laws" and states that no person can be deprived of "life, liberty or property without due process of law". These fundamental rights are a basis for young people to expect fairness and justice in a matter as essential as the condition of the planet they will inhabit. We do not prescribe the legal arguments by which these rights can be achieved, but **we maintain that failure of governments to effectively address climate change infringes on fundamental rights of young people**.

James Hansen (former NASA GISS lab director) and colleagues in
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081648

OPEN ACCESS Freely available online PLOS | ONE

Review

Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature

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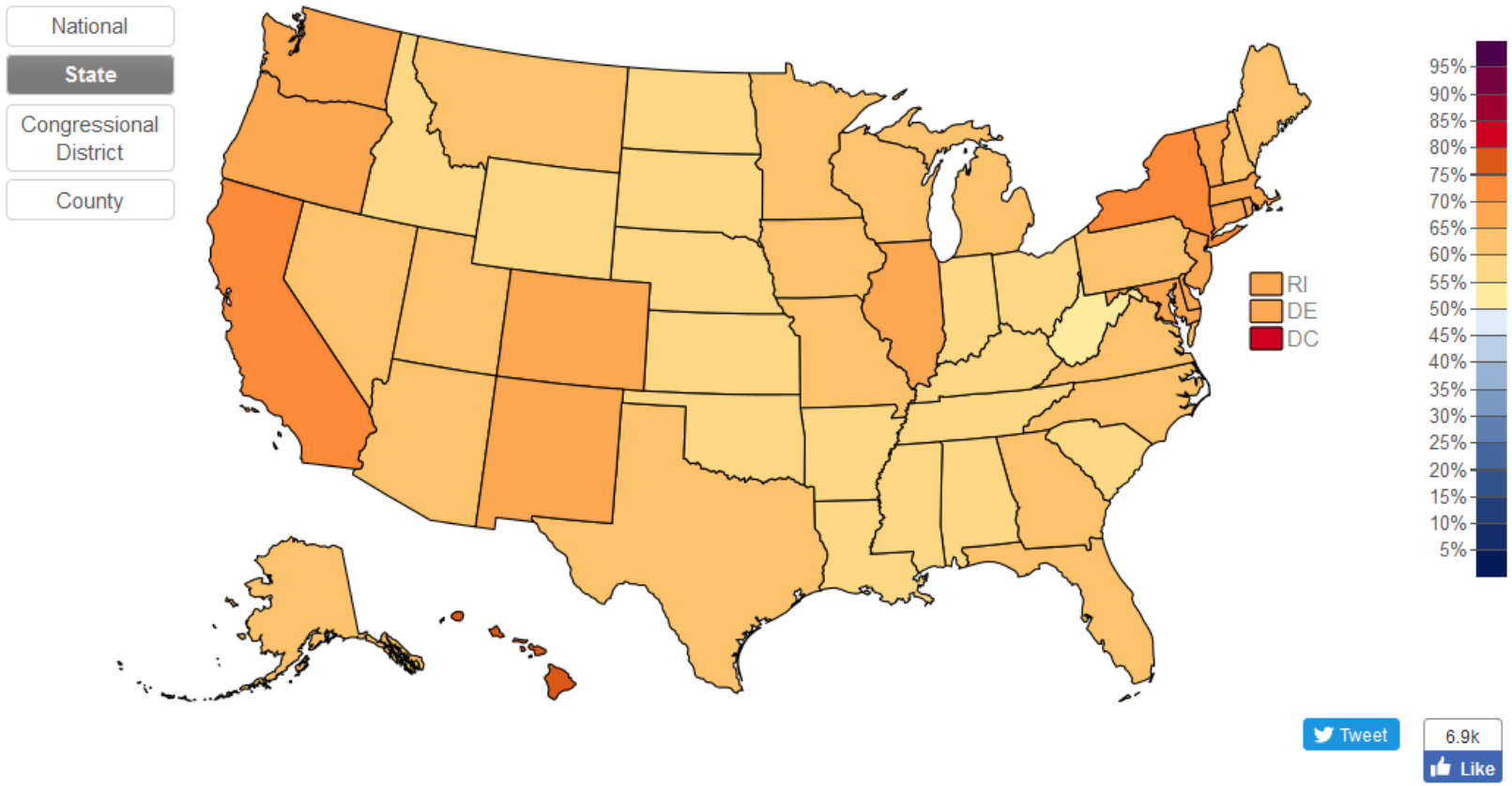
Estimated % of adults who think global warming is happening, 2014

Display model output: Global warming is happening



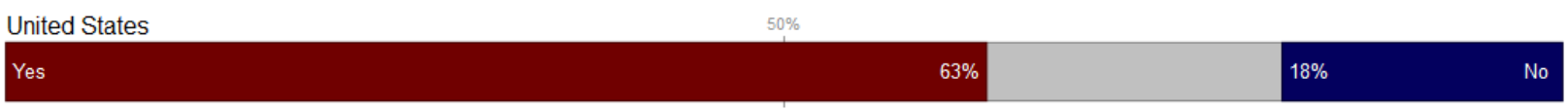


Image source: Yale Project on Climate Change Communication
http://environment.yale.edu/poe/v2014/

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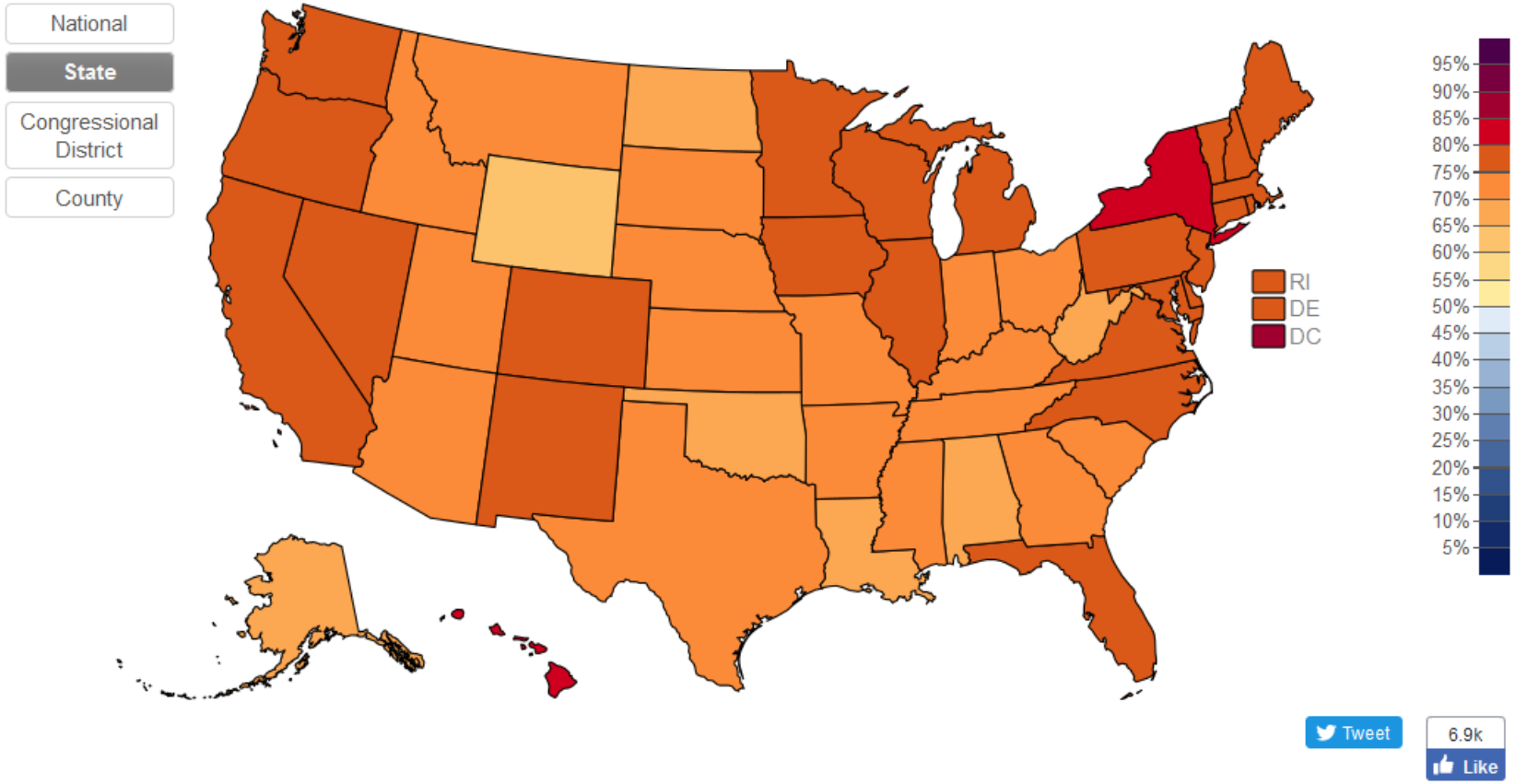
Estimated % of adults who support regulating CO2 as a pollutant, 2014

Display model output: Regulate CO2 as a pollutant



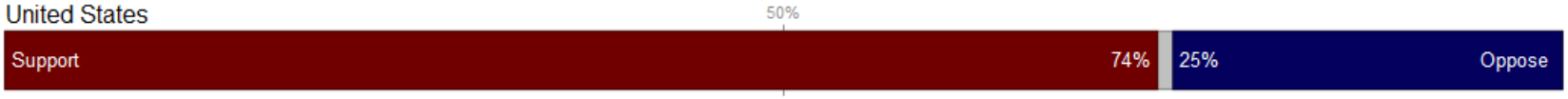


Image source: Yale Project on Climate Change Communication
http://environment.yale.edu/poe/v2014/

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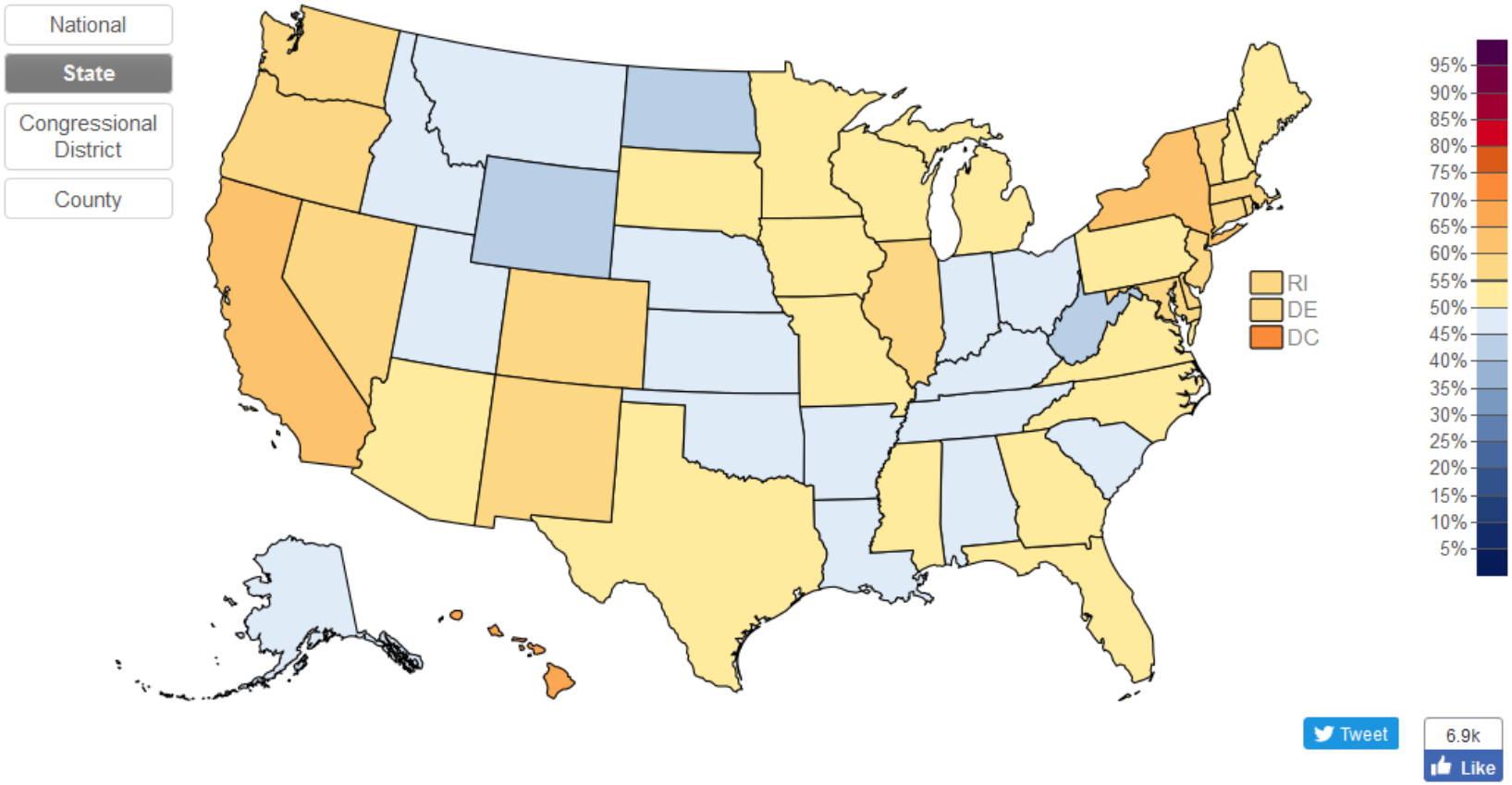
Estimated % of adults who are worried about global warming, 2014

Display model output: Worried about global warming



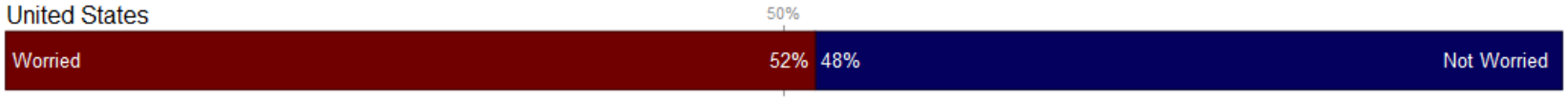


Image source: Yale Project on Climate Change Communication
http://environment.yale.edu/poe/v2014/

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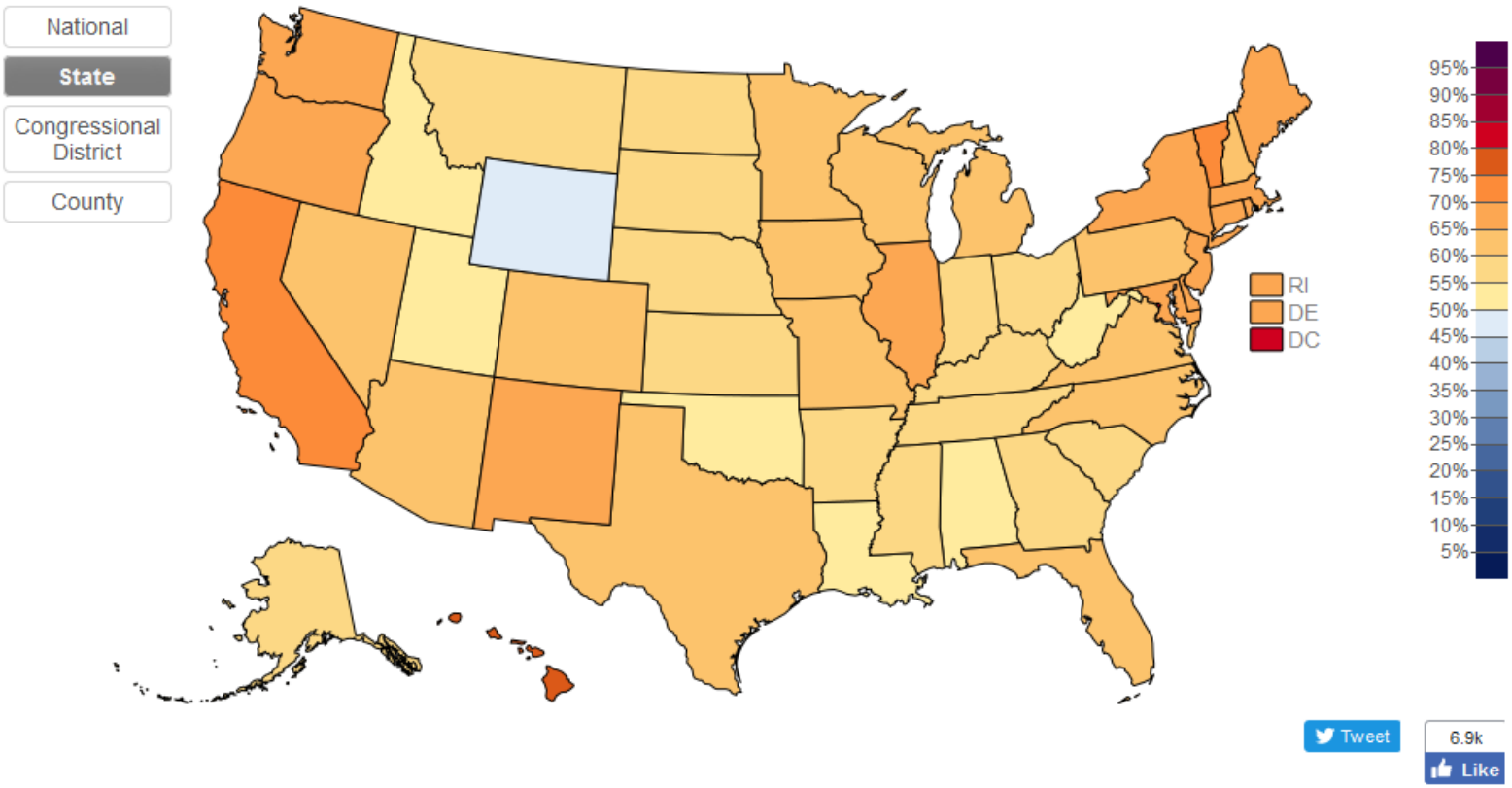
Estimated % of adults who think global warming will harm future generations, 2014

Display model output: Global warming will harm future generations



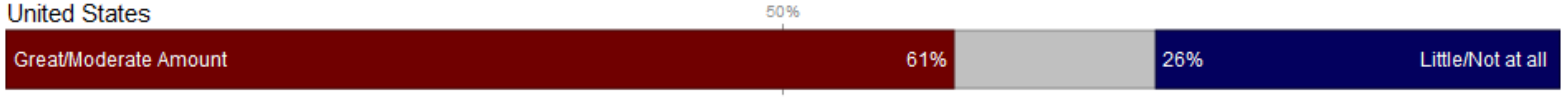


Image source: Yale Project on Climate Change Communication
http://environment.yale.edu/poe/v2014/

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Climate Change: A Multi-generational problem

Come mothers and fathers throughout the land
And don't criticize what you don't understand
Your sons and your daughters are beyond your command
Your old road is rapidly aging
Please get out of the new one if you can't lend a hand
For the times they are a-changing

Bob Dylan, *The Times They Are Changing*

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Are scientists lending a hand to future generations?

Is this *actually* as helpful as scientists think?

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Estimated % of adults who believe most scientists think global warming is happening, 2014

Display model output: Most scientists think global warming is happening

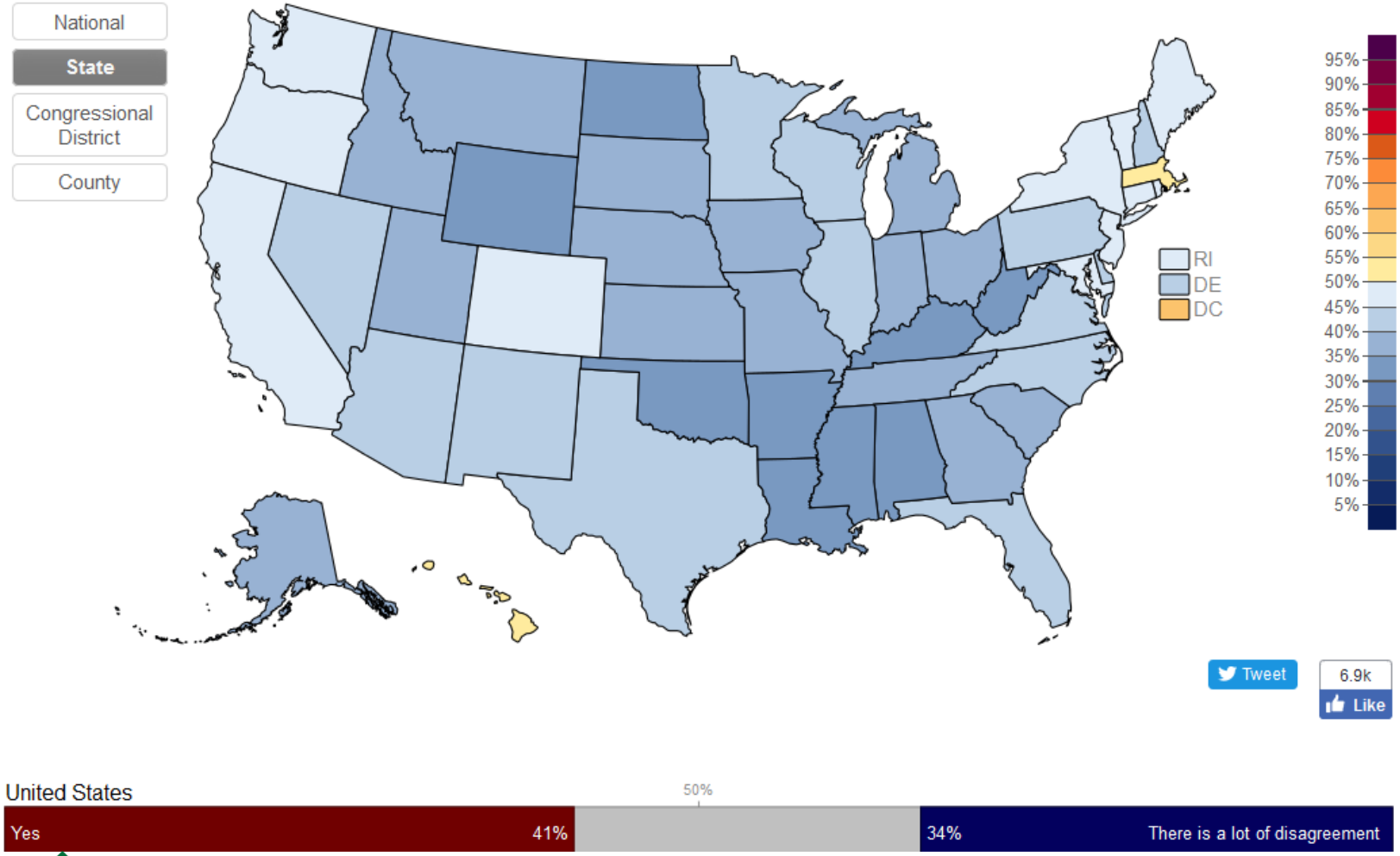

Image source: Yale Project on Climate Change Communication
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OPEN ACCESS
IOP PUBLISHING
ENVIRONMENTAL RESEARCH LETTERS
Environ. Res. Lett. 8 (2013) 024024 (7pp)
doi:10.1088/1748-9326/8/2/024024

Quantifying the consensus on anthropogenic global warming in the scientific literature

John Cook[1,2,3], Dana Nuccitelli[2,4], Sarah A Green[5], Mark Richardson[6], Bärbel Winkler[2], Rob Painting[2], Robert Way[7], Peter Jacobs[8] and Andrew Skuce[2,9]

Abstract We analyze the evolution of the scientific consensus on anthropogenic global warming (AGW) in the peer-reviewed scientific literature, examining 11,944 climate abstracts from 1991–2011 matching the topics 'global climate change' or 'global warming'. We find that 66.4% of abstracts expressed no position on AGW, 32.6% endorsed AGW, 0.7% rejected AGW and 0.3% were uncertain about the cause of global warming. **Among abstracts expressing a position on AGW, 97.1% endorsed the consensus position that humans are causing global warming.** In a second phase of this study, we invited authors to rate their own papers. Compared to abstract ratings, a smaller percentage of self-rated papers expressed no position on AGW (35.5%). **Among self-rated papers expressing a position on AGW, 97.2% endorsed the consensus.** For both abstract ratings and authors' self-ratings, the percentage of endorsements among papers expressing a position on AGW marginally increased over time. Our analysis indicates that the number of papers rejecting the consensus on AGW is a vanishingly small proportion of the published research.

Peer-reviewed article available at: http://iopscience.iop.org/1748-9326/8/2/024024/

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Efforts to address weakness: Everything under the sun!

- Saying scientists know something critical
- Movies and documentaries
- Communication coaching
- NCSE Scientist in the Classroom
- Climate Voices
- NASA/NSF/NOAA GLOBE Program (or similar)
- Outreach efforts via expert-led seminar/salons

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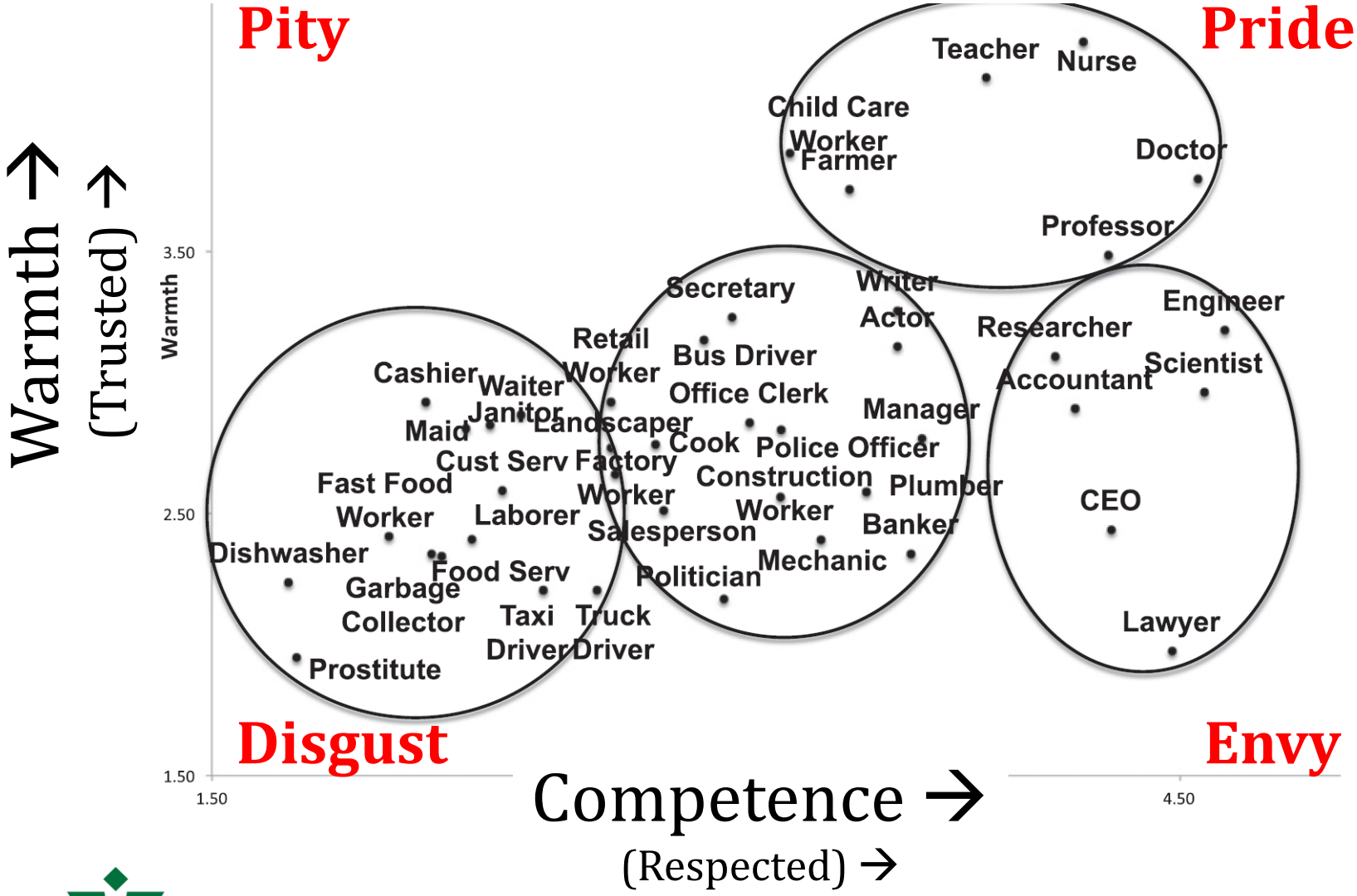
Cultural Perception of Scientists

How audiences view scientists as communicators, not just scientists



From figure in the peer-reviewed paper by Professor Susan Fiske (Princeton University) et al. at http://www.pnas.org/content/111/Supplement_4/13593.full

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Weakness: Communication of climate science from scientists

Impact: Limited effect on perception through short-exchanges due to a lack of perceived/real warmth

Classrooms contain an audience AND our future → The strongest way for scientists to engage is as a teacher that **builds** a foundation through trust and respect

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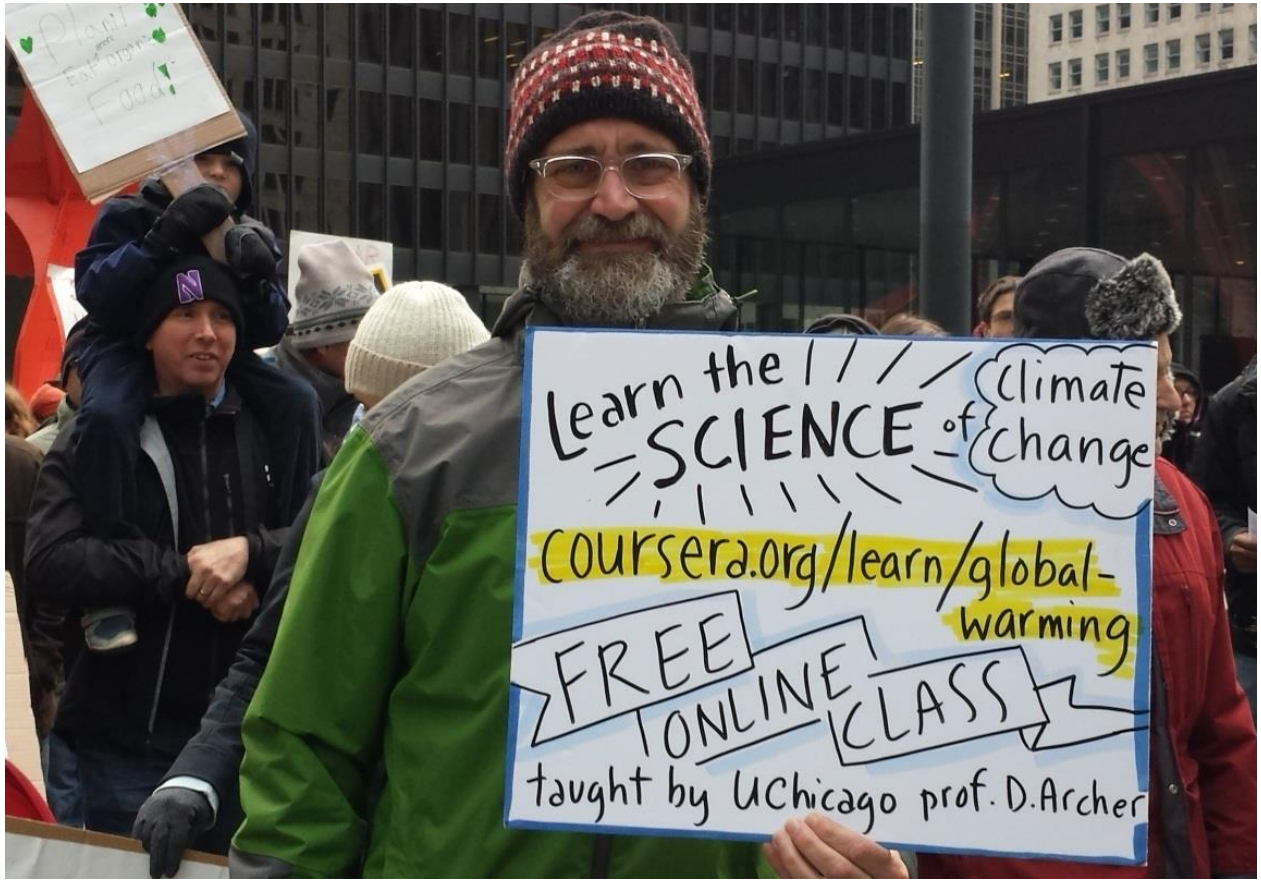

Picture of Professor David Archer stolen from http://geosci.uchicago.edu/people/david-archer/

A 3-Star Review said: These are my personal metrics: A 4-star course has a high level of student collaboration and teaching staff participation, a 5-star course has very responsive teaching staff. I love learning the material but the learning environment is disappointing.

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Short-exchanges with audiences echo the problem that is global climate change

Are scientists only there to make sure those who are comfortable with the consensus continue to feel engaged?

Long-exchanges in a university classroom → treating the student as the most critical stakeholder in the RESILIENCY SPHERE

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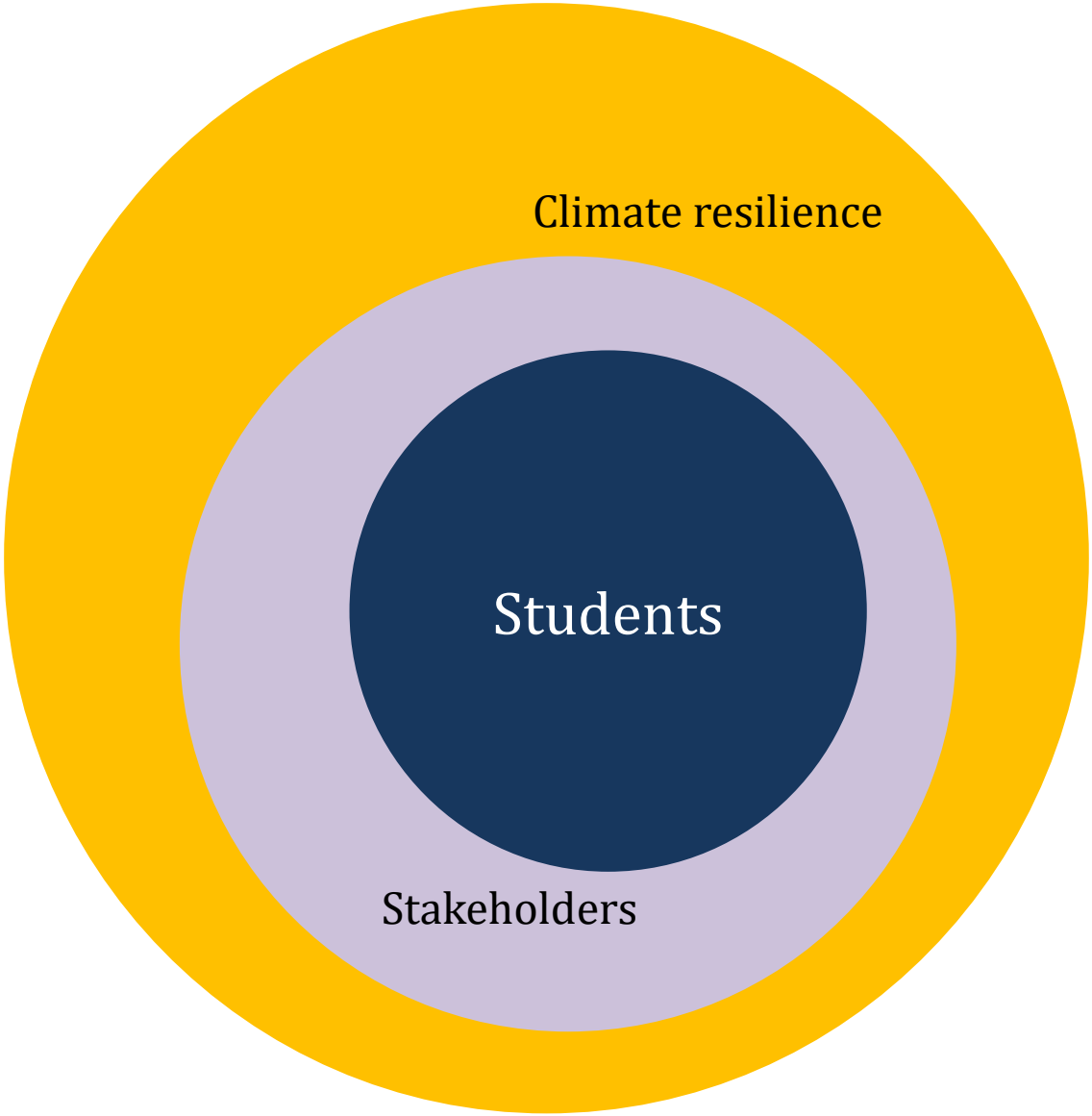
Future Resilience to Climate Change Depends on Students



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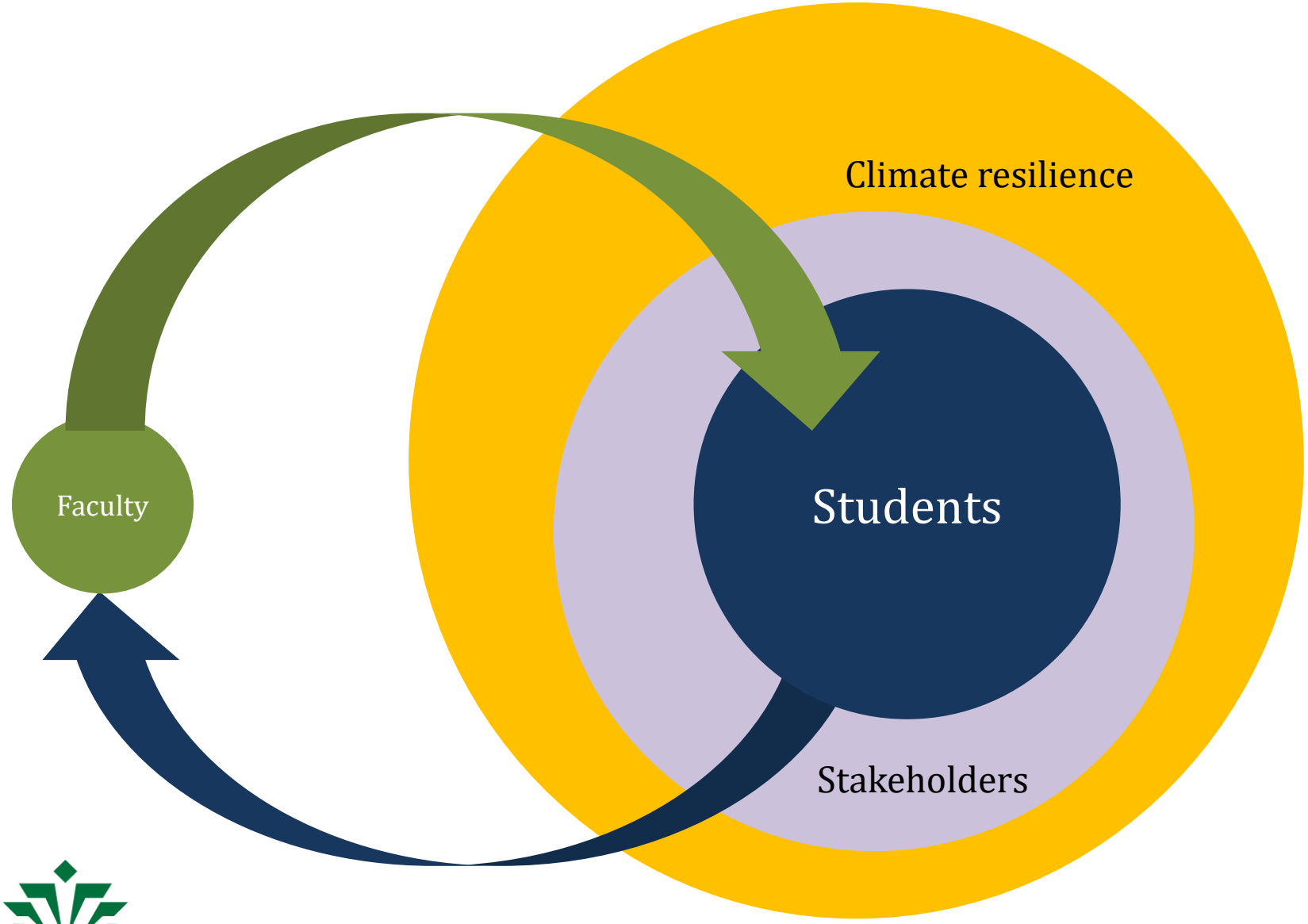

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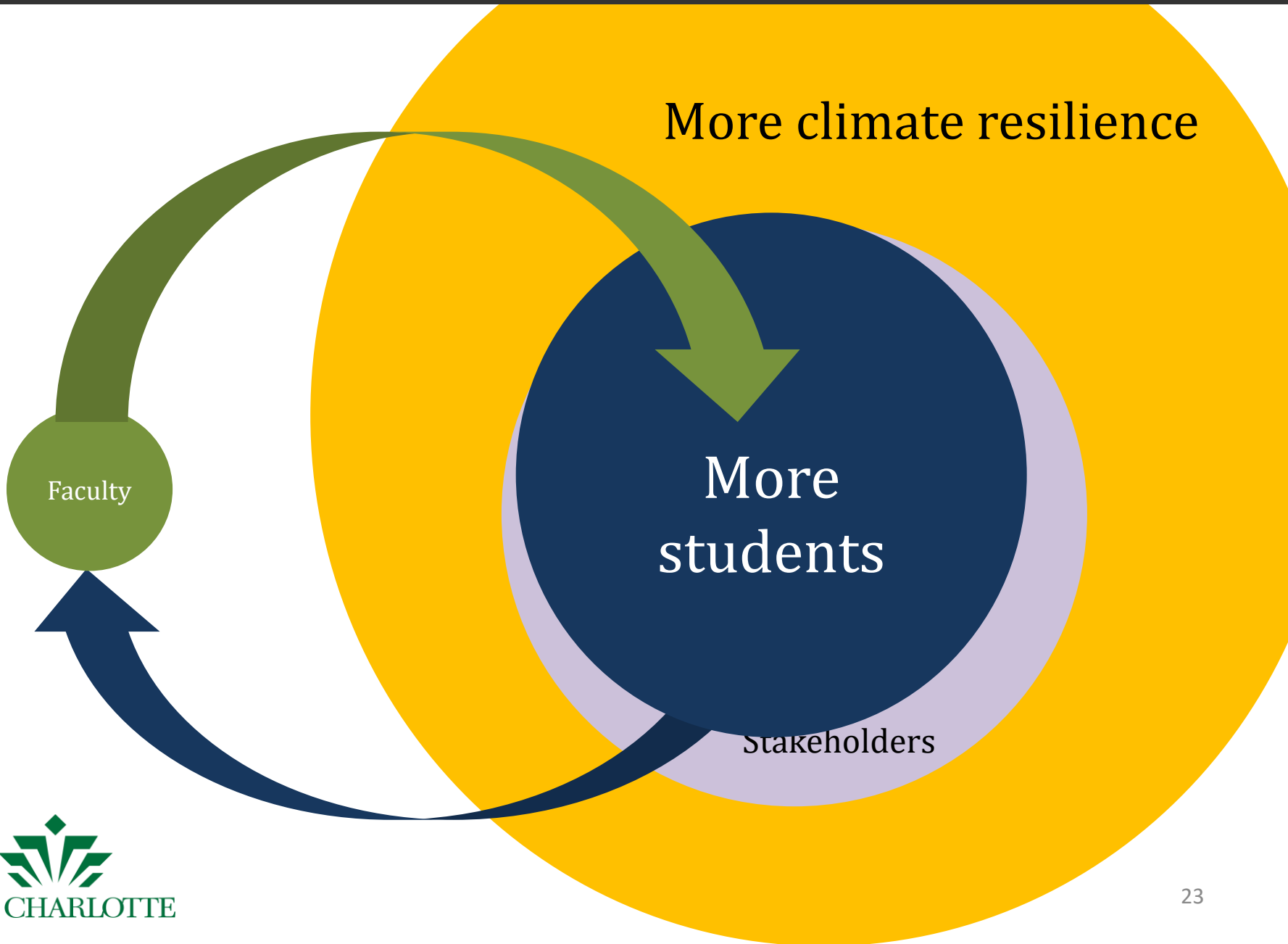

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Thought for discussion

Researchers with teaching responsibilities and teaching faculty must **engage students in individual conversations**, or risk limited returns

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Teaching techniques in my classroom

→Low-stakes, high frequency, writing or Response Papers (direct feedback from me)

→Interactive group work on multiple-choice quizzes (tiered feedback from group)

→Essay exams (direct feedback about synthesis of ideas)

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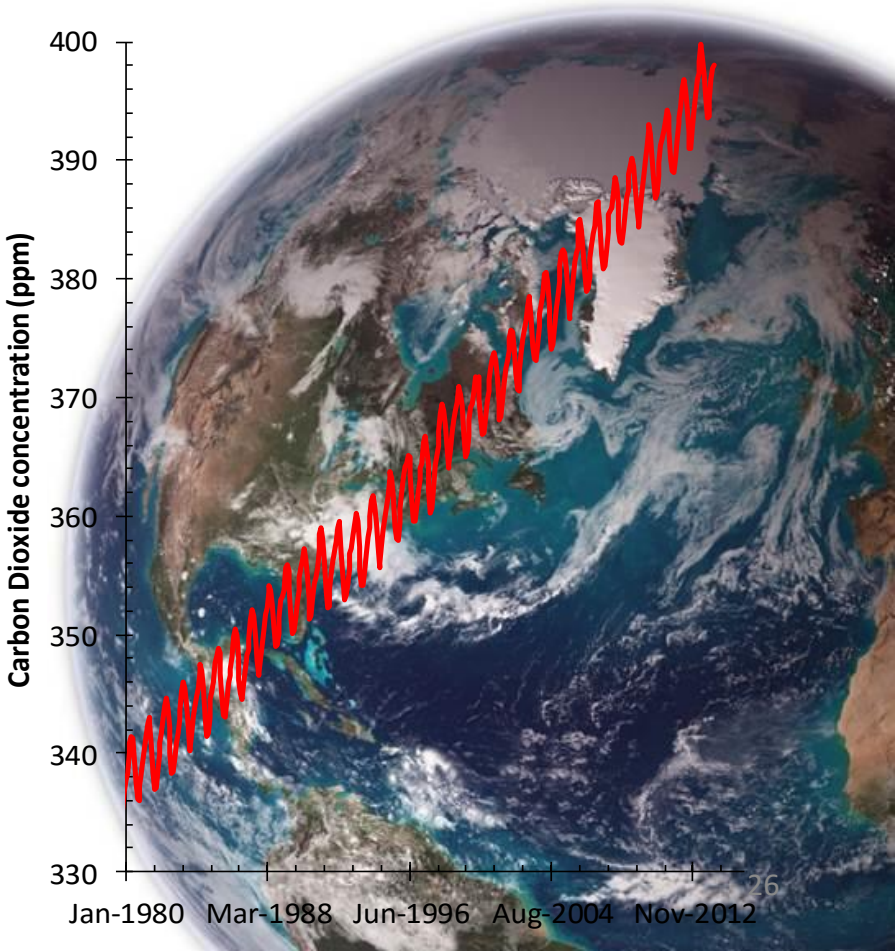
Concluding thoughts

A call for coordinated, peer-to-peer evaluation of how individual teaching related to climate change

Collaborative teaching similar to collaborative research?



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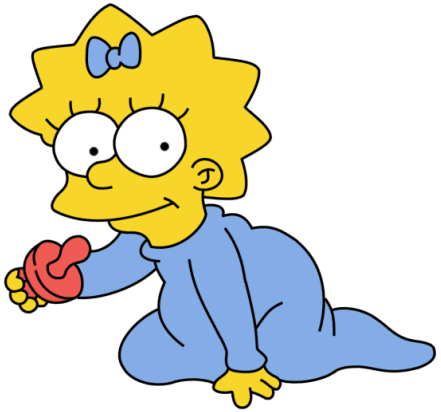

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