Ogmius

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Florencia Foxley speaks to the crowd as University of Colorado Boulder campus graduate students protest against the proposed tax bill making its way through the Congress. Photo: Paul Aiken.

The CSTPR blog, Prometheus (http://ciresblogs.colorado.edu/prometheus), was revived in 2016 to regularly feature content from CSTPR core faculty, affiliates, postdocs, and visitors to serve as a resource for science and technology decision makers. This dynamism reflects the new energies and pursuits taking place in and around CSTPR. Below we feature one of the recent blog posts.

Tax Reforms, Tuition Waivers, and the Role of Policy-Relevant Knowledge Production in a Contemporary Society

by Steve Vanderheiden

In the wee hours of Saturday morning, December 2, the Senate passed its long-anticipated tax reform bill, having circumvented the filibuster-proof supermajority requirements routinely used to obstruct ordinary legislation when Democrats controlled the chamber with a 51-49 majority. In announcing the vote, Majority Leader Mitch McConnell remarked that he was "totally confident" that the bill would be at least revenue-neutral, and that he personally believed "that it's going to be a revenue producer" (Tankersley, Kaplan and Rappeport 2017).

The basis for such a belief is unclear. The Joint Committee on Taxation, which was established in 1926 to assist legislators in "making objective and informed decisions with respect to proposed revenue legislation," projected that the bill would add over $1 trillion to the federal deficit over a decade, after accounting for any economic stimulus effects.

Only one Senator crossed party lines, with Bob Corker (R-TN) opposing the bill on stated fears that this congressional advisory body might possibly be correct in its estimates. According to analysts, his 51 Senate colleagues voting for the bill rejected the findings of the institution's in-house and non-partisan experts "because they felt burned by unflattering analyses of their health care proposals issued this year by the Congressional Budget Office" (Tankersley, Kaplan and Rappeport 2017).

The message sent by McConnell and his fellow congressional Republican colleagues was

THIS ISSUE

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http://sciencepolicy.colorado.edu/ogmius

The U.S. Senate passed the most sweeping tax rewrite in decades in December 2017. Photo: United States Senate TV.

clear: rather than seeking to make "objective and informed decisions" about public policy, where facts and evidence inform legislative decision-making and relevant forms of expertise are valued for their contributions to the understanding of such facts, questions such as the budget impact of tax cuts are to be settled by reference only to the personal beliefs of individual politicians. Where unbiased expertise becomes an obstacle to partisan or ideological objectives, expertise itself is to be denigrated and cast aside, to be replaced by whatever personal beliefs accommodate the interests of the nation's donor class. Critics have lamented this "post-truth" turn in U.S. politics and public life as endemic to the Trump era. (See, for example, The Economist 2016; Bomey 2018). CSTPR founding Director Roger Pielke, Jr. has actually chronicled that the politicization of science has a longer history.

What is new and alarming about the hostility of U.S. political elites toward scientific knowledge and expertise is that it appears now to be moving beyond attempts to suppress inconvenient facts and discredit scientists as mere ideological actors, from a radically constructivist epistemology in which no empirical finding can have more validity than any other (or even unfounded personal beliefs about empirical facts). That hostility is no longer directed only at individual researchers or the findings of scientific bodies that result from processes like peer review, but has been widened to include sweeping attacks against the scientific knowledge production system itself.

Prometheus—for whose symbolic association with the human quest for knowledge this blog was named—was tortured by Zeus for allowing mortals access to a systematic understanding of the natural world. As the French philosophes that produced the first Encyclopedia well understood, making knowledge available to the public can be emancipatory, but is also threatening to those whose hold on power is challenged by it.

Knowledge is power, but democratic distributions of power undermine the monopoly control over it previously held by elites.

A generation ago, Prometheanism was among the leading political discourses opposed to state regulatory protection of the environment, embracing this association between knowledge and human progress. Insofar as technical knowledge and the capacity for innovation is unlimited, Prometheans like Julian Simon promised, there could be no real ecological limits to growth, as technology would allow humans to overcome forms of scarcity motivating environmentalism. Competing discourses like this one, along with competing knowledge production institutions like contrarian "think tanks" emerged to challenge an emerging scientific consensus about the need for science-based natural resource management or pollution control policy within a marketplace of ideas in which adversaries still respected that competition. Even climate skeptics sought to influence decision outcomes against environmental protection while allowing genuine scientific research to go forward, obfuscating its findings or exaggerating its uncertainties to confuse the public and delay regulatory action, interfering with knowledge dissemination but not production.

In this sense, the bill opens a new and pernicious front in the science wars through an attempt to interfere in knowledge production rather than merely politicizing its dissemination.

A protest for social media as University of Colorado Boulder graduate students rally against the 2017 tax bill. Photo: Paul Aiken.

Among the provisions of the House tax reform bill, which was not included in the Senate bill but which could still emerge through reconciliation, is a move to treat tuition waivers for graduate students as income, amounting to an approximately 300-500 percent tax increase on a low-income group that did not appear to have been randomly targeted (Siegel 2017). Because graduate students train to acquire the knowledge-production skills in their chosen fields, whether these are in the natural or social sciences, humanities, or arts, they pose a threat to those elites seeking a level of control over knowledge production and dissemination not seen in Western democracies since before the Enlightenment. While partly retributive, targeting scholars during their most economically vulnerable time to punish academia for the free inquiry it cherishes but which is loathed by those whose political ends depend upon stifling public access to impartial knowledge, the provision appears to also be partly designed to diminish the future research capacity of these universities and knowledge-based institutions outside of the academy. No longer content to merely suppress knowledge produced by scholars who are dependent upon tuition waivers to make financial ends meet while training at U.S. universities, this provision financially threatens the young scholars themselves, and with them the process of training the next generation of researchers. Indeed, it threatens the future of U.S. leadership in scholarly research, with a chilling effect upon the future production of the kind of policy-relevant research valued by this Center as contributing to the public good, viewing it as a threat to the post-truth politics embraced by the Majority Leader.

As part of a nationwide movement, CU Boulder students walked out of their classrooms and labs last Wednesday in a show of support for their integral role within the university. This is not a problem for graduate students alone: faculty, administration, undergraduate students, and indeed the public at large all stand to lose as access to graduate education is diminished for all but the wealthy, and society's capacity to train new knowledge producers is undermined by those threatened by the production and public dissemination of that knowledge. In the short run, we should all remind our representatives about the role of policy-relevant knowledge production in a democratic society, and opposing this pernicious attempt to interfere with it for transparently political reasons. In the long run, we should think about how to better communicate the social value of the research university, and of scholarly research itself, not just to the more educated and progressive members of the public that are already inclined to view it favorably, but also to its indirect beneficiaries, whose support for higher education declines as its suspicion that our educational mission is socially exclusive increases. We in public research universities must also continue to fight to keep access to higher and graduate education economically accessible and socially inclusive, to prevent this kind of anti-intellectual populism from arising in the future and to reaffirm the basic democratic values that inform our knowledge production system.

Steve Vanderheiden, steven.vanderheiden@colorado.edu
CSTPR Faculty, Associate Professor of Political Science and Environmental Studies at University of Colorado at Boulder

Bomey, N., 2018. After the Fact: The Erosion of Truth and the Inevitable Rise of Donald Trump, Prometheus Books.

The Economist, 2016. Yes, I'd Lie to You: The Post-Truth World, The Economist, September 10.

Siegel, E., 2017. The GOP Tax Plan Will Destroy Graduate Education, Forbes, November 7.

Tankersley, J., T. Kaplan and A. Rappeport, 2017. Senate Passes Sweeping Republican Tax Overhaul Bill, The New York Times, December 1.

FACULTY AFFILIATE FORUM

Fostering Scientific Integrity in Policymaking: Opportunities at the State Level

by Matthew Druckenmiller

Scientific integrity is the foundation for science and scientists to be useful to, and trusted by, those consulting science to make decisions. The Union of Concerned Scientists (UCS) defines scientific integrity as "processes in which independent science fully and transparently informs policy decisions, free from inappropriate political, ideological, financial, or other undue influence". In today's climate of divided politics, partisan rancor, and rampant spread and availability of misinformation, efforts are underway to safeguard what UCS defines as the four principles of scientific integrity in federal policymaking: (1) independent science, (2) scientific free speech, (3) transparent decision making, and (4) statutory compliance. The first two are at the core of what it means to be a scientist. By and large, scientists commit to the deeply held belief that their work must be free from conflicts of interest that may bias their science, and that they are free to express their personal views on the science with appropriate disclaimers. The third and fourth principles, however, are perhaps more in-view for those scientists working at the interface of science and policy; those immediately concerned with bringing science in service of the public good. (While the proportion of basic research funded by taxpayer dollars is dramatically down from previous decades, federal funds remain by far the largest supporter of research.) Implementing statutory compliance to scientific integrity refers to legal frameworks that require that the best available science be brought to bear on policy decisions. Knowing where and how such frameworks apply requires experience, and is key to identifying opportunities for bringing transparent, independent science to bear on federal policy deliberations.

However, any momentum toward greater evidence-based governance in the U.S. and action on some of the most pressing issues we face requires progress at the state level as well. Policy issues debated in a federal context often mirror discussions underway across the states, whether, for example, related to health-care, education, environment, or extreme weather events. Also, in terms of opportunity, it is important to keep in mind that the vast majority of states (if not all) are not experiencing the gridlock of the U.S. Congress. (For example, in Colorado, 62% of bills introduced last year passed both chambers, and were passed onto the Governor. By comparison, the 114th U.S. Congress sent only about 3% of introduced bills to the President.) While there are some nonpartisan resources at state legislators' disposal, most states lack adequate resources to support informed legislative policy. Yet, they are encountering issues that are increasingly technically complex without the scientific or technical expertise to address them.

One partial solution is to bring more scientists into the policy realm. Towards this goal, the Center for Science and Technology Policy is currently exploring the creation of a science and technology policy fellowship program at the state level. What would such a program look like? Ideally, the fellowship

would entail 1-2 year placements of PhD-level scientists and professional engineers within the state legislature to provide an in-house source of non-partisan, evidence-based information. In other words, the program will embed a "scientist's mindset" into the daily activities of the legislature. In turn, these fellowships will expose scientists to the policymaking process and to opportunities (statutory or otherwise) for science and evidence-based information to be considered in the context of critical issues facing the state, including water resources, transportation, wildfire management, agriculture, air quality, and resource development—issues that are intricately linked to the state's dramatic population growth and economic development.

Of course, this is not a new idea! The American Association for the Advancement of Science (AAAS) has implemented an S&T policy fellowship program at the federal level since 1973, and now places approximately 300 fellows each year in all branches of the federal government. At the state level, the California Council on Science and Technology (CCST) has implemented a successful program within the California Legislature since 2009, and places up to 10 fellows per year. Both of these programs provide a wealth of experience for efforts that are now underway to plan similar fellowships in nine states across the country, including Colorado.

A decade ago, the state science and technology policy movement was seen as somewhat uncharted territory. However, those interested in science and technology recognized that many of the institutions needed to inject scientific considerations into state policymaking already existed, but that the potential was largely unrealized. This report by the National Academy of Sciences summarizes the first of its kind convocation that took place in 2007 to discuss with state policymakers the benefits of policy informed by science and technology. The report outlines opportunities and challenges, and called for a mechanism for sharing best practices across institutions that are in a position to offer science and technology advice at the state level. The effort underway to plan S&T policy fellowships across states (thanks to the Moore Foundation, the Simons Foundation, and CCST) is an excellent example of such a mechanism emerging.

Matthew Druckenmiller, druckenmiller@nsidc.org
Research Scientist at NSIDC and CSTPR Research Affiliate

FACULTY AFFILIATE FORUM

On the Ground Learning Over Spring Break: Law Students Travel the Colorado Plateau by Alice Madden

None of us would have guessed that the most impactful part of an eight-day, adventure filled field-trip around the Four Corners area would be a short walk around a mesa in northeastern Arizona. But that was before we met Nicole Horseherder.

Let me backup. I have the pleasure of teaching the Advanced Natural Resources Seminar at the Law School this Spring. Initiated by Prof. Charles Wilkinson 30 years ago, this unique seminar examines issues facing a specific geographic area and culminates with a field-trip. Past seminars have studied important watersheds across the southwest, the Greater Yellowstone Ecosystem, and the Grand Canyon.

This year, we studied the Colorado Plateau—these canyons and high deserts are home to more national parks and monuments than any place in the world. Native American Tribes hold one-third of the land. From Durango to the shadows of Bears Ears, from Glen Canyon Dam to the south rim of the Grand Canyon, through Monument Valley and the expanses of Hopi and Navajo lands – we racked up over 1,300 miles meeting with federal land managers, Native Americans, environmental organizations, land trusts, and others who shared what they know about this unique landscape.

Throughout the semester, 12 law students learned about the area's history, culture, and current challenges such as a raging public land debate, habitat loss, grazing, increased aridity, electricity production, drilling, and mining. But walking on Nicole's ancestral lands with her nine year-old son and 14 year-old daughter is what put everything into perspective.

Indigenous people have occupied Black Mesa since the 1500s relying on the once vast Navajo Aquifer. Nicole's family was nomadic into her teens, moving with their sheep and utilizing the Navajo Aquifer. Long after her family settled into permanent homes, her grandmother continued to travel around the mesa with their sheep — sleeping in small hogans. (When we arrived at Nicole's remote home, her grandmother had just returned from a long trek with her sheep.)

Far off the grid, the house is powered by a solar array and battery packs and we found her homeschooled kids busily working on their iPads. The seeps and springs her people relied on for years have all dried up. They now must truck water in for themselves, their horses and sheep, and a large garden.

If you ask Nicole why the water has disappeared over the last 20 years, she has a quick answer: the 2,250 megawatt Navajo Generating Station (NGS) and its associated coal mines. The coal plant was built to help push Colorado River water through 300 miles of canals to Phoenix and Tucson. Over the lifetime of the mines, it is estimated that Peabody Coal used 45 billion

gallons of aquifer water to run its slurry lines. Peabody still uses an estimated 1 million gallons of Navajo Aquifer water every day.

The coal plant is scheduled to be closed in 2019, but Navajo leadership is searching for new buyers for the coal. If the mine remains open, the aquifer will continue to be drained. Regardless, it has little chance of recharging with only ~eight inches of rainfall a year. Climate change has taken a toll, and these lands are now hotter and drier than in recorded history.

Yet Nicole and her family are determined to stay; she advocates for closing the mine and replacing those jobs with investments in renewable energy. "Having had the privilege of seeing the land as the Creator left it for us, I know that the wise management of the basic elements of life – land, air, water and the sun – are necessary if we are to fulfill our responsibility to ensure a decent quality of life for the next generation."

After hiking to a former spring site, Nicole invited us into her home for tea and cornbread. Her daughter had made the bread for her recent coming of age ceremony. The intimacy of this moment cannot be fully explained in words. I struggled to think of what gift we could leave besides the abundant research produced by the class and a heartfelt thank you note circulating among the students. Thanks to our emergency contingency planning, we had almost ten gallons of water in our cars.

So we left our water at her family's door step and continued our journey. A little quieter than on our way in. Each one of us processing the multiple layers of complexities that led to Nicole's battle. The student's upcoming research papers will be that much richer having experienced how law and policy intersect with the land, water, wildlife, and people of the Colorado Plateau.

Alice Madden, alice.madden@colorado.edu
Getches-Wilkinson Center, Colorado Law and CSTPR Affiliate

VISITOR HIGHLIGHT

CSTPR's Fulbright Visiting Scholar: Anna Kukkonen

by Abigail Ahlert, CSTPR Science Writing Intern

Last semester, Anna Kukkonen had a quintessential "Boulder" experience. A friendly man waiting next to her at a bus stop asked what she worked on. When she explained her research on climate change debates in the media, the man mentioned that he was a part of the Shanahan Ridge Neighbors for Climate Action—a South Boulder group that discusses local sustainability issues—and invited her to join. She was delighted by the coincidence. Boulder is a hub for those interested in the environment, and as a Fulbright visiting scholar at University of Colorado's Center for Science and Technology Policy (CSTPR), Kukkonen is truly finding opportunities around every corner.

Kukkonen is a PhD student in Sociology at the University of Helsinki, and applied for a Fulbright grant with CU's high ranking environmental policy program in mind. She anticipated that visiting CU would provide many opportunities for collaboration, particularly since her research is well-aligned with that of Dr. Max Boykoff, Director of CSTPR. In 2017, Kukkonen and her co-authors published a paper applying the Advocacy Coalition Framework (ACF) theory to U.S. media coverage of climate change from 2007-2008. According to Kukkonen, "The general beliefs concerning the reality of anthropogenic climate change, the importance of ecology over economy and desirability of governmental regulation divide organizations into three advocacy coalitions: the economy, ecology and science coalitions". Specific beliefs concerning policy instruments such as cap and trade and alternative energy do not. She found that the ACF theory could be clarified to better account for how beliefs contribute to coalition formation in specific points in time and policy domains.

During her time in Boulder, Kukkonen is working on multiple projects involving climate change politics. First, she is comparing media discussions of climate change in the United States, Canada, Brazil, India and Finland. Kukkonen works with researchers from these countries and others in the Comparing Climate Change Policy Networks (COMPON) project. She finds writing with international colleagues to be very rewarding and acknowledges that the writing process is the most challenging part of her work. "You really grow as a person when you do this kind of stuff, and you learn to take critique," she says. Additionally, Kukkonen is studying the roles of different types of policy actors (such as non-profit organizations, universities and businesses) and the moral justifications they use in the Finnish and Canadian media debates on Arctic climate change.

When she isn't working on her PhD research, Kukkonen attends classes offered by CU's Environmental Studies Program, where she has learned more about the interactions between science and policy. To her surprise, many of her classmates are natural scientists. "It has been very enlightening how differently we think," she says. "They have their own conception of what social science is and that has been very interesting." Discussions with her classmates have challenged her to describe her work and its use to researchers outside of her field, and this has given her greater confidence in her role as a social scientist.

Kukkonen also appreciates how many scientists at the University of Colorado prioritize communicating their results with the public. "This is another reason why I came to CSTPR, because here I think they focus a lot on how researchers can communicate their research to the general audience. I notice that people in the US like to talk about their research in a way that people who are not experts in that field can understand it," she says. In May, Kukkonen will return to Finland to complete her PhD. She is excited about the direction her research has taken at CSTPR and hopes to continue studying climate change after graduate school. "Now I find purpose in my research better than before I came here," she says. "I feel more motivated after this experience because I've had to think about my research in a more practical way."

CENTER HIGHLIGHT

Reflections from the 2018 AAAS "CASE" Workshop

For the fifth year CSTPR organized a campus-wide competition to select two students to attend the AAAS "Catalyzing Advocacy in Science and Engineering" Workshop in Washington, D.C. Winners of the 2018 AAAS CASE workshop competition reported on their experiences at the workshop.

Over the course of three and a half days in Washington, D.C., I had the opportunity to learn about how science fits into the complex process of political decision-making. Whatever my understanding of the inner workings of our government was before I attended the AAAS CASE Workshop, it has drastically changed since I got a glimpse of the policymaking process first-hand. For the first three days of the workshop, I and almost 200 other students plunged into a crash course from science and technology policy experts about topics such as congressional committees, the federal budget process, and science communication methods. On the final day, we were able to put our knowledge to the test on Capitol Hill, where we met with our congressional representatives and their staff to discuss the importance of scientific research and to advocate for science funding and support in the then-forthcoming budget.

Congress is a complicated machine. When policymakers are deciding where to allocate funds, they have an enormous array of influences and stakeholders pulling them in different directions. Budget choices are influenced by constituents, power dynamics, politics, media, personal values, congressional rules, and countless other factors. It may be easy as scientists to sense that scientific research—both basic and applied—is crucial when it comes to setting a federal budget. But there are many groups and individuals with lots of ideas about what the government should be doing. It is up to scientists to make our voices heard among the many stakeholders at play; ultimately, the AAAS CASE Workshop helped to teach scientists like myself how to do this effectively.

Two of the most useful tips I learned regarding communicating with policymakers were to 1) know your audience, and 2) tell your story. As researchers, we tend to live in the realm of data and numbers. Very few congresspeople come from a scientific background, and thus they aren't necessarily informed or motivated by the same methods we typically use to communicate. As in any instance of communication or advocacy, understanding the background and perspective of the other person is crucial. Furthermore, personal stories can be incredibly effective tools when communicating with policymakers. Human connections are not often stressed when scientists talk about our research, but sharing personal experiences can help us to forge lasting relationships with lawmakers and to deliver our point of view more successfully.

Our time in D.C. culminated in an impressive snowstorm as we met with our congressional representatives—luckily all of the Colorado offices remained open for the day! We had the chance to talk about our research and express our thoughts about the importance of science funding within the federal budget. And in a dramatic finale, later that afternoon congress approved the largest U.S. research spending increase in a decade. I'd like to think that the presence of 200 students with an interest in science policy on Capitol Hill contributed to the increase in research funding. I look forward to using the science advocacy and communication skills I learned at the CASE workshop throughout my career, and I would encourage other interested students to apply.

Amanda Koch, Julia Bakker-Arkema, and Kaitlin McCreery in Washington, DC. Photo: Heather Bené.

Julia Bakker-Arkema (Chemistry & Biochemistry, CU Boulder)

I left my snow boots by the door as I departed for Denver International Airport at 4:30 a.m. on a Sunday morning, thinking the forecasted snow was a Southern bluff. From March 18 to 21, I navigated the streets and government buildings of our nation's capitol with a fellow CU-Boulder graduate student, Julia Bakker-Arkema and a graduate student representative from Colorado State, Amanda Koch. We were three of a contingent of 193 graduate students from around the country that the American Association for the Advancement of Science (AAAS) policy workshop called "Making Our C.A.S.E." (Catalyzing Advocacy in Science and Engineering). The goal of this annual workshop is to inform scientists how funding for science is determined by Congress, how science serves the interests of the public, and how scientists can integrate these two aspects.

Why do we need young scientists in Washington to advocate for funding? It is important to remember who is running our country, and their education background. For instance, 18 members of the House have no post-secondary education. Fifty-five percent of the Senate holds law degrees. Just 22

CENTER HIGHLIGHT
Reflections from the AAAS "CASE" Workshop

Representatives and 2 Senators have doctoral degrees. In all of Congress, there is one physicist, one chemist, and eight engineers. But there is no significant advantage of having a science background in Congress, as it serves two purposes: passing laws and writing checks for nearly every social and economic issue that our nation faces. If scientists want more funding, we need to show them who we are, and ask for it.

Graduate students from every state in the continental United States packed the auditorium in the AAAS Headquarters on a Monday morning. Matthew Hourihan, Director of the AAAS Research and Development (R&D) Budget and Policy Program, gave us a detailed look at the federal budget process. We heard from Rush Holt, CEO of AAAS and former U.S. Representative for New Jersey, as he discussed why scientists have untapped potential for political influence. Graduate students are some of the best science advocates because we do the grunt work in academic research while being paid with federal dollars. We have passion behind our commitment to research, and our representatives want to go to bat for us.

Some of what I learned about the federal budget surprised me. In general, Defense spending accounts for just under half of R&D expenditures. The National Science Foundation—which pays my salary, through a graduate training grant—makes up a relatively small portion of the budget. For the life sciences, the largest source of funding is the National Institutes of Health. The buzz term of the week in Washington was "appropriation season," as the federal government was scheduled to shut down in three days if a spending bill was not signed into law. Congressmen and their staffers—many of whom were in their twenties—were charged with the task of writing and refining the spending bill that influences every aspect of the American economy.

As we prepared for our meetings, I wondered: as a scientist, what impact can I make? There are so many issues that I feel passionate about, from climate change to increasing research on gun control measures. I desired to tackle all of them with this unique opportunity. During lunch, the day before our meetings with Colorado congressmen, I approached Rush Holt (CEO of AAAS) to gain insight, and he boiled down his decades of experience while we hunched over our boxed lunches. He asked me three key questions: "First, who do you want them to think you are? Second, what do you want them to do? Third, what can you thank them for?" These questions made an excellent point. These brief meetings would be most impactful if we represent a concise group of people with a clear message: increase funding for scientists like us. Give them a face representing the people funded by the NSF.

On our final morning in Washington, I wished that I was wearing snow-appropriate shoes as we dashed out of our cab, through the snowy slush, and up the stairs of the Longworth House Office Building which houses all of the offices of the House of Representatives. We first met with congressional

Amanda Koch, Julia Bakker-Arkema, and Kaitlin McCreery meet with Congressman Jared Polis. Photo: Heather Bené.

staffers in Jared Polis' office, who were incredibly friendly and receptive. As we left for our next meeting, Representative Polis himself stepped into the hallway and called to us, "Hello, scientists!" We quickly thanked him for his commitment to funding research and snapped a photo before he disappeared to attend a hearing.

We followed a Congressional staffer down to the basement and hurriedly walked through the tunnel beneath the Capitol to get to our meetings with the staffers of Senators Gardner and Bennett. Each of their offices were decadently decorated with local Colorado art and memorabilia, including a Broncos poster and oil paintings of Aspen trees. Since the Senators were in hearings, we discussed federal R&D funding with young, educated, overworked staffers in decadent offices. Meeting with these staffers was inspiring in its own rite, and our discussions reminded me that we are all trying to find the optimal way we can serve our society. Spending time in these offices reinforced the idea that Congressmen work for their constituents, as our 15-minute meeting was on a long list of issues they were to address that day from constituents that traveled to Washington offices. They listened to our stories, asked about our research, and asked about how federal dollars impact our work. The staffers assured us that our representatives were opposed to cuts to scientific research, and we just needed to remain optimistic.

Just a few days after I returned to Colorado, my endless scrolling on Twitter abruptly froze when I saw an omnibus bill was sitting on the President's desk waiting to be signed. The bill contained a 12.8 percent increase in funding for research and development, and is now law. We were fortunate to have nearly 200 student scientists strolling through the halls on the Hill advocating for research funding during a critical time in the bill's passage. I envision a lot more nerds in Washington in upcoming years to conserve our momentum.

Kaitlin McCreery (Mechanical Engineering, CU Boulder)

CENTER NEWS

Angela Boag Receives Radford Byerly, Jr. Award in Science and Technology Policy

Rad Byerly, Jr.

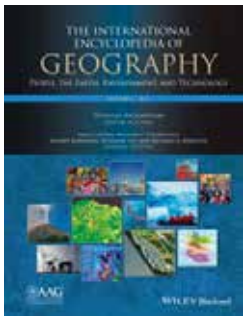
Rad Byerly, Jr., passed away in 2016 after an impressive career that included more than twenty years as staff on and ultimately Director of the Science Committee of the U.S. House of Representatives. He also was Director of the Center for Space and Geosciences Policy at CU Boulder. Rad spent the last years of his career with the Center for Science and Technology Policy Research (CSTPR) at CU Boulder, where he was known as a mentor, adviser and friend with a wicked sense of humor.

CSTPR launched the Radford Byerly, Jr. Award in Science and Technology Policy in recognition of Rad's contributions to and impact on the CSTPR community. Thanks to several generous donations, CSTPR was able to offer a $1500 award to a graduate student this year. We are soliciting donations for future awards here: https://giving.cu.edu/fund/radford-byerly-jr-award-science-and-technology-policy.

Angela Boag

Following a selection process, Angela Boag was chosen to receive the 2018 Byerly award. Angela is a PhD Candidate at the University of Colorado Boulder investigating the relationships between climate change, forest management and land ownership. She has a Master's in Forestry from the University of British Columbia and serves as Co-Chair of the Ecosystem-based Adaptation and Mitigation Thematic Group of the International Union for Conservation of Nature (IUCN). As a member of the Communities and Forests in Oregon research project led by Dr. Joel Hartter, Angela studies how changing climate and wildfire regimes impact forest resilience, as well as how private forest owners adapt to changing conditions.

International Encyclopedia of Geography Receives CHOICE Award



Max Boykoff and Gesa Luedecke's contributed a paper "Environment and the Media" to 2017 CHOICE Book Award Winner, The International Encyclopedia of Geography: People, the Earth, Environment, and Technology. Significantly, as the Encyclopedia's Editor-in-Chief Douglas Richardson noted, "this six-year encyclopedia project also resulted in building a collaborative international community of leading geography scholars and researchers who served as editors and authors, and with the international geographical societies and associations with whom the AAG interacted throughout the creation of The International Encyclopedia of Geography."

CU's Inaugural Colorado Science and Engineering Policy Fellowship

CU Engineering's Michelle Lin, Sage Sherman and Abby Oglesby are the 2018 fellowship winners.

Policy is increasingly playing a hand in what guides the technical world. That's why CU Engineering in partnership with the CU Office of Government Relations and the Center for Science and Technology Policy Research have teamed up with Colorado state representatives Chris Hansen and Bob Rankin to bring to life the Colorado Science and Engineering Policy Fellowship. This fellowship will enable STEM students to pull back the curtain on the public policy arena and help bridge the gap between STEM disciplines and the policy-making process at the state level.

CU Engineering's Michelle Lin, Sage Sherman and Abby Oglesby are the 2018 fellowship winners. Over the course of the fellowship, Michelle, Sage, and Abby, along with students from institutions across the state, will learn about the policy-making process at the Capitol while splitting their time between outside activities. These add-ons include visiting institutions where technology and policy intersect, sitting in with committees aligned with the policy interests from their applications, and lastly, researching their own policy proposal.

As part of their fellowship they'll take part in a legislative boot camp at the Capitol and visit NREL, Google's Boulder campus, Panasonic, Xcel Energy, National Wind Technology Center and more. They'll close their capstone research with a presentation day at the Capitol in July. To learn more about the program see: http://sciencepolicy.colorado.edu/students/csepf.html.

Flood Modelling and Assessments for Downstream Communities of Koka Dam, Ethiopia

Katie Chambers is a PhD student in Environmental Engineering with a focus on Engineering for Developing Communities. In Ethiopia, Katie developed flood inundation maps for communities downstream of hydroelectric dams. These maps

CENTER NEWS

2017 Red Cross/Red Crescent Climate Centre Fieldwork team enjoying fresh sugar cane after completing a set of interviews. Photo: Katie Chambers.

will guide the development of Early Warning Early Action frameworks for the Ethiopian Red Cross Society and IFRC. Her research investigates the comparative vulnerabilities and resilience of different types of sanitation systems found in resource-limited communities, as well as the tradeoffs made when prioritizing resilience in system selection.

The report presents the findings of the Katie's research from May to August 2017 with support from the International Federation of Red Cross and Red Crescent Societies; Ministry of Water, Irrigation and Electricity – Ethiopia; Ethiopian Red Cross Society; and Red Cross Red Crescent Climate Centre (Climate Centre). The study area was Koka Dam and its downstream communities, located in the Oromia Region of Ethiopia. To read more see: http://sciencepolicy.colorado.edu/students/redcross/chambers/executive_summary.pdf.

CSTPR Receives CU Green Office Certification

CSTPR was awarded the Green Office Certification from the CU Boulder Leadership Council. CSTPR received the award at the Campus Sustainability Summit held on April 25, 2018. The Campus Sustainability Summit, now in its 25th year, is an information-sharing forum that features strategic updates and inter-departmental discussions on campus sustainability initiatives.

Jeremiah Osborne-Gowey Presenting in Environmental Journalism Course

CSTPR graduate student, Jeremiah Osborne-Gowey, spoke in a University of Colorado Boulder Environmental Journalism course ("Reporting on the Environment") for a field trip to discuss community adaptations and responses to wild land fire. They visited a 2017 burned site, started by a homeless camp's illegal campfire just on the Western edge of Boulder, Colorado and that burned right to the edges of a couple of communities.

RIO Seed Grant Awarded to Katie Chambers and Sherri Cook

CSTPR graduate student and Red Cross Red Crescent Climate Centre intern, Katie Chambers, and CU Environmental Engineering's Sherri Cook were awarded the 2018 Research & Innovation (RIO) Seed Grant for their project "Resilient and Sustainable Sanitation Systems: Characteristics, Links, and Barriers" (PI Sherri Cook, with these collaborators: CSTPR Director Max Boykoff, CSTPR Affiliate Amanda Carrico, Dr. Trisha Shrum). The seed grant will provide funding to evaluate the social, economic, and technical characteristics of resilient sanitation systems and to integrate this work with existing sustainability research to develop strategies and recommendations to increase access to and long-term performance of sanitation systems.

CENTER NEWS

ITG 2018 Comedy & Climate Change Video Winners Announced

Inside the Greenhouse held a competition to harness the powers of climate comedy through compelling, resonant and meaningful videos. All winning entries can be viewed here: http://www.insidethegreenhouse.org/node/3254.

First Place

'Perr Review' (United Kingdom)
by Madeleine Finlay and Sarah Barfield Marks

Second Place

'Recipe for Disaster' (Ireland)
by Emmet Sheerin

Third Place Runner Up

'S**T Environmentalists Say' (United States)
by Matthew Cohen

CENTER TALKS & EVENTS

The Spring 2018 noontime seminar series is coming to a close. All past talks are available via webcast at http://sciencepolicy.colorado.edu/news/webinars.

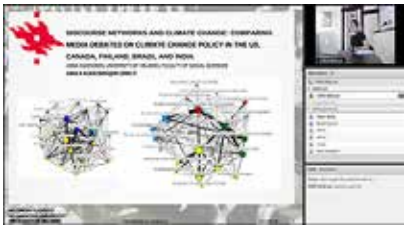
January 24, 2018
Flood Modelling and Early Warning Assessments for Downstream Communities of Koka Dam, Ethiopia

by Katie Chambers, Department of Civil, Environmental, & Architectural Engineering, CU Boulder

February 7, 2018
Extreme Events Reconnaissance: Social Science and Interdisciplinary Research in the Disaster Aftermath

by Lori Peek, Department of Sociology, CU Boulder

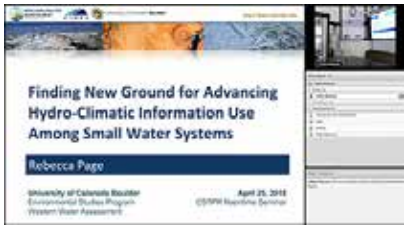
March 14, 2018
Discourse Networks and Climate Change: Comparing Media Debates on Climate Change Policy in Canada, the US, Finland, Brazil, and India
by Anna Kukkonen, Helsinki Research Group for Political Sociology (HEPO), University of Helsinki, Finland



April 11, 2018
Our Lives in the 21st Century: The Best of Times or the Worst of Times?

by Alexander Verbeek, Yale Greenberg World Fellows, Stockholm Environment Institute

April 25, 2018
Finding New Ground for Advancing Hydro-Climatic Information Use Among Small Mountain Water Systems



by Rebecca Page, Environmental Studies, CU Boulder

MEDIA AND CLIMATE CHANGE OBSERVATORY MONTHLY SUMMARY

The Media and Climate Change Observatory (MeCCO) (http://sciencepolicy.colorado.edu/media_coverage) analyzes traditional/legacy media representations of climate change. MeCCO team endeavors to comprehensively aggregate, monitor, appraise and critically examine media coverage that influence the spectrum of possibility for effective responses to ongoing climate challenges. The MeCCO team monitors 74 sources (across newspapers, radio and TV) in 38 countries in seven different regions around the world.

Special Issue, 2017 Recap

2017 saw media attention to climate change and global warming ebb and flow. At the global level, June of this year was the high water mark for coverage of climate change or global warming in the fifty-two sources across twenty-eight countries tracked by our Media and Climate Change Observatory (MeCCO) team. Figure 1 shows media coverage of climate change or global warming month to month - organized into seven geographical regions around the world - from January through December 2017. This trend of highest levels of coverage in June was also the case at the national level in Australia, Canada, India, Spain and the United Kingdom (UK) in 2017. This increase was largely attributed to news surrounding United States (US) President Donald J. Trump's withdrawal from the 2015 United Nations (UN) Paris Climate Agreement, with continuing media attention paid to the emergent US isolation following through the G7 summit a few weeks later.

However, coverage of climate change or global warming across *The Washington Post*, *The Wall Street Journal*, *The New York Times*, *USA Today*, and the *Los Angeles Times* in the US was at its highest level for the year in January. Figure 2 illustrates these trends month to month in US press accounts in these five publications in 2017. The inauguration of US President Trump on January 20th along with great anticipation (punctuated by a heavy dose of dread) regarding a new phase of approaches to science and the environment by the incoming administration generated numerous stories on political and policy dimensions of climate change.

The prominence of news on climate change or global warming associated with Donald J. Trump in 2017 has been referred to as a 'Trump Dump'. This is defined as a phenomena where media attention that would have focused on other climate-related events and issues instead was placed on

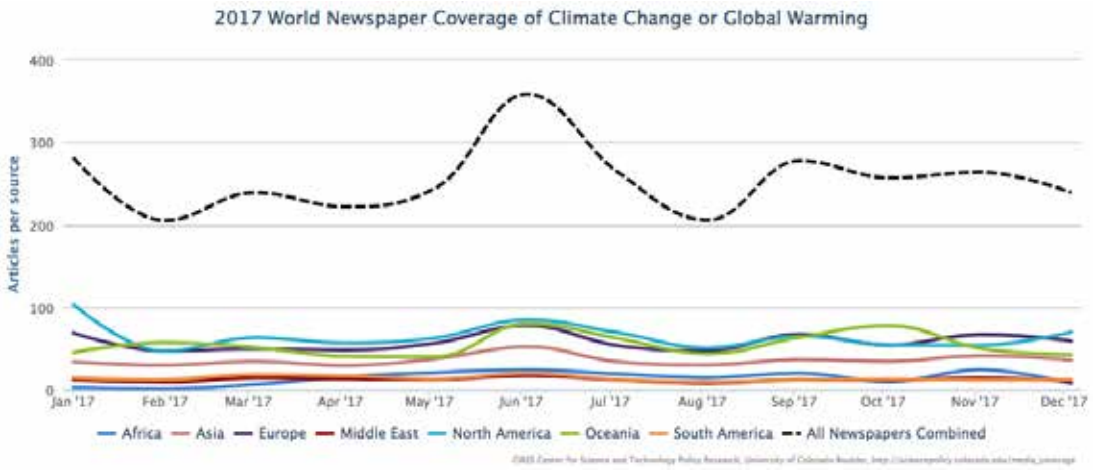


Figure 1. Media coverage of climate change or global warming in fifty-two sources across twenty-eight countries in seven different regions around the world, from January through December 2017.

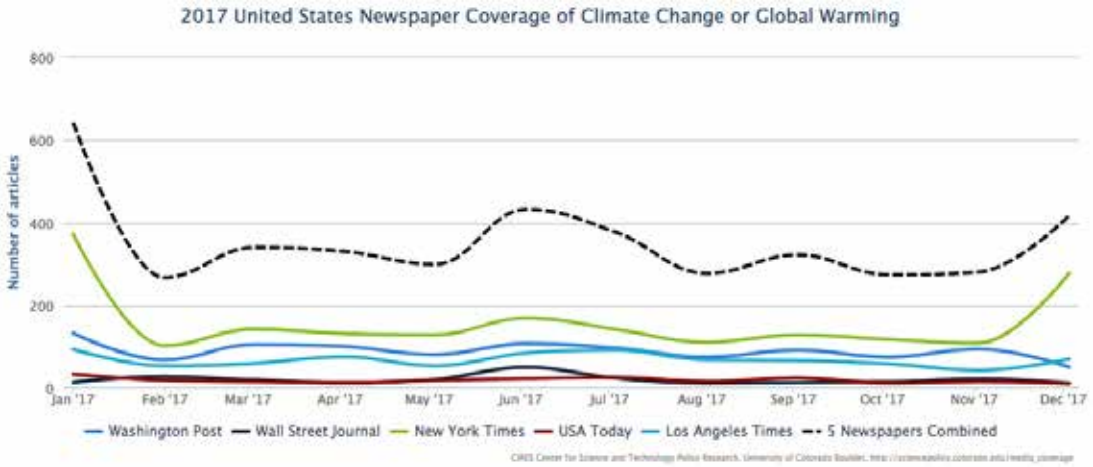


Figure 2. Media coverage of climate change or global warming month to month in the Los Angeles Times, The New York Times, USA Today, The Washington Post, and The Wall Street Journal in the US from January through December 2017.

MEDIA AND CLIMATE CHANGE OBSERVATORY MONTHLY SUMMARY

Trump-related actions, leaving many other stories untold.

This Trump Dump was illustrated most recently as the year 2017 came to an end, through media responses to the December 28 tweet from the President that referred to a cold snap in the Eastern half of the United States (approx. 1% of the Earth's surface) to cheekily call into question investments and action to confront climate change (see Figure 3 for the tweet). This goading on social media garnered reports and responses in a number of sources. For examples, journalist Kendra Pierre-Louis from *The New York Times* reported that President Trump "appeared unaware of the distinction between weather and climate" in an article entitled 'It's Cold Outside. Cue the Trump Global Warming Tweet'. Meanwhile, reporter Dino Grandoni from *The Washington Post* pointed out, "Before sending that message, Trump had not sent any tweet containing the phrase "climate change" or "global warming" since becoming president... In contrast, two years ago during the chilly winter of 2015, Trump sent off at least nine tweets holding up cold temperatures as evidence that global warming can't be happening."

Throughout the year 2017, in terms of the frequency of words in articles in the US, 'Trump' was invoked 19,184 times through 4117 stories in *The Washington Post*, *The Wall Street Journal*, *The New York Times*, *USA Today*, and the *Los Angeles Times* in 2017 (a ratio of nearly 4.7 times per article on average). Figure 4 depicts word frequencies in US press accounts across the calendar year 2017.

This report is an aggregation of monthly summaries that our MeCCO team has compiled and posted each month on our website. The project is a part of the Center for Science and Technology Policy Research (CSTPR) in the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado Boulder. Initial funding for this project (six months) was received from the Office for Outreach and Engagement at the University of Colorado Boulder and continues with support from CSTPR.

Figure 3. US President Donald J. Trump tweet from December 28, 2017 to close out the year.

Figure 4. This word cloud shows the frequency of words (4 letters or more) invoked in media coverage of climate change or global warming in the Los Angeles Times, The New York Times, USA Today, The Washington Post, and The Wall Street Journal in the US in 2017.

Media stories on climate change or global warming typically manifest through primary yet often intersecting *political*, *scientific*, *cultural* and *ecological/meteorological* themes. The month-to-month summaries that follow generally then highlight key events, stories and developments through these dimensions.

As 2018 begins, it is a time for important reflection on how the past year 2017 shapes the one to come and those that follow. Reverend Martin Luther King, Jr. once said, "We are now faced with the fact that tomorrow is today. We are confronted with the fierce urgency of now." May this report provide a useful resource to help confront climate change in 2018 and beyond.

Read the full report: http://sciencepolicy.colorado.edu/icecaps/research/media_coverage/summaries/special_issue_2017.html

- report prepared through contributions from Max Boykoff, Kevin Andrews, Meaghan Daly, Jennifer Katzung, Gesa Luedecke, Celeste Maldonado, and Ami Nacu-Schmidt

CENTER PUBLICATIONS

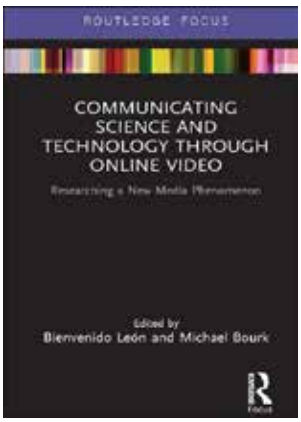
Fazey, I., N. Schäpke, G. Caniglia, **B. Goldstein,** et al. (2018). Ten Essentials for Action-Oriented and Second Order Energy Transitions, Transformations and Climate Change Research. Energy Research & Social Science, 40, 54-70.

Abstract: The most critical question for climate research is no longer about the problem, but about how to facilitate the transformative changes necessary to avoid catastrophic climate-induced change. Addressing this question, however, will require massive upscaling of research that can rapidly enhance learning about transformations. Ten essentials for guiding action-oriented transformation and energy research are therefore presented, framed in relation to second-order science. They include: (1) Focus on transformations to low-carbon, resilient living; (2) Focus on solution processes; (3) Focus on 'how to' practical knowledge; (4) Approach research as occurring from within the system being intervened; (5) Work with normative aspects; (6) Seek to transcend current thinking; (7) Take a multi-faceted approach to understand and shape change; (8) Acknowledge the value of alternative roles of researchers; (9) Encourage second-order experimentation; and (10) Be reflexive. Joint application of the essentials would create highly adaptive, reflexive, collaborative and impact-oriented research able to enhance capacity to respond to the climate challenge. At present, however, the practice of such approaches is limited and constrained by dominance of other approaches. For wider transformations to low carbon living and energy systems to occur, transformations will therefore also be needed in the way in which knowledge is produced and used. Read more: http://sciencepolicy.colorado.edu/admin/publication_files/2018.01.pdf.

Dilling, L., R. Morss, and O. Wilhelmi (2018). Learning to Expect Surprise: Hurricanes Harvey, Irma, Maria, and Beyond. Journal of Extreme Events 4(3), doi: 10.1142/S2345737617710014.

Abstract: Extreme events often bring unexpected situations and impacts, as the sequence of hurricanes and other natural disasters in summer and fall 2017 demonstrated. To reduce the risks associated with such events, many have focused on reducing uncertainty in prediction or reducing vulnerability. Although both are worthy goals, we suggest that the research community should also be focusing on the nature of surprise itself, to investigate the role of surprise in extreme events and its implications. Surprise arises when reality differs from people's expectations. Multiple factors contribute to creating surprise, including the dynamic nature of natural and human systems, the limitations of scientific knowledge and prediction, and the ways that people interpret and manage risks, not to mention climate variability and change. We argue that surprise is an unavoidable component of weather and climate disasters — one that we must acknowledge, learn to anticipate, and incorporate into risk assessment and management efforts. In sum, although it may seem paradoxical, we should be learning how to expect surprise. Read more: http://sciencepolicy.colorado.edu/admin/publication_files/2018.02.pdf.

León, B., **M. Boykoff**, J. Huda, and C. Rodrigo (2018). Framing in Climate Change Videos. Communicating Science and Technology Through Online Video: Researching a New Media Phenomenon , Ed. B. León and M. Bourk, 107-119, Routledge.



Online video's unique capacity to reach large audiences makes it a powerful tool to communicate science and technology to the general public. The outcome of the international research project "Videonline," this book provides a unique insight into the key elements of online science videos, such as narrative trends, production characteristics, and issues of scientific rigor. If offers various methodological approaches: a literature review, content analysis, and interviews and surveys of expert practitioners to provide information on how to maintain standards of rigour and technical quality in video production. Read more: http://sciencepolicy.colorado.edu/admin/publication_files/2018.03.pdf.

Goldstein, B., et al. (2018). Transformative Learning Networks: Guidelines and Insights for Netweavers. CSTPR White Paper 2018-01.

This report is intended to inform the design and operation of NSEC, the Network of STEM Education Centers, an NSF and Sloan funded initiative founded to help catalyze educational transformation by creating a vibrant community of STEM education centers. In addition, its primary audience included designers and members of other STEM learning networks, such as

CENTER PUBLICATIONS

SMTI and ASCN, and the broader community of netweavers and network participants.

NSEC was created as a learning network, an inter-organizational voluntary collaborative that nurtures professional expertise. Learning networks are often attempted when deeply rooted obstacles to institutional change have proven resistant to both top-down or bottom-up change strategies. Effective learning networks have a loose structure that can amplify the potential for transformative change by combining site-based innovation with community-spanning interaction and exchange. However, many of the features that provide learning networks with transformative potential also make them difficult to organize and maintain. Learning networks require a high level of engagement and commitment in order to identify deep-rooted problems and coordinate disparate actors to implement solutions that are both site-specific and network-wide.

To address this challenge, NSEC commissioned researchers at the University of Colorado Boulder and Oregon State to prepare four case studies to identify the opportunities and challenges of a learning network approach, with the purpose of informing NSEC's design. In addition to myself, the University of Colorado Boulder project team includes Claire Chase, Lee Frankel-Goldwater, Jeremiah Osborne-Gowey, and Sarah Schweizer. In addition, the team includes Julie Risien at Oregon State University, who is Associate Director of the Center for Research on Lifelong STEM Learning and herself a member of NSEC. Our team assembled the case studies using interviews with netweavers, document analysis, and literature review. The four learning networks that our project team examined, along with their transformation challenges, are:

- NABI (National Alliance for Broader Impacts): Connecting the university-based research enterprise to societal impacts and addressing the cultural divide between academy and public;
- 100 Resilient Cities Network: Fostering resilience in response to the inability of city governments to address challenges to sustainability;
- Fire Adapted Community Learning Network: Creating fire adapted communities after 100 years of failed wildfire management policy; and
- START (Global Change SysTem for Analysis, Research & Training): Addressing the capacity deficit to address global change impacts in the developing world.

Read more: http://sciencepolicy.colorado.edu/admin/publication_files/white_papers/2018.01.pdf.

MULTIMEDIA HIGHLIGHT

Al Jazeera, The Listening Post

The curious persistence of climate scepticism

Climate scepticism is fringe and unscientific. So why is it that sceptics still manage, in certain countries, to get airtime denying the effects of global warming?

Sceptics theories in the news media, such as carbon dioxide doesn't cause a greenhouse effect, are largely confined to what is known as the Anglosphere: the likes of the US, the UK, Australia.

Elsewhere, including the most populous, polluting countries like China and India, such scepticism is hard to find.

The Listening Post investigates the curious existence and persistence of climate scepticism in the news media.

Contributors: Leo Hickman (director, Carbon Brief), Maxwell Boykoff (associate professor, University of Colorado Boulder), Anu Jogesh (India policy and governance lead, Acclimatise), James Painter (research associate, The Reuters Institute), and Hepeng Jia (director, China Science Media Centre)

Video [9:53]: **https://www.aljazeera.com/programmes/listeningpost/2018/01/persistence-climate-scepticism-media-180127102510571.html**

ABOUT US

Ogmius is the newsletter of the Center for Science and Technology Policy Research. The Center is within the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado Boulder. The mission of CIRES, which was established in 1967, is to act as a national resource for multidisciplinary research and education in the environmental sciences. CIRES is jointly sponsored by the University of Colorado Boulder and the National Oceanic and Atmospheric Administration.

Co-Editors:

Max Boykoff

boykoff@colorado.edu

Ami Nacu-Schmidt

ami.nacu-schmidt@colorado.edu

Jennifer Katzung

jennifer.katzung@colorado.edu

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Center for Science and Technology Policy Research
University of Colorado/CIRES
1333 Grandview Avenue, Campus Box 488
Boulder, CO 80309-0488
Ph: 303-735-0451
http://sciencepolicy.colorado.edu

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