This changes everything: Fixing climate change might save more money than it costs

Dr. Philip B. Duffy
President & Executive Director

Here’s a startling finding buried in California’s 4th Climate Assessment, which I recently reviewed for Governor Jerry Brown’s office: the financial cost of meeting California’s ambitious climate mitigation goal is expected to be entirely offset by reduced health care costs associated with improved air quality. The state aims to reduce statewide greenhouse gas emissions 80 percent by 2050 — substituting clean energy sources for fossil fuels accomplishes this and also results in much cleaner air.

This finding suggests that even without taking into account the substantial direct costs of climate change (impacts on extreme weather, wildfire, reduced crop yields, and so on), addressing climate change could pay for itself while improving peoples’ lives through improved health outcomes.

The California example is a projection of the future, and therefore perhaps questionable, but experience close to home shows the same thing. Studies of the Regional Greenhouse Gas Initiative (RGGI)—a cap and trade system on electric power generation in nine northeastern states—have consistently shown positive economic effects throughout the decade that the Initiative has been in place. These benefits include billions of dollars in health care savings resulting from better air quality following reduced burning of fossil fuels.

If this applies generally, its significance would be difficult to overstate. Most obviously, if climate policies truly can have immediate economic benefits, that would transform the political calculus around climate action. Why not take steps to improve the climate if those same steps also help the economy? This idea probably terrifies climate change deniers, who tirelessly promote the narrative that “we can’t afford” to take on climate change (or other environmental challenges).

It is critically important that the economic benefits mentioned above are expected to occur even in the absence of climate action by other jurisdictions. If true generally, this means that regional actors like California have an economic incentive to tackle climate change even if no one else does. This would overturn the key assumption that has framed international climate policy (including the United Nations climate process) for more than 25 years – that we need to all act together, because individual nations would put themselves at an economic disadvantage by acting unilaterally. International climate policy, in other words, is based on the assumption that climate change is a “tragedy of the commons,” a situation where individual users of a common resource (in this case, the atmosphere) are motivated to take actions that harm that resource. It may turn out that this isn’t true after all, because fossil fuel burning is so bad for human health.

China in particular has already realized this, and is acting upon it. An important motivation for their very strong climate policies has been the desire to lessen air pollution, which is estimated to kill 4,000 people per day.

Obviously it’s important to understand how widely these findings apply, and to bring them to the attention of policymakers. These are some of the goals of WHRC’s new collaboration with the Climate Policy Lab at Tufts University, which is one reason why

WHRC is an independent research institute where scientists investigate the causes and effects of climate change to identify and implement opportunities for conservation, restoration and economic development around the world. In June 2017, WHRC was ranked as the top independent climate change think tank in the world for the fourth year in a row. Learn more at www.whrc.org.
International organizations launch initiative to promote natural climate solutions
by Dave McGlinchey

Six leading international organizations—including WHRC—launched an initiative this week calling for concerted action to make better use of forests, soils, and wetlands in addressing climate change.


“There is no feasible way to stay under 2°C of warming without significant removal of CO2 from the atmosphere,” said WHRC President Dr. Phil Duffy. “There is no better technology for large-scale carbon removal, available right now, than natural systems. Science has shown us the scale and potential. Nature4Climate will help national and international climate policy makers to take advantage of this opportunity.”

Last year a prominent study found that the land sector contributes a quarter of total greenhouse gas emissions, but could deliver 37 percent of the greenhouse gas reductions required by 2030 to keep global warming below 2 degrees. WHRC scientists Dr. Richard Houghton and Dr. Jonathan Sanderman were co-authors on the paper. (bit.ly/2mym9tF)

Despite that climate mitigation potential, however, just 38 out of the 160 governments who signed the Paris agreement have specific targets for the sector. Natural climate solutions only receive three percent of public mitigation finance.

“Natural climate solutions are absolutely critical in addressing the climate challenge—and they include strategies that are available today, in every country, ready to be implemented and scaled,” said Mark Tercek, CEO of The Nature Conservancy, in a press release. “Managing land presents a great opportunity: it is one of the most effective, cost-efficient tools we have to slow the runaway effects of climate change.”

The Nature4Climate partners will work over the next five years with national and subnational governments, and with business groups at global and national levels, to increase policy action and investment on natural climate solutions. Their first initiative is to call for commitments from subnational governments and businesses to back the 30X30 Forests, Food and Land Challenge at the Global Climate Action Summit in San Francisco this September.

News Briefs

On June 20, WHRC’s Dr. Linda Deegan delivered a public lecture to 100 attendees about efforts to rehabilitate the Coonamessett River in Falmouth. Deegan, who works in the Arctic and the Amazon, also volunteers for the Coonamessett River Trust. She described the project to return the river to its natural course, remove sand deposited by cranberry farms, remove or improve culverts, and restore native vegetation.

On May 31, Dr. Scott Powell from Montana State University delivered a seminar at WHRC on "Advances in do-it-yourself (DIY) remote sensing." Powell focused on several applications of remote sensing with unmanned aerial systems, including characterizing the ecosystem structure and composition of juniper woodland encroachment into riparian systems in southwest Montana.

The faith and science climate coalition held its second organizational meeting on May 30. The gathering of more than 40 faith leaders and scientists was hosted by Boston College’s Boisi Center for Religion and American Public Life. The initiative was launched, in part, by WHRC President Dr. Phil Duffy. Massachusetts Secretary of Energy and Environment Matthew Beaton addressed the meeting, and discussed the state’s plans for climate mitigation and adaptation.

The Cape Cod Rivers Observatory team repeated a high-resolution assessment of the Santuit River on June 14, taking water samples every 100 meters along its entire length. The first high-res assessment like this one was last fall. River chemistry data are available online at caperivers.org/data.

In Memory

Ola Ullsten, a former member of the WHRC board of directors and a longtime honorary director, passed away on May 2018 in Öja, Sweden. He was 86 years old. The following passage was written by WHRC founder George Woodwell.

Ola, a former prime minister of Sweden, came to us through our international connections and Ola’s long-term interests in environment. Ola maintained a residence in Canada and on Gotland in Sweden, and gravitated naturally to leadership of the World Commission on Forests, which we established and ran in an attempt to call attention to the power of forests in the global carbon cycle. He was a delightful friend and kept us in the forefront on international environmental affairs over many years. He has been less active over recent years as all have moved on, grown older and less willing to travel. We miss him, especially as we watch the trends that concerned us in those years of the nineties and the early years of the new century become crises of the present.
China making progress toward climate goals, international policy expert says

by Dave McGlinchey

China is making significant progress toward achieving emissions reductions targets because senior Chinese government leaders understand the urgency of the threat, an international climate policy expert said this month during a talk at WHRC.

Dr. Kelly Gallagher is the director of the Center for International Environment and Resource Policy at Tufts University. She was also the lead negotiator for the United States during behind-the-scenes climate discussions with China in 2014. That process led to a bilateral climate agreement between China and the United States, the two largest emitters in the world. It also paved the way for the Paris Agreement the following year.

WHRC President Dr. Phil Duffy said that Gallagher is an “unsung hero of international climate policy” and that she deserves as much credit as anyone for the success of the Paris Agreement.

During her appearance at WHRC, Gallagher said the recent U.S. retreat on climate action might have caused China to soften some of their more ambitious goals. According to Gallagher, however, Chinese leadership is extremely concerned about climate impacts – including rising sea levels, shifting precipitation patterns, and thawing permafrost. As a result, she said that China is moving forward aggressively to deploy renewable energy and reforestation projects.

“For anyone wondering if China will actually hit their climate targets, they are very much on their way,” Gallagher said.

That conflicts with the narrative often pushed by the Trump administration, claiming that U.S. involvement in the Paris Climate Agreement places an unfair burden on the United States while China is not required to take any action. When President Trump announced the U.S. withdrawal from the Paris Agreement, he said, “China will be able to increase these emissions by [sic] a staggering number of years, 13. They can do whatever they want for 13 years.”

Trump’s comments were apparently based on a misunderstanding of the Paris Agreement, in which commitments are framed in terms of greenhouse gas emissions in 2030. To meet those targets, of course, requires actions by all nations well in advance of that date.

Gallagher also discussed the challenges of making progress on international climate policy without U.S. government leadership. She said, however, that the newly formed partnership between Tufts and WHRC would provide climate policy expertise and assistance. That partnership was launched in March to help nations develop policies that will meet their Paris Agreement emissions reductions targets.

WHRC in the news

Announcing Nature4Climate. A new initiative from WHRC, The Nature Conservancy, UNDP, World Business Council for Sustainable Development, WRI, and Conservation International, encouraging increased action from governments and businesses to deploy the land sector to address climate change was covered in the EU Reporter, June 20. bit.ly/2tjeHUg

The impact of El Niño drought in the Amazon. Dr. Paulo Brando was quoted in this article from NASA about a novel use of remote sensing technology to study Amazonian drought. June 12. go.nasa.gov/2McbnBs

Scientist Schools Congressmen on Climate. FactCheck.org published an in-depth fact check of the House Committee on Science, Space, & Technology’s hearing on climate change last month. May 25. bit.ly/2I8awiR

Obama’s Science Adviser Blasts Trump Policies and Personnel. WHRC senior advisor Dr. John Holdren’s speech to the American Academy of Political and Social Science was published an in-depth fact check of the House Committee on Science, Space, & Technology’s hearing on climate change last month. May 25. bit.ly/2I8awiR

Climate science covered in religious news outlets. WHRC’s joint-appeal for climate action with faith and science groups in Massachusetts was covered in National Catholic Reporter on May 24 (bit.ly/2MMj1Ug), The Pilot on May 25 (bit.ly/2yxiiHI), Episcopal News Service on May 29 (bit.ly/2MK5UD6), Anglican Communion News Service on May 31 (bit.ly/2tixijn), and others.

Faith leaders and leading scientists issue joint call for climate action. Dr. Phil Duffy’s joint press conference with Cardinal Sean O’Malley and Reverend Mariama White-Hammond was covered by the Boston Globe on May 24 (bit.ly/2Kba2NT) and NPR station WCAI on May 29 (bit.ly/2KdZNZq).

River herring education effort. WHRC research assistant Hillary Sullivan’s presentation to students on the life cycle of river herring was covered in The Wanderer. May 27. bit.ly/2lc7ji2


On climate change solutions. Dr. Max Holmes was featured in this Falmouth Enterprise article on his work to understand the impacts of climate change on rivers around the world. May 25. bit.ly/2MN4eZh

Pushing back on false claims made during the House Science hearing last month. Dr. Phil Duffy’s testimony and the reality of accelerating decay of the Antarctic ice sheet was covered by the Denver Channel. May 24. bit.ly/2I9bDPi

‘A blow to climate science’. Dr. Phil Duffy was quoted in this New York Times article regarding the Trump Administration’s quiet efforts to dismantle a critical climate monitoring program. May 23. nyt.ms/2lljgEC

‘Falling rocks’ continues to make a splash. Dr. Phil Duffy’s exchange with Rep. Mo Brooks on sea level rise during the House Science hearing last month was covered in the National Catholic Reporter. May 22. bit.ly/2Mb3nkD
The populations of some Alaska Native villages could be forced to relocate by climate change impacts, according to WHRC Arctic scientist Sue Natali.

Dr. Natali traveled this month to Kwinhagak and Nunapitchuk in Alaska’s Yukon-Kuskokwim Delta to assess thawing permafrost and help provide data to village leaders who are deciding whether to relocate or not. Natali studies the global impacts of emissions from thawing permafrost, as well as the impacts on local populations. Many Alaska Native villages are built on permafrost, and infrastructure is collapsing as warmer temperatures cause that permafrost to thaw.

Villages are also facing challenges from coastal and river erosion, loss of sea ice, shifting vegetation, as well as sea level rise. The thawed permafrost is eroding into the rivers and ocean, threatening infrastructure and also depositing silt that can prevent supply barges from reaching the villages.

“We are working with the communities to identify their monitoring needs, and provide tools to monitor permafrost thaw,” Natali said. “Every person I talked to over 30 years old had a story about the change that they’ve seen in their lifetimes. Now they are making decisions about whether they should relocate or set up adaptation plans in the current location.”

Kwinhagak is a coastal village with a population of about 700. Nunapitchuk, with a population around 500, is further inland, but is still situated on the delta and the entire community is connected by a boardwalk. The inhabitants of both villages are primarily part of the Yup’ik people.

Natali traveled to the villages with representatives from the Alaska Institute for Justice, as well as officials from the Alaska Division of Geological & Geophysical Surveys.

Last year, the western Alaskan village of Newtok requested federal government assistance to relocate. That community was also built on permafrost, and the thaw has allowed a nearby river to encroach on the village.

Natali said that the community leaders in Kwinhagak and Nunapitchuk need scientific data to convince government agencies that they are facing an emergency situation.

“They know it’s happening,” she said. “But they need the data for policy makers.”

Arctic Great Rivers Observatory marks 15 years

The Arctic is warming faster than any other region of the planet, and this week the Arctic Great Rivers Observatory marked its 15th year of monitoring the consequences of that warming on Arctic rivers and their watersheds.

WHRC scientist and deputy director Dr. Max Holmes and Jim McClelland from the University of Texas Marine Science Institute took the Observatory’s first sample on June 18th 2003 from the Yukon River, at the remote Yupik village of Pilot Station. They both continued on to the Mackenzie River in Canada and the Ob’, Yenisey, Lena, and Kolyma rivers in the Siberian Arctic.

The water samples are analyzed for their chemistry and nutrient composition, providing clues about the health of the watershed, much as a doctor analyzes blood chemistry to gather clues about the health of the patient. Long-term water chemistry analysis at this scale is what makes the Observatory unique, according to Holmes.

“We are looking at the six largest rivers, covering three different countries in a coordinated and long-term effort. Nobody else is doing that,” said Holmes.

Working with government agencies across Alaska, Canada, and Russia, Holmes developed a standardized sampling method to ensure the generation of reliable river chemistry data. The publicly available dataset is available here.

In addition to the chemical signature, Holmes and his team also investigate river discharge - the volume of water that flows out of a river. What they are seeing is worrying. River discharge is increasing in Arctic rivers, a sign of rapid warming driven by climate change.

“Climate change is their dominant threat,” Holmes said. “The Kolyma River’s watershed, for example, is 100 percent continuous permafrost. And so our long term data collection becomes more and more valuable with time. We are establishing a critical baseline against which we can detect changes that happen far away in the Arctic but which are globally significant.”

The work, which began 15 years ago, continues today on all six rivers. Next week, Holmes and McClelland and will return to the Yukon at Pilot Station, this time accompanied by WHRC research assistant Anya Suslova.
Staff Picks!
Books and movies our staff members highlighted as generating important insight into their work, the world around them, or both.

**The Game Changers**
gamechangersmovie.com
*The Game Changers* is a movie about benefits of plant-based diet. It is a story about elite special forces trainer James Wilks’s search for optimal diet for maximum athletic performance and fastest recovery. After an injury he did a lot of scientific reading about benefits of vegan diet. It completely transformed his view on health and diet. In the movie he travels to interview world-class athletes that are totally fueled by plants. The movie features some strongest, fastest people on earth and breaks myths about meat and masculinity. – Research Assistant Anya Suslova

**King Corn**
kingcorn.net
This documentary offers a fun and enlightening look into the current state of American corn production and how we got here. It entices us to think critically about what our food is made of, where it comes from, and what the implications are of our daily food choices. – Research Assistant Seth Gorelik

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**Study suggests future irrigation for Brazilian agriculture could push water use to unsustainable levels**
*By Connor Murphy*

According to a recent study conducted in the tropical Xingu Basin of Mato Grosso, Brazil, the agricultural sector is the largest regional consumer of water despite a minimal amount going to irrigate cropland and pastures.

Most of the agricultural water use comes from cattle ranching, which uses over 11 times more water than the local population of Mato Grosso.

WHRC scientist Dr. Michael Coe, who was the paper’s second author, noted that agricultural water usage in the region could climb. With Brazil’s announced goal of doubling crop yields by 2030, irrigation systems will likely be employed more in the coming years.

“Ideally, there are two crops per year - soy and corn,” Coe said. “Farmers will want to guarantee the harvest despite highly variable growing seasons, so increased irrigation is something we could see occurring in the region.”

This is a concern, considering the study’s suggestion that increased use of irrigation—along with deforestation and increased cattle ranching—could push water use to unsustainable levels in the future.

The study, published by the Multidisciplinary Digital Publishing Institute and led by Ph.D candidate Michael Lathuilliere of the University of British Columbia, used observations of annual changes to water usage, deforestation, and effects of climate change to predict future levels of water usage.

Coe’s primary role in the study was to project the effects of climate change on regional water usage into 2030 and beyond. He did so along with WHRC scientist Dr. Andrea Castanho, who was the paper’s third author.

Fortunately, the goal of doubling agricultural productivity in Brazil is parallel to another: reforesting 22 million hectares of climate-proof landscapes. While it’s a lofty goal, Coe believes it is achievable.

“There’s not another tropical nation close to the position that Brazil is in with respect to monitoring and enforcing policies in land use,” Coe said. Farmers in Brazil are required to fill out permits specifying how they intend to use land. Satellite imagery allows law enforcement to ensure that land is being used as permitted.

Coe suggested that conservation of tropical rainforests in Brazil must include a dialogue with the agricultural industry in order to create meaningful progress.

“We realized when we got into this fifteen years ago that we weren’t getting where we wanted without working with agriculture - it wasn’t going to happen,” Coe said. “What we were not going to do is say [to farmers] that you can’t grow your crops.”

Agriculture is a critical source of income for the population of Mato Grosso. Over the past 20 years, the expansion of agriculture has funded infrastructure development that now supports three million people.

According to Coe, conservationists must account for growing agriculture, as its water use seems likely to increase.

“Telling people not to farm is a non-starter for productive conversation,” he said. “We have a goal: end deforestation. We know in Brazil that means also finding a way for agricultural production to increase. We have to do this.”
Heading upriver on the Santuit in Mashpee, Cape Cod.