



Photo: Eleanor Steinhagen

Launching K-12 Climate Science Literacy to Scale in Washington State

Abby Ruskey

Washington teachers and specialists in climate literacy, tribal ecological knowledge, Next Generation Science Standards, assessment, and project-based curriculum development celebrate progress in Olympia.



As the sine die gavel pounded the dias March 8, 2018, it signified the conclusion of the Washington State Legislature’s biennial short session and a nationally historic first for climate science literacy. On this day, the state of Washington allocated \$4 million for climate science learning.

In the following six months, the nine-line budget proviso became an active network of 16 formal and informal education partnerships piloting climate learning in K-12 schools across the state. By October 2018, students from Chewelah School District in northeastern Washington had presented [their initial](#)

[learnings to an international gathering of educators in Spokane](#). Among many findings, the Chewelah fifth-graders discovered that \$499 in food was being wasted daily across their small Northeastern rural school district, not to mention the impact this waste was having on greenhouse gas emissions, water, and energy consumption. Upon hearing the student’s presentation, the director of a statewide education association commented that the annual savings could pay for an extra teacher!

The example above is just one snapshot of education innovation taking root across the state of Washington. Now known as ClimeTime, a network of education leaders has developed Next Generation

Science Standards (NGSS) aligned curriculum prototypes, teacher professional development, and assessment tools for thousands of K-12 students and their communities. The ClimeTime initiative is a solid first step in the 2018 – 2019 school year toward the goal of providing every Washington teacher and student with applied climate science learning, benefiting families, businesses, and communities across the state. As a case study for those in and beyond Washington, it illustrates how we can shift from [incremental to exponential action](#), especially in light of the [October 2018 report](#) by the Intergovernmental Panel on Climate Change that greenhouse gas emissions must be halved by 2030. This is a clear, compelling, and quantifiable goal that

the Washington State ClimeTime initiative addresses and one that opens up a world of possibilities for education leaders and students everywhere.

Washington’s Trail-Blazing Efforts

Washington State has a history of environmental and sustainability education “firsts.”

- Starting in the 1940s, Camp Waskowitz in the Highline School District was an early, if not the first, residential outdoor center to provide teacher professional development.
- Washington’s Office of Superintendent of Public Instruction (OSPI) ratified one of the

first Environmental Education Guidelines in 1970 and then updated them in 2009 as the country's first [Integrated Environmental and Sustainability Education \(ESE\) Standards](#).

- In 1984, conservation and environmental education was [legally mandated as an area of study](#) in the state.
- In 2007, the Washington Professional Education Standards Board (PESB) approved a [standard for accredited teacher education programs](#) that requires teacher candidates to design instruction for students to “be responsible citizens for an environmentally sustainable, globally interconnected, and diverse society.” In 2009, the PESB passed the nation's first [ESE Teacher Specialty Endorsement](#).
- In 2011, Washington was among the first states to create an [Environmental and Sustainability Literacy Plan](#) and led in the development of a Green Sustainable Design and Technology Course, both approved by the State Superintendent of Public Instruction.
- In 2015, Washington passed legislation requiring that tribal sovereignty—now known as [Since Time Immemorial curriculum](#)—be taught in all common schools.

With this foundation and a collaborative network of innovative ESE organizations, programs, and people, a natural next step was to pursue statewide K-12 climate literacy. These efforts were reinforced at the highest level when Governor Jay Inslee publicly signaled his concern that Washington students lacked an understanding of basic scientific concepts underlying climate science. As author of the book, *Apollo's Fire: Igniting America's Clean Energy Economy*, and a long-time clean energy advocate in the U.S. Congress (1999 – 2012) and as governor (2013 – current), Inslee is one of the nation's foremost policy authorities on clean energy climate solutions. Said Inslee, “We're the first generation to feel the sting of climate change and we are the last to be able to do something about it” (Berton, 2015).

Following his statewide tour and town hall gatherings, Governor Inslee was keen to increase

teacher's capacity to engage students in science learning using NGSS and advance key climate change and clean energy related policies, among other priorities. Fortunately, the state revenue forecast for 2018 – 2019 provided a surplus to work with.

With the Governor's indication of his resolve to address gaps in science comprehension and improve science teacher preparation, education, tribal, business, and community leaders jumped into action. [E3 Washington](#), the state environmental and sustainability education association, coalesced a series of stakeholder meetings. Meanwhile, the [Association of Education Service Districts \(AESD\)](#) also mobilized, seeing promise in community partnerships for teacher science professional development, student achievement, and career connected learning through climate literacy. When these two networks, along with OSPI and the Governor's policy office, put their aspirations and strategies together, the result was a \$6.5 million climate science budget proviso built by some of the most credible voices in education and learning. The proviso specified grants to school districts to work with informal learning centers and engage teachers across all grade bands, and for statewide coordination.

The partners next coordinated an event in February 2018 on the capitol campus during the [STEM Innovation Alliance](#) meeting. At this meeting business and education leaders, legislators, and legislative staff were treated to presentations from students, teachers, and their business and tribal partners about the power of environmental and climate science learning.

Moving through the state budget process, the Governor's proviso was eliminated in the House Appropriations Committee and reduced to \$4 million in the Senate Ways and Means Committee, as budgetary priorities competed. In response, [E3 Washington](#), [AESD](#), the [Pacific Education Institute](#), [IslandWood](#), and others exerted constituent pressure through emails, [blogs](#), phone calls, and appointments with legislators on budget committees. When the final budget was hashed out in conference, the following was retained thanks to the timely efforts of the partnership and supportive legislators, primarily

Senators Rolfes and Ranker, and Representatives Ormsby, Lytton, Doglio, and Dolan.

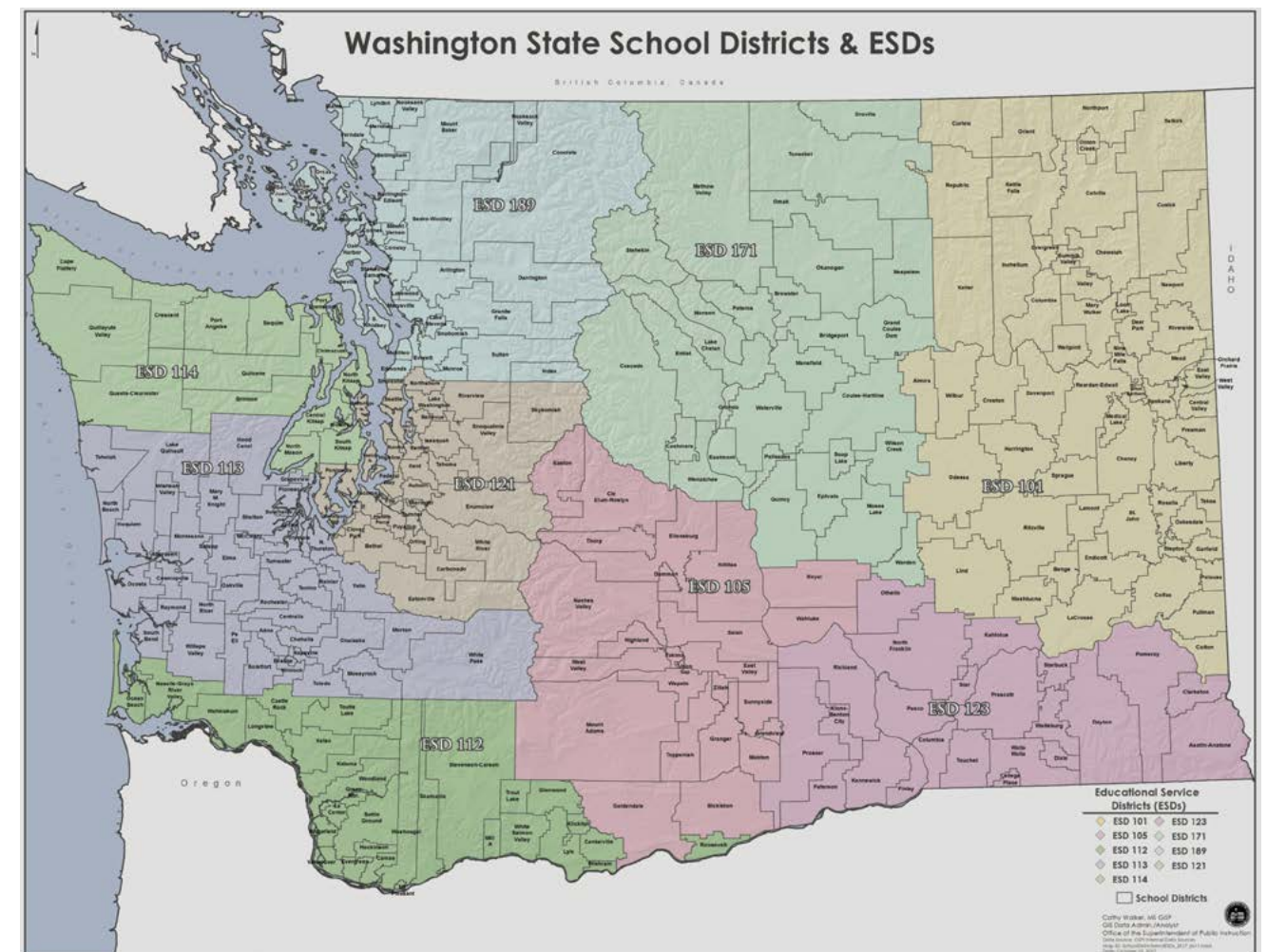
(68) \$4,000,000 of the general fund—state appropriation for fiscal year 2019 is provided solely for the office of the superintendent of public instruction to provide grants to school districts and educational service districts for science teacher training in the next generation science standards including training in the climate science standards. At a minimum, school districts shall ensure that teachers in one grade level in each elementary, middle, and high school participate in this science training. Of the amount appropriated \$1,000,000 is provided solely for community-based nonprofits to partner with public schools for next generation science standards. (Washington State Engrossed Senate Substitute Bill 6032, as Amended by the Conference Committee (State Budget), 65th Legislature, 2018 Regular Session)

Stated Dr. Gene Sharratt, Executive Director of AESD, “Based on the strength of our combined networks,

we have great potential to perform in 2018 – 2019 and expand consistent, year-to-year climate science professional development for our entire science teacher corps. This will result in K-12 students in every community excelling in science and will prove to be the very foundation on which Washington's successful transformation into a clean energy economic powerhouse will take place” (Sharratt, 2018).

From Statehouse to Schoolhouse in Six Months

Initial activities to implement the first phase of Washington's \$4 million climate science literacy program have been efficient and far-reaching. Under the leadership of State Superintendent Chris Reykdal and Dr. Ellen Ebert, OSPI Director, Learning and Teaching Science, a [two pronged proposal and budget submission process](#) was generated for all nine education service districts (ESDs) along with a competitive grant process for community-based organizations (CBOs) across the state.



Washington State's 295 school districts and the nine ESDs that serve them.

Source: Washington State Office of Superintendent of Public Instruction

The speed of project start-up matched the urgency of the issue. State funding was achieved in March 2018 and transformed into a grant program by OSPI by May. Teams of CBOs, ESDs, and their partners developed proposals from May – June 2018 that involved expanded partnerships and focused priorities, including access and inclusion as required in the request for proposals:

Priority focus must be given to comprehensive and targeted comprehensive schools, and communities historically underserved by science education. These communities can include but are not limited to Tribal Nations (including Tribal Compact Schools), Migrant students, schools with high free and reduced lunch populations, rural and remote schools, students in alternative learning environments, students of color, English Language Learner students, and students receiving special education services (OSPI, 2018).

Sixteen grantees were selected by OSPI in June and activated in summer 2018 through curriculum design and professional development, leading to student learning and assessment to be completed during the 2018 – 2019 school year.

While time-efficient and equitable, the ClimeTime project is also innovative and rigorous. A high caliber team from OSPI and the [University of Washington's Institute for Science and Mathematics](#) brought together the nine ESDs and seven CBOs selected in early July to launch all 16 projects as a networked, statewide climate science leadership community. During the two-day launch, project leaders were given time to share and network and were supported to strengthen their use of NGSS-3D strategies (Practice, Cross-Cutting Concepts, and Disciplinary Core Ideas) and the incorporation of formative assessment tools. Additionally, pedagogy and content professional development were provided in areas such as tribal ecological knowledge and place-based learning, anchoring phenomena, and current climate solutions and climate education clearinghouses (e.g., [Drawdown](#) and [The Climate Literacy and Energy Awareness Network](#)). [STEM teaching and assessment tools](#), Open Educational Resources guidelines, and other pertinent information were also shared.

The seven ClimeTime CBOs selected for 2018 – 2019 by OSPI include [Cascadia Conservation District](#), [IslandWood](#), [Pacific Education Institute](#), [Padilla Bay National Estuary](#), [Nooksack Salmon Enhancement Association](#), [Snohomish Conservation District](#), and [Washington Green Schools](#).

These CBOs are dedicated educational hubs for a wide range of informal learning resources beyond their own organization and within their service area. They research, vet, and broker resources on behalf of individual teachers, schools, and school districts with whom they have built ongoing working relationships. All have a successful track record of providing quality teacher professional development and K-12 student learning and curriculum that correlates with state standards.

An OSPI – ClimeTime webpage, to be launched in 2019, will share information about ClimeTime and all 16 CBO and ESD grantees' activities.

According to ClimeTime project lead, Dr. Ellen Ebert, "To leverage the scale of teacher and student science learning needed today for a green economy and climate stabilized future tomorrow, we are tapping into the wealth of teaching, learning, assessment, and evaluation resources across Washington State including environmental and sustainability informal learning organizations, ESDs, Tribes, University of Washington's Education Department, STEM Innovation Alliance members, practicing scientists in diverse communities and professions, and many more" (Ebert, 2018).

Cutting-Edge Assessment for High-Impact Learning

Because assessment is a leading driver of K-12 curriculum and student and teacher learning, team leads from all 16 ClimeTime initiatives convened at the University of Washington in late August 2018 to learn and apply NGSS related tools. Cross-initiative groups led by Dr. Phillip Bell and Dr. Deb Morrison worked for two days to co-design initial learner assessment tasks and measures for student and teacher learning that can be shared across the 16 initiatives and beyond. Washington's ClimeTime

project benefits from intersecting with state-of-the-art education and learning and assessment networks nationally through OSPI and the University of Washington's Institute for Science and Math.

NGSS assessments are three-dimensional and based on item clusters that attempt to emphasize student interest and relevance. State-of-the-art learning research and tools are being utilized across the 16 initiatives as they design curriculum, train teachers, and measure teacher and student interdisciplinary learning. Reflection, dialogue, expression, and presentation are among the many methods available to measure learning. Formative probes adjust teaching in real-time. And for program consistency, the ClimeTime project assessment approach prioritizes inclusion and equity issues across diverse student and teacher cohorts.

Ultimately, projects in the ClimeTime network are challenged to measure the results of student field-based learning and projects on greenhouse gas emissions and carbon sequestration as well as other community-based environmental, economic, and

social impacts. Through citizen science, students will increasingly be able to collect and contribute data and utilize tools and datasets, such as [Google's new tool for measuring emissions across the globe](#), to learn about climate change and design and measure climate solutions.

Informal and Community-Based Local Resources and Phenomena for Science Learning

Natural phenomena are observable events that science attempts to explain or predict. With an understanding of local phenomena, students have the basis to design solutions using multiple disciplines, most commonly science and engineering. Observable phenomena may be an increase in algae blooms, a decline in bee populations, or record heat, fire, and flood events. There is no limit to the number of climate change associated phenomena in any given community. And there is usually at least one locally-based organization, agency, tribe, college, university, or business that will have in-house expertise, equipment, and field-based learning locations, along with years of institutional and cultural



Governor Inslee met with climate literacy partners including 30 representatives from the state's Office of Superintendent of Public Instruction, E3 Washington, Association of Educational Service Districts, Suquamish Tribe, Climate Solutions, Pacific Education Institute, Western Washington University, Antioch University, Washington STEM, U.S. Partnership for Education for Sustainable Development, and Campaign for Environmental Literacy.

Photo: Paul Williams

records and stories, to engage student science learning around identified phenomena.

Across Washington, as is the case in other states and geographies at this scale, there are endless classrooms-without-walls and scientists addressing climate change impacts and solutions. In Washington, these include forest health and wildfire management, regenerative agriculture, carbon

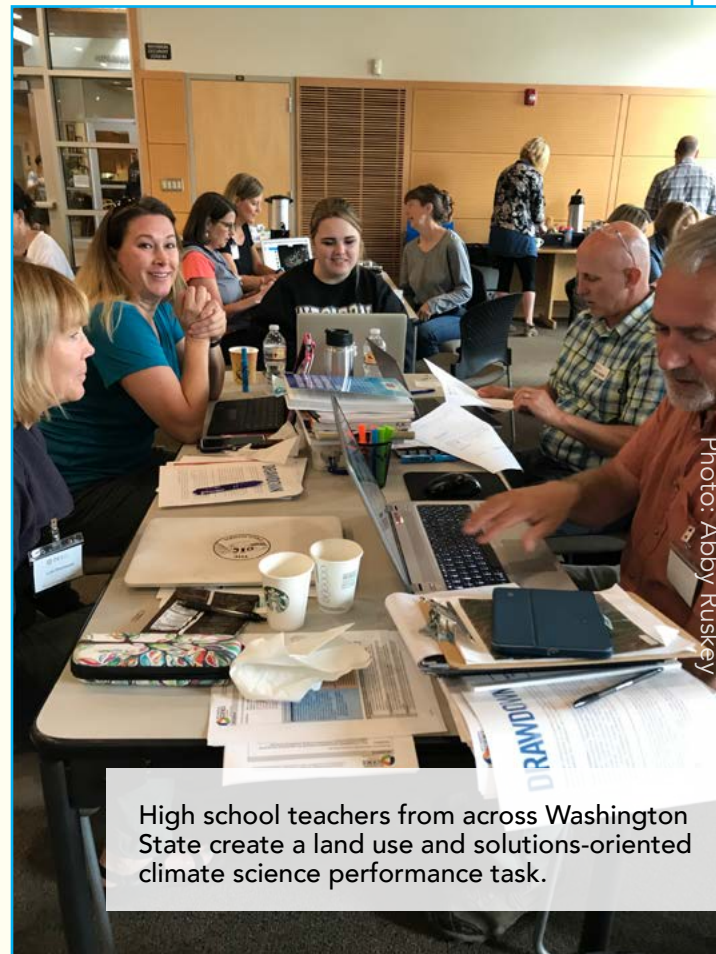
sequestration, watershed and ocean-estuary health, energy conservation, clean-renewable electricity, transportation, and building and manufacturing technologies. OSPI's grant guidelines ensured that all 16 ClimeTime projects start and/or strengthen the relationship between ESDs, school districts, and informal education organizations, setting the stage for unleashing K-12 science learning resources and opportunities as never before imagined.

A Deeper Dive into One Project

The Pacific Education Institute's Locally Relevant 3-D Climate Science for Drawdown is one of the 16 ClimeTime network projects. Partnering with Project Drawdown, OSPI's Office of Native Education, Braided Education Consulting, the Suquamish and Muckleshoot Tribes, five ESDs, and multiple schools and school districts across Washington, the Pacific Education Institute is creating a new "solutions-oriented" methodology for student learning and teacher instructional practice in climate science.

Pacific Education Institute first convened a design team – half of whom are indigenous traditional ecological knowledge (TEK) educators and the other half being formal education and climate literacy specialists – to craft a template weaving together NGSS, TEK, Drawdown solutions, place-based learning, and formative assessment strategies. Twenty-seven educators used the template during summer 2018 to develop standards-aligned, Solutions Oriented Learning tasks for students. These tasks will be tested by teachers and students in the classroom during the 2018 – 2019 school year. The project will involve additional teachers to utilize the tasks in spring 2019, and in June up to 30 tribes in the indigenous educator network will send teachers to develop additional tasks unique to tribal needs.

The work will contribute to a statewide system of climate science education resources for educators. Pacific Education Institute's Executive Director, Kathryn Kurtz said, "If we do this right, if we include all teachers and all students in the schools and districts where we work, we will see students raising their voices to speak about their personal accomplishments to drawdown greenhouse gases and inform their communities about climate solutions" (Kurtz, 2018).



High school teachers from across Washington State create a land use and solutions-oriented climate science performance task.

In addition, the seven ClimeTime CBOs and nine ESDs are directly partnering with additional CBOs, tribes, networks, universities, and agencies across the state. These include the Suquamish, Spokane, and Muckleshoot Tribes; RE Sources for Sustainable Communities; Common Threads; Garden of the Salish Sea; Wild Whatcom; North Cascades Institute; University of Washington Climate Impacts Group; Yakima Valley Technical College MESA; Pacific Northwest National Laboratory; NGSS-STEM Leadership Network; and Washington Leadership & Assistance for Science Education Reform (LASER). This is just the beginning of a comprehensive listing of informal or community-based learning resources for climate literacy that can be expanded significantly and linked to school-based learning across the state.

Success Inspires Success: Education for a Green Economy

Coming on the heels of the successful launch of the ClimeTime initiative, Washington State's Employment Security Department announced funding in October 2018 for "Educating for a Green Economy" (EGE), a pilot project to link green economy workforce development needs with preK-16 educational pathways. The EGE initiative is committed to inclusive programming for underserved audiences under the Workforce Innovation and Opportunities Act. Led by E3 Washington and the Pacific Education Institute, EGE coordinates with OSPI and brings together environmental educators; employers seeking student interns for green jobs; and K-12, career and technical college, and four-year post-secondary educators. Sharing her excitement, Lisa Eschenbach, E3 Washington's EGE Project Director stated, "In the next year we will create an advisory panel, research high demand green jobs, convene regional gatherings for locally relevant approaches, and support students to present related projects of excellence" (Eschenbach, 2018).

Next Up: Policy and Partnerships to Scale Climate Science Literacy

'Our highest intention is that young people see themselves as knowers of critical climate science concepts and as solvers of important problems within their own and the wider community.' (OSPI Draft

Report to Governor Inslee regarding status of Climate Science Literacy, August 2, 2018)

Washington State has 1.1 million K-12 students, 64,323 teachers, approximately 2,500 schools, and 295 school districts. Upward of 5,000 teachers will receive professional development and assessment support to teach and measure climate science learning in their classrooms through ClimeTime in 2018 – 2019. Scaling ClimeTime, EGE, and related programs will entail a series of bold and strategic steps for those of us in Washington.

The first step is for climate science learning to be legally mandated by incorporating it into the Washington Administrative Code specifying it as a mandatory area of study in Washington schools.

The second step entails a review and revision of all related Washington State policies, requirements, guidelines, programs, and funding that can be linked, updated, and fortified with K-12 climate science literacy.

Third, policy and financial mechanisms are needed to increase the current budget allocation for the ClimeTime program from \$4 million to \$50 - \$75 million per year to reach all Washington teachers, students, families, and communities with quality NGSS-aligned climate science learning. While just a drop in the bucket of the \$23.5 billion that the state spends on K-12 education, the \$50 - \$75 million needed to scale ClimeTime could include matching investments from stakeholders needing an educated and trained workforce. The green building, clean energy, low-carbon agriculture, waste management, and transportation industries are partners and likely investors, as well as those directly experiencing the impacts of climate destabilization such as Tribes and the insurance, health services, forestry, and aquaculture industries.

Fourth, to successfully scale ClimeTime and related education and training programs, environmental and sustainability education stakeholders need to strengthen and enlarge the climate literacy coalition into a formidable force that can secure and retain climate science policies and funding year-to-year. This can be modeled on coalitions like the



Photo: Lisa Eschenbach

Students present their climate science projects to Washington industry, education, tribal, and governmental leaders, including Governor Inslee and State Superintendent Chris Reykdal, at the Governor's STEM Innovation Alliance meeting at the state capitol on February 14, 2018.

[Washington Wildlife and Recreation Coalition](#), which secured \$80 million for projects in 2017 – 2019.

For those inside and outside of Washington, this case study is intended to spur ideas, inspiration, replication, and feedback. In your journey, you may wish to consider the following:

Don't wait, do it today.

Is there a known or potential climate science champion in your state, province, or other jurisdiction responsible for setting education policy and providing public funding? Who might you share this article with to spur attention and action for climate science literacy? You will be surprised at how far you can get given the political momentum that is rapidly growing for the [Green New Deal](#), a system of climate literacy and solutions that are locally meaningful.

Do your homework.

What environmental and sustainability education, green schools, career and tech education, STEM and related policy, guidelines, standards, endorsement,

and program milestones are in place where you are? What are the values that hold strong in the population there and what can you leverage that is unique to your context?

Hold to your vision and speak from your heart as well as your head.

Educators and education stakeholders can relay story upon story of why there is no better investment for our children and future generations than environmental, sustainability, and climate literacy. Find all the ways you, your students, and partners can express those stories to those who have the power to make a BIG difference. Then provide them with a concept of the policies, programs, and funding needed.

Closing Thoughts

The “sweet spot” for climate solutions and the emerging regenerative, life-enhancing economy is rooted in communities and neighborhoods where schools and colleges are the heart of change alongside other local institutions such as businesses,

libraries, and community and environmental centers (Bhowmik et al., 2018). As the first state-funded and coordinated climate science literacy program, ClimeTime is working to ensure educational rigor and student academic success while pushing pedagogical boundaries for teachers and students to be central actors in what indigenous science scholar Megan Bang calls “place-making” (Bang and Vassoughi, 2016).

A future where all students understand the principles of the Earth's climate system and the land and other local natural resources that sustain their bodies, minds, and spirits—and where they can communicate about climate change impacts and solutions in a meaningful and localized way—simply cannot unfold without a full-scale climate science literacy

policy effort and resulting funding and programs. ClimeTime is the beginning of such an endeavor in Washington and once it and other initiatives like it elsewhere take flight, students, families, neighborhoods, businesses, and communities everywhere will be better prepared and resilient in the face of climate impacts.

Governor Inslee's statement, that we are the last generation to do something about climate change, is our “call to arms.” Clean energy systems, carbon taxes, and other technologies and policies alone will not get the job done. Indeed, the hour to unleash the power of climate science learning for this and future generations is finally here, and it rests squarely in our hands. What is your next step?

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