



**THE IMPACTS OF THE COVID-19
PANDEMIC ON SUSTAINABILITY AND
ENVIRONMENTAL LITERACY
IN CALIFORNIA
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INTRODUCTION

The COVID-19 pandemic has brought profound change to every aspect of life in California and around the world. Now, after more than two years of disruption and loss, we are at an inflection point as the world seeks to move beyond the pandemic and return to some semblance of pre-crisis “normal.” However, the pre-COVID world was on a precarious and unsustainable trajectory marked by multiple and converging global crises including climate change, global warming, loss of biodiversity, and rising racial and socioeconomic inequalities (Steffen et al. 2015; IPBES 2019; Leach et al. 2021). The COVID-19 crisis highlighted the interdependence of human social systems and natural systems and exposed and exacerbated socioeconomic inequities, underscoring the urgent need to forge a more just and sustainable path forward (Kauko et al. 2021).

Although the pandemic has had multiple and profound negative effects on human societies and the environment, it has also furnished opportunities for resilience, innovation and massive collective action (de León 2021). As author Arundhati Roy noted, pandemics have historically “forced humans to break with the past and imagine their world anew.” She describes the current pandemic as a portal to the future that offers a pivotal choice: “We can choose to walk through it, dragging the carcasses of our prejudice and hatred, our avarice, our data banks,

and dead ideas, our dead rivers and smoky skies behind us. Or we can walk through lightly, with little luggage, ready to imagine another world. And ready to fight for it” (Roy 2021).

“Building better forward” will require paradigm-shifting changes in the ways that we interact with nature and with one another (de León 2021; Erdelen et al. 2021). Education at all levels is widely acknowledged as a key driver of positive social transformation (UNESCO 2016; Ramanathan et al. 2019; Reid et al. 2021) and “because effective paradigm shifts require engaging all different levers for change, including policy, behavior, and mindset, the PK-12 education system has a high amount of leverage (and some would argue responsibility) to catalyze change” (Yeghoian 2021). California, which serves more than 5.8 million PK-12 public school students, supported by over 300,000 teachers—and nearly 500,000 students in the California State University system—is well positioned to lead an education-driven change toward more sustainable ways of living within the boundaries of a finite planet.

As a place of unparalleled natural beauty and abundant nature-provided resources, California has long been a leader in environmental policy and education (CDE 2015; Vogel 2018). Since the 1970s, school instructional materials have been required to





address the importance of environmental protection and to portray humans as a part of the natural world. The state's pioneering and ongoing work to foster environmental literacy among all of California's students provides a model for infusing coherent, standards-based sustainability and environmental education across the PK-16 educational system (CDE 2015).

The purpose of this report is to survey the impacts of COVID-19 on sustainability and environmental literacy in California and beyond, to summarize progress made despite the pandemic, and to provide resources and recommendations for moving forward. Moreover, it is aimed at PK-12 teachers, higher education faculty, school and university administrators, policymakers, nonprofits, and other community organizers.

An environmentally literate person has the capacity to act individually and with others to support ecologically sound, economically prosperous, and equitable communities for present and future generations. Through lived experiences and education programs that include classroom-based lessons, experiential education, and outdoor learning, students will become environmentally literate, developing the knowledge, skills, and understanding of environmental principles to analyze environmental issues and make informed decisions.

—A Blueprint for Environmental Literacy (CDE 2015)

CONVERGING PLANETARY CRISES

The World Health Organization's declaration of a global pandemic in March 2020 was preceded by decades of growing evidence that human actions are having unprecedented and accelerating impacts on the natural systems that support all life on Earth (Griggs et al. 2013; Steffen et al. 2015; IPBES 2019). With increasing urgency, scientists have repeatedly warned that we are exceeding planetary limits and risking irreversible harm to ecosystems (Ripple et al. 2017, 2021; Reid et al. 2021). In fact, zoonotic diseases like COVID-19, which are transmitted between humans and animals, are an expected outcome of human infringement on natural ecosystems (Servant-Miklos 2022). So pervasive are human impacts on the Earth system that many scientists believe we have entered the Anthropocene, a new geological epoch in which human activities are a planet-changing force (Crutzen 2002; UNDP 2020).

For the first time in our long, more than 200,000-year relationship, instead of the planet shaping humans, humans are shaping the planet.

—UNDP 2020

Intersecting crises in the Anthropocene, including climate change, pollution, water scarcity, and biodiversity loss, threaten the current and future health and well-being of both people and the planet.

There are, however, stark divides between those who bear the most responsibility for environmental degradation and those who suffer most from its effects (Asayama et al. 2021). The pandemic has exposed and, in some cases, magnified “preexisting social inequalities and fragilities in socio-ecological systems that support health and well-being, food, sustainable livelihoods, resilient ecologies, resource

access, employment, trade, finance, inclusive governance, citizen rights and more” (Leach et al. 2021). Dangerous planetary change and pervasive and widening social imbalances amplify and exacerbate one another and threaten the health of closely intertwined natural and human systems, now and in the future (UNDP 2020, 2022).

While the unprecedented turmoil of the pandemic has captured the world's attention, preexisting socioecological crises continue (UNDP 2020; Leach et al. 2021). Human impact on the Earth system continues to accelerate: “In 2020 the human-made mass overtook the total living biomass on Earth, and at current rates of growth, it is expected to double over the next two decades” (UNDP 2022, p. 45). A major message of the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, issued in three parts from August 2021 to April 2022 (IPCC 2022), is that while we may still have time to limit catastrophic climate change, the window of opportunity is rapidly closing. In a video statement in response to the latest report in spring 2022, United Nations Secretary-General António Guterres remarked:

The jury has reached a verdict. And it is damning... This report of the Intergovernmental Panel on Climate Change is a litany of broken climate promises. It is a file of shame, cataloging the empty pledges that put us firmly on track toward an unlivable world. We are on a fast track to climate disaster.

—United Nations 2022

The idea that human and planetary well-being are inextricably intertwined, and that a more equitable and sustainable future must be achieved within planetary boundaries is at the heart of the Sustainable Development Goals (SDGs), adopted in 2015 as part of “Transforming Our World: the 2030 Agenda for Sustainable Development” (Fig. 1; United Nations 2015a). The SDGs provide a blueprint for a more equitable and sustainable world and “recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth—all while tackling climate change and working to preserve our oceans and forests” (UNDESA 2022). These 17 goals and their accompanying targets stand at the intersection of natural and human systems—each struggling to thrive in a constantly changing world and seeking long-term sustainability.

The SDGs weave together the environmental and socioeconomic dimensions of sustainability and highlight the need for a holistic approach that protects planetary health and “leaves no one behind.” They also provide a framework for directing recovery from the COVID-19 crisis toward more sustainable and just pathways (Kharas and McArthur 2020).

The Paris Climate Agreement (United Nations 2015b)—adopted just a few weeks after the 2030 Agenda for Sustainable Development—serves as a well-aligned partner to the UN Sustainable Development Goals to address issues related to social, environmental, and economic stability. So too do California’s environmental literacy initiatives, especially the State Board of Education-adopted Environmental Principles and Concepts (EP&Cs), align with this international urgent call for action. They also help to translate global goals, which may seem remote to learners in California, into local contexts (de Paula 2021).



Figure 1. The 17 United Nations Sustainable Development Goals UNDESA (2022).

IMPACTS OF THE COVID-19 PANDEMIC

GLOBAL IMPACTS

The spread of the COVID-19 virus, combined with the swift and drastic measures taken to contain it, have wreaked havoc at scales from local to global and across all aspects of life (de León et al. 2021; Doi et al. 2022). In addition to its direct impacts on mortality and health, the economic consequences of lockdowns and other measures designed to combat the spread of the disease will continue to have significant repercussions on the world’s intertwined social, political, and economic systems (Khalifa et al. 2021; de León, et al. 2021; Doi et al. 2022).

The pandemic has had both negative and positive consequences in California and beyond, some of which are summarized in Figure 2. It will take years or even decades to fully comprehend the longer-term effects of the COVID-19 pandemic (Diffenbaugh 2022; European Environment Agency 2022). Initial studies reveal that the pandemic is impeding progress toward achieving the Sustainable Development Goals and has, in some instances, reversed years of progress (UNEP 2021). For example, the pandemic brought the first increase in global poverty in more than 20 years by pushing an estimated 70 million more people into extreme poverty in 2020 (UNEP 2021). Importantly, a list of pandemic impacts (Fig. 2) obscures the reality that although everyone has experienced the effects of COVID-19, not everyone has been equally affected (Leach et al. 2021). The coronavirus has disproportionately affected the world’s most vulnerable people, including racial minorities, temporary migrant workers, the homeless, the disabled, and people living in poverty (Asayama et al. 2021; Leach et al. 2021).

The negative effects of the pandemic on human social systems include loss of life, erosion of physical and mental health, job loss, and unprecedented disruption of education. The COVID-19 crisis has also intersected with the climate emergency to further compound inequalities, as those most affected by the virus were often already struggling to cope with extreme weather, drought, fires, and other effects of climate change (Mattar et al. 2021).

The United Nations has called the COVID-19 pandemic “the largest disruption of education systems in history, affecting nearly 1.6 billion learners in more than 190 countries and all continents. Closures of schools and other learning spaces have impacted 94 percent of the world’s student population, up to 99 percent in low and lower-middle-income countries” (UNSDG 2020). Although educational leaders quickly adopted remote learning plans, many of the world’s children and youth face challenges in accessing the internet, and some poorer households may lack personal computers or other communication technologies such as TV or radio (Avanesian et al. 2021).

POSITIVE IMPACTS	NEGATIVE IMPACTS
<p>Human Systems</p> <ul style="list-style-type: none"> • Innovations in online pedagogy • More time with family • Increased safety net in some places due to government assistance, stimulus packages, augmented health care access, etc • Enhanced appreciation for nature 	<p>Human Systems</p> <ul style="list-style-type: none"> • More than 6 million deaths • Economic shutdown • Increased unemployment • School closures • Shift to online instruction/digital divide • Social isolation • Mental health issues
<p>Natural Systems</p> <ul style="list-style-type: none"> • Less pollution • Lowered greenhouse gas emissions • Less noise • Wildlife resurgence 	<p>Natural Systems</p> <ul style="list-style-type: none"> • Increased plastic waste from masks, etc. • Distraction from climate change action • Stalled conservation efforts

Figure 2. A partial list of positive and negative effects of the COVID-19 pandemic. Sources of information: de León, et al., 2021; Khalifa et al., 2021; Doi et al. 2022.



Further, school closures, isolation, and other pandemic stressors severely impacted students' mental and physical health (Khalifa 2021; Butler 2022). Although the pandemic's negative impacts on education have been staggering, it has also "triggered mass innovation that grew flexible learning modalities and pathways that can be built upon in future sector plans to make education systems more resilient" (Lennox et al. 2021, p.1).

Positive socioeconomic consequences of the pandemic include more time spent with family, more flexible work schedules for some, an increased appreciation for nature, and educational innovations that may ultimately contribute to more equitable teaching and learning.

The pandemic has affected the natural environment, although the positive impacts have been largely short-lived (de León 2021; Doi et al. 2022). Early in the pandemic, restrictions in transportation and

shipping led fuel consumption and nitrogen dioxide, sulfur dioxide, and carbon dioxide emissions to decline (Khalifa et al. 2021). Other positive changes included clearer skies, less noise, and the resurgence of wildlife in areas vacated by humans (Bates et al. 2021; Diffenbaugh 2022). Although largely the short-term consequences of the lockdown, these positive impacts offer a glimpse of how following more sustainable ways of living would benefit natural systems.

Negative environmental impacts of COVID-19 include an increase in plastic waste from discarded personal protective equipment, increased pollution from the use of soap and hand sanitizers, and a decrease in recycling (Ankit et al. 2021). Disruption from COVID-19 also interrupted or stopped conservation policy development and enforcement, environmental monitoring efforts, and community-based restoration projects (Bates et al. 2021).

IMPACTS IN CALIFORNIA

The positive and negative socioeconomic and environmental effects of the COVID-19 crisis in California mirror those experienced worldwide, as do their disproportionate impacts on the most vulnerable. “Due to inequitable access to healthcare, income inequality, and disproportionate employment in high-risk, ‘essential’ jobs, low-income, Black, and Latinx communities are suffering most” (Pier et al. 2021). As of October 2022, over 96,000 Californians have died from COVID-19, with rates higher among those 65 and older. Sharp disparities exist across race and ethnicity, with Black and Latino residents dying at rates 37 percent and 20 percent higher, respectively, than those of white Californians (Bohn 2022). The economic effects of the pandemic and ensuing shutdown were severe, with California unemployment spiking at 16 percent (McConville et al. 2022).

The economic recovery has been relatively rapid, but unemployment rates are greater for Latinos, Blacks, and other underrepresented groups (McConville et al. 2022).

The COVID-19 pandemic had a profound effect on teaching and learning in California. Most K–12 schools closed in March 2020 and remained closed for more than a year. That caused “an unprecedented disruption to the state’s system of public education and the lives of the children and families it serves” (Hough et al. 2021, p.2).

The turmoil of the pandemic has worsened existing or created new mental health issues among many of California’s young people (Varghese and Natsuaki, 2021). It has also exacerbated a preexisting and critical shortage of teachers in California (Carver-Thomas et al. 2022).

School closures and the shift to online learning spotlighted inequities in digital access. In the fall of 2020, 1.8 million students (31 percent) in California still didn’t have access to high-speed internet. This represented 25 percent of all Black students and 33 percent of all Latinx and Native American students. Also, 690,000—including 10 percent of all Black, Indigenous, and students of color—had no access to a device (Alliance for Excellent Education 2020).





All students experienced learning loss, but students of color were disproportionately impacted. For example, by late 2020 and in comparison with the prior three-year average, students in schools whose student population was greater than 50 percent white demonstrated learning 69 percent of the required mathematics curriculum. However, students in schools where the student population was more than 50 percent students of color indicated learning only 59 percent of the required mathematics curriculum (Dorn et al. 2020).

While federal and state stimulus spending have narrowed the pre-pandemic divide, it may be a challenge to sustain broadband access and replace outdated devices after this funding expires (Johnson et al. 2022).

Low-income students and English language learners have been the most affected by school closures and the shift to online learning. In addition to lacking access to computers and reliable internet connections, many students' living circumstances are not conducive to learning at home. Food and housing insecurities presented additional obstacles and studies show that distance learning is less effective for students in the early grades, students who have disabilities, and language learners (Pier et al. 2021).

The pandemic had a devastating effect on outdoor and environmental learning, which has shown to have positive cognitive, socioemotional, and health incomes while enhancing students' understanding of human impacts on the Earth system (Collins et al. 2020; Butler

2022). Two policy briefs from the Lawrence Hall of Science highlight pandemic-related programmatic, financial, educational, and organizational impacts that threaten the field of outdoor science education (Collins et al. 2020; Collins et al. 2021).

The pandemic also brought widespread disruption to California's higher education institutions and the students they serve, although emergency funding from the state and federal government prevented the significant increases in tuition that took place during the earlier economic crisis (Johnson et al. 2022). Nonetheless, the educational goals of many students were either canceled or interrupted due to the pandemic, which served to highlight and magnify existing inequities in access to higher education. The pandemic's largest and most immediate outcome was the rapid shift to online learning, bringing similar equity challenges like those experienced in the PK-12 sector.

In summary, the COVID-19 pandemic has profoundly impacted education outcomes and health and well-being in California, underscoring the importance of preparing young people to act as change-makers who can imagine a more just and sustainable world and take action to help achieve it.

Education is widely recognized as a powerful catalyst for social change and is a crucial component of the Sustainable Development Goals, both as a stand-alone goal (United Nations 2015) and as a facilitator for all seventeen of the global goals (UNESCO 2017).

ENVIRONMENTAL AND SUSTAINABILITY EDUCATION: A CATALYST FOR CHANGE

The power of education to drive transformative change is reflected in California’s long history of supporting environmental literacy for all PK-12 students. Important milestones spanning the past two decades are summarized below, including initiatives and programs launched during the COVID-19 pandemic.

PK-12 EDUCATION

1. The Education and Environment Initiative (AB1548, Pavley 2003): Called for the creation of Environmental Principles and Concepts—big ideas that help students understand the interdependence of human social systems and natural systems across multiple standards-based subjects. Sen. Fran Pavley’s bill also called for the creation of a model curriculum to demonstrate to teachers how to integrate the EP&Cs (Fig. 3) into standards-based instruction in science and history-social science. The model curriculum was approved by California’s State Board of Education in 2010 and is in wide use in California classrooms. Subsequently, the EP&Cs were integrated into numerous frameworks—history-social science

(2016), science (2016), health (2018), arts (2019), and the upcoming mathematics framework.

The EP&Cs serve as a cornerstone of environmental literacy policy and initiatives in California education. As teachers and students across grade levels and disciplines explore these principles and concepts, they better understand the dynamic and changing natural systems that support life, shape environments, influence decision-making, and impact human communities. At the same time, they learn about the dynamic and changing cultural, social, economic, and political systems created and maintained by people, which rely on healthy ecosystems.

What is more explicit in the Sustainable Development Goals than the EP&Cs are the inequities and injustices that exist locally and globally when natural, human, and capital resources are disproportionately distributed, cultural values are overlooked, and human rights are violated. However, when we deeply explore the EP&Cs, these issues surface. For example, in analyzing a common activity (e.g., drinking coffee, reading books, knitting), the “inputs” (e.g., trees, water, dyes, fossil fuels, rubber, metal, etc.) can be evaluated through the lens of EP&C II, and the “outputs” (e.g., ideas, concepts, clothing, air pollution, landfill waste, water pollution, etc.) can be evaluated through the lens of EP&C IV. Discussions lead to SDGs #12 (Responsible Consumption and Production), SDG #13 (Climate Action), and #15 (Life on Land), etc. Both the EP&Cs and SDGs provide insights and opportunities for informed decision-making and personal/collective actions that reflect knowledge and understanding of our ever-changing and interconnected world.

CALIFORNIA’S ENVIRONMENTAL PRINCIPLES AND CONCEPTS

Principle 1: The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.

Principle 2: The long-term functioning and health of the terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.

Principle 3: Natural systems proceed through cycles that humans depend upon, benefit from and can alter.

Principle 4: The exchange of matter between natural systems and human societies affects the long-term functioning of both.

Principle 5: Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.

Figure 3.

2. California’s A Blueprint for Environmental Literacy: Educating Every Student In, About, and For the Environment (CDE 2015): A call to action for educators and administrators to educate every student in, about and for the environment.

3. The California Environmental Literacy Initiative (CAELI 2016–present): Led by California nonprofit Ten Strands, CAELI is a collective action network that implements the ideas in the state’s blueprint. CAELI’s focus is on equitably taking this work to scale by focusing on school districts as the unit of change in the education system. CAELI Innovation Hubs unite leaders who collaborate to address multiple facets of environmental literacy. These hubs are:

- Community-Based Partners
- County Offices of Education
- Districts
- Equity
- Green Career Education
- Professional Learning
- Policy

4. Senate Bill 720 (Allen 2018): Sponsored by Ten Strands, SB 720 codified the EP&Cs as the state’s definition of environmental literacy by adding them to the Education Code and added climate change and environmental justice to the list of topics covered by

the EP&Cs. SB 720 also directs the State Board of Education, State Superintendent of Public Instruction, and District Superintendent and their school boards to support environmental literacy, and it pulls the core ideas in the blueprint into Education Code.

5. The Environmental and Climate Change Literacy Projects (ECCLPs 2019–present): The University of California-California State University Environmental and Climate Change Literacy Projects (ECCLPs, pronounced (“eclipse”) is a coalition of PK-12 and university educators, researchers, advocacy groups, nonprofit organizations, and schools. It aims to support, expand, and advance existing environmental and climate change initiatives in the state by educating all high school graduates to be literate in climate and environmental justice issues and solutions who are prepared to take action (Ramanathan et al. 2019). ECCLPs highlights the critical role of PK-12 teachers who can serve as guides for students on a politically controversial topic. Teachers are on the frontlines of addressing climate and environmental misinformation that students are bombarded with daily, making them susceptible to misleading information put forth by the media. Teachers also have the incredible responsibility of translating educational policy and implementing curriculum with effective teaching pedagogy to support climate and environmental literacy, justice, and action through education.





The ECCLPs Steering Committee prepared a report (Ramanathan et al. 2019) in response to the need to support PK-12 educators to advance climate change and sustainability literacy with the following key recommendations:

- Integrate environmental and climate change literacy across all subjects in California.
- Establish an official California state taskforce for the promotion of environmental and climate change literacy.
- Engage the California Commission on Teacher Credentialing to update learning opportunities for teachers in support of environmental and climate literacy.
- Expand access to Earth science with an emphasis on climate for high school students.

Members of the ECCLPs Steering Committee met in March 2020 to prioritize these recommendations and, after a brief hiatus because of the COVID-19 crisis, have continued to build on this work. A proposal and executive summary have been

finalized for a joint University of California-California State University initiative for PK-12 Climate Change and Environmental Justice. This initiative will leverage statewide partnerships and collaborations to advance accessible, inclusive, equity-centered, and culturally relevant climate change literacy and environmental justice education for all by amplifying statewide support for teacher preparation programs, in-service teachers and school administrators. Last September, an ECCLPs (Re)Launch Event took place at UC Irvine to “highlight and showcase work of multiple stakeholders including students, educational leaders, Indigenous voices and community organizations engaged in climate and environmental justice literacy.” Additionally, the highly successful in-person and virtual event announced initial funding to advance the goals of ECCLPs and begin to create the infrastructure needed to take action on the key recommendations put forth by the 2019 Steering Committee. See the joint press release by Ten Strands and UC Irvine School of Education [here](#).



6. The National COVID-19 Outdoor Learning Initiative (2020): A national collective impact project led by four California organizations (Green Schoolyards America, the Lawrence Hall of Science, San Mateo County Office of Education and Ten Strands) to create free resources for education leaders focused on using outdoor spaces for learning during COVID-19 and beyond. An important extension of this initiative is the recently launched California Schoolyard Forest System (2022), a new, statewide initiative to increase tree canopies on public school grounds across California to shade and protect PK-12 students from extreme heat and rising temperatures as a result of climate change.

7. Assembly Bill 130 (Allen et al. 2021): Appropriates \$6 million to develop standards-based K–12 open education resource model curriculum units focused on climate change and environmental justice. The Climate Change and Environmental Justice Program is led by the San Mateo County Office of Education and Ten Strands.

8. Citizen Science Project: Inspired by the call to action outlined in the 2019 ECCLPs report (Ramanathan et al. 2019), the Citizen Scientist Project aims to foster environmental literacy through projects in which teachers and students gather and analyze data and collaborate with scientists and community organizations to address issues of community concern.

HIGHER EDUCATION

A key aspect of the California State University's role in California's environmental literacy and sustainability education efforts is preparing future teachers who are the frontline change agents in the PK-12 school system. The CSU readies more of the state's teachers and educators than any other institutions combined (CSU 2022a).

The mission and work of ECCLPS are closely aligned with the CSU's holistic efforts to incorporate sustainability throughout our curricula and every aspect of our operations across our 23 campuses. And with its emphases on teacher preparation and the power of education at scale, ECCLPS plays to some of the CSU's greatest strengths.

— Former CSU Chancellor Timothy White, speaking at the December 2019 University of California - California State University Environmental and Climate Change Literacy Project Summit (CSU 2019).

The California State University (CSU) is committed to infusing sustainability principles and practices into teaching, research, and campus operations across its 23 campuses. A systemwide CSU Sustainability Policy adopted in 2014 and updated in March 2022 "is intended to position the nation's largest university system as a leader in the teaching and use of applied research to educate climate literate students equipped to solve the complex challenges of the world and prepare them for an evolving workforce" (CSU 2022b). The multifaceted policy calls for the integration of sustainability and climate literacy across the curriculum and addresses climate action plans, water conservation, energy

conservation, efficiency, and sustainable procurement. Progress at each campus is measured using the STARS (Sustainability Tracking, Assessment & Rating System) reporting system of the Association for the Advancement of Sustainability in Higher Education (AASHE 2022). AASHE's 2021 Sustainable Campus Index (AASHE 2021) included five CSU campuses (California State University, Chico; California State Polytechnic University, Humboldt; California State University, Northridge; San José State University; and California Polytechnic State University, San Luis Obispo) on its list of top 10 performers among the nation's master's degree-granting institutions.

Highlights of the CSU initiatives that relate to sustainability and environmental literacy in California include:

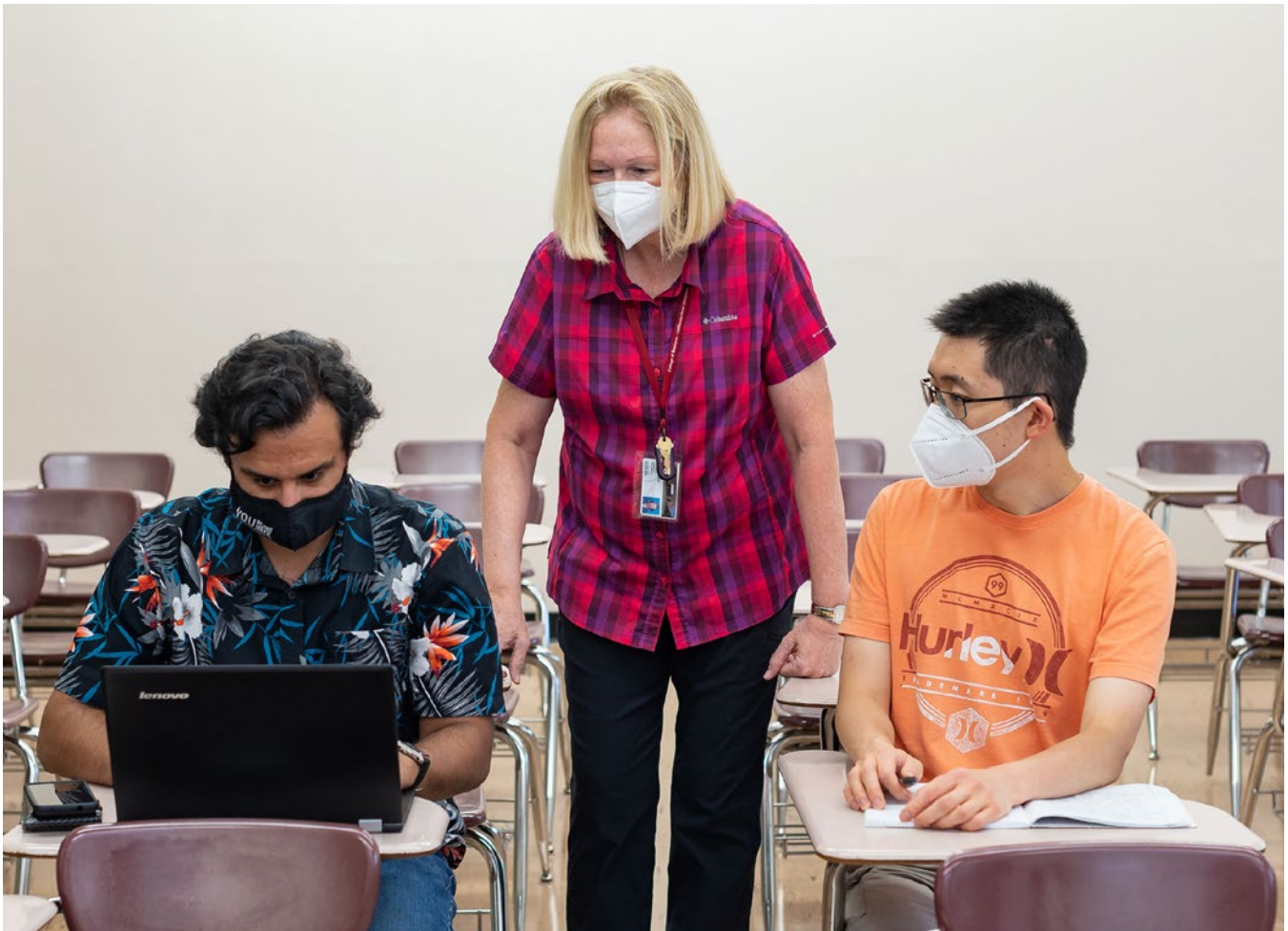
- NXTerra A joint initiative of the University of California and the CSU, the NXTerra Digital Platform "is an archive of educational resources for educators and students seeking to enrich their courses and educations with an infusion of critical climate change, sustainability, and climate justice materials."
- California State University Journal of Sustainability and Climate Change This journal, a coordinated effort of the California State University Chancellor's Office Department of Research, the CSU Chancellor's Office Department of Sustainability and Humboldt State University Press, was launched in 2021 "to provide inclusive, diverse, and accessible opportunities for peer-reviewed publication as well as access to research to lift all voices and perspectives addressing the critical issues of climate change and sustainability."
- This Way to Sustainability Conference at Chico State is a nationally recognized, student-run conference that attracts 1,400 participants each year and aims to "raise awareness, build community, and plan for a more resilient/sustainable future."

RECOMMENDATIONS FOR MOVING FORWARD

Despite the hardships of the pandemic, advocates for climate and environmental literacy have made some progress to connect across silos. However, none of the initiatives have had enough investment to scale them to the levels needed to match the large-scale response demanded by the climate crisis. Also, most of the initiatives described in this report are funded by private philanthropy. This is, of course, appropriate to spur innovation but without a commitment by the state, it won't be possible to scale these essential and urgent efforts. We, therefore, recommend the following:

- An increased number of supportive state education policies and investments aimed at advancing climate and environmental literacy focused on evidence-driven approaches and practices. These would enable the work to effectively scale across all levels of the system of support for education—universities, community colleges, counties, districts, schools, and community-based organizations.
- Free, open education curricular resources specific to sustainability, climate change, and environmental justice, with sufficient wraparound services for teachers, administrators, and community-based organizations, e.g., research-based professional learning, tools to create local derivatives, facilitation of teacher networks, print services for schools without reliable access to devices and broadband, etc.
- State support for effective professional learning for in-service and pre-service PK-12 teachers and administrators to support the integration of California's EP&Cs into 21st-century and standards-aligned instruction, and the support of interdisciplinary teaching and learning opportunities focused on sustainability, climate change and environmental justice through a culturally relevant and responsive lens.
- State support for community-based partners to have long-term partnerships with administrators, teachers and students focused on hyper-local issues leading to enduring global understandings that also support participants as environmental stewards and community leaders.
- State support for research focused on sustainability education, climate change education and environmental literacy in PK-16.
- Supportive school, campus and community policies that embrace whole-school sustainability efforts—curriculum, campus, community and culture.
- State support for private sector intermediary organizations—e.g., Ten Strands and others—to continue to provide backbone support and technical assistance to accelerate the overall effort to reach scale.





CONCLUSION

The COVID-19 pandemic is a powerful reminder of the inextricable interconnectedness of people, place and the environment and of the need to reimagine humanity's relationship with the natural environment (Leach et al. 2021). It has also revealed fragilities in our socioeconomic systems, highlighted widespread inequities and served as a stark reminder of the price of ignoring humanity's embeddedness in nature (UNDP 2022). The pandemic has brought additional turbulence to a world already beset with converging crises, underscoring the critical need to forge a different path forward.

While the pandemic caused monumental disruption and suffering, it also showed that human societies are capable of overcoming entrenched practices to make rapid and drastic changes in response to a crisis (Kaukko et al. 2021).

Returning to Arundhati Roy's concept of the pandemic as a portal that offers a pivotal opportunity to reimagine our world, the need has never been greater for comprehensive, interdisciplinary sustainability and environmental education that promotes understanding of human-nature connections and enables and inspires students to act as changemakers. In spite of the COVID-19 crisis, existing environmental and climate-change literacy programs, projects, collaborations, and networks have continued, and new ones have been set in motion. With a renewed and expanded commitment to justice-centered environmental literacy for all students, California is poised to leverage PK-16 education to help build forward better from the pandemic.

REFERENCES CITED

- Alliance for Excellent Education. 2020. "Keeping Students Linked in California." https://all4ed.org/wp-content/uploads/2020/09/California-Linked-Learning-Report_FINAL.pdf.
- Ankit, Amit Kumar, Vartika Jain, Ankit Deovanshi, Ayush Lepcha, Chandan Das, Kuldeep Baudhh, et al. 2020. "Environmental Impact of COVID-19 Pandemic: More Negatives Than Positives." *Environmental Sustainability 4* (September): 447–54. <https://doi.org/10.1007/s42398-021-00159-9>.
- Asayama, Shinichiro, Seita Emori, Masahiro Sugiyama, Fumiko Kasuga, and Chiho Watanabe. 2021. "Are We Ignoring a Black Elephant in the Anthropocene? Climate Change and Global Pandemic as the Crisis in Health and Equality." *Sustainability Science 16*, (March): 695–701. <https://doi.org/10.1007/s11625-020-00879-7>.
- Avanesian, Garen, Suguru Mizunoya, and Diogo Amaro. 2021. "How Many Students Could Continue Learning During COVID-19-Caused School Closures? Introducing a New Reachability Indicator for Measuring Equity of Remote Learning." *International Journal of Educational Development 84*, (July): 102421. <https://doi.org/10.1016/j.ijedudev.2021.102421>.
- Bates, Amanda E., Richard B. Primack, Brandy S. Biggar, Tomas J. Bird, Mary E. Clinton, Rylan J. Command, Cerren Richards, et al. 2021. "Global COVID-19 Lockdown Highlights Humans as Both Threats and Custodians of the Environment." *Biological Conservation 263* (November): 109175. <https://doi.org/10.1016/j.biocon.2021.109175>.
- Bohn, Sarah. 2022. "How Did California's Economy Recover From COVID—and What Comes Next?" Public Policy Institute of California. March 9, 2022. <https://www.ppic.org/blog/how-did-californias-economy-recover-from-covid-and-what-comes-next/>.
- Butler, Megan. 2022. "Interdisciplinary Experiential Learning During COVID-19: Lessons Learned and Reflections for the Future." *Journal of Environmental Studies and Sciences*. (June): 369–77. <https://doi.org/10.1007/s13412-021-00734-w>.
- California Department of Education. 2015. "A Blueprint for Environmental Literacy." <https://www.cde.ca.gov/pd/ca/sc/documents/environliteracyblueprint.pdf>.
- California State University, Office of the Chancellor. 2019. "Remarks by Dr. Timothy P. White." The Chancellor's Communications. December 12, 2019. <https://www.calstate.edu/csu-system/chancellor/the-chancellors-communications/Pages/Environmental-and-Climate-Change-Literacy-Project-and-Summit-Opening-Remarks-12-12-19.aspx>.
- California State University, Office of the Chancellor. 2022. "Sustainability." Last modified summer 2022. <https://www.calstate.edu/impact-of-the-csu/sustainability>.
- California State University, Office of the Chancellor. n.d. "Teacher and Educator Preparation." Accessed November 18, 2022. <https://www.calstate.edu/impact-of-the-csu/teacher-education/Pages/default.aspx>.
- Carver-Thomas, Desiree, Dion Burns, Melanie Leung-Gagné, and Naomi Ondrasek. 2022. "Teacher Shortages During the Pandemic: How California Districts Are Responding." Learning Policy Institute. <https://doi.org/10.54300/899.809>.
- Collins, Melissa, Rena Dorph, Jemma Foreman, Aparajita Pande, Craig Strang, and Aujanee Young. 2020. "A Field at Risk: The Impact of COVID-19 on Environmental and Outdoor Science Education." Lawrence Hall of Science, University of California, Berkeley. https://www.lawrencehalloffscience.org/wp-content/uploads/2021/10/EE_A_Field_at_Risk_Policy_Brief.pdf.
- Collins, Melissa, Aparajita Pande, Craig Strang, Jemma Forman, and Rena Dorph. 2021. "Impacts From COVID-19: Resilient Outdoor Science Programs Need Support as Challenges Persist." Lawrence Hall of Science, University of California, Berkeley. https://www.lawrencehalloffscience.org/wp-content/uploads/2022/02/impacts-from-covid-19-osps_2-2022.pdf.



Crutzen, Paul J. 2002. "Geology of Mankind." *Nature* 415, (January): 23–23. <https://doi.org/10.1038/415023a>.

De León, Emilia Aragón, Amanda Shriwise, Göran Tomson, Stephen Morton, Diogo Simão Lemos, Bettina Menne, and Mark Dooris. 2021. "Beyond Building Back Better: Imagining a Future for Human and Planetary Health." *The Lancet Planetary Health* 5, no. 11 (November): e827–39. [https://doi.org/10.1016/S2542-5196\(21\)00262-X](https://doi.org/10.1016/S2542-5196(21)00262-X).

De Paula, Nicole. 2021. *Breaking the Silos for Planetary Health*. Palgrave Macmillan Singapore. <https://doi.org/10.1007/978-981-16-3754-4>

Diffenbaugh, Noah S. 2022. "COVID-19 and the Environment: Short-Run and Potential Long-Run Impacts." *Annual Review of Environment and Resources* 47 (October): 65–90. <https://doi.org/10.1146/annurev-environ-120920-125207>.

Doi, Hideyuki, Takeshi Osawa, and Narumasa Tsutsumida. 2022. "Assessing the Potential Repercussions of the COVID-19 Pandemic on Global SDG Attainment." *Discover Sustainability* 3, no. 2 (January). <https://doi.org/10.1007/s43621-021-00067-2>.

Dorn, Emma, Bryan Hancock, Jimmy Sarakatsannis, and Ellen Viruleg. 2020. McKinsey & Company. "COVID-19 and Learning Loss—Disparities Grow and Students Need Help." <https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-learning-loss-disparities-grow-and-students-need-help>.

Erdelen, Walter R., and Jacques G. Richardson. 2021. "A World After COVID-19: Business as Usual, or Building Bolder and Better?" *Global Policy* 12, no. 1 (February): 157–66. <https://doi.org/10.1111/1758-5899.12904>.

European Environment Agency. 2022. COVID 19: Lessons for Sustainability? Last modified June 1, 2022. <https://www.eea.europa.eu/publications/covid-19-lessons-for-sustainability>.

Gao, Niu, Joseph Hayes, and Darriya Starr. 2022. "How Has California Narrowed Its K–12 Digital Divide?" *Public Policy Institute of California*. April 5, 2022. <https://www.ppic.org/blog/how-has-california-narrowed-its-k-12-digital-divide/>.

Griggs, D., Stafford-Smith, M., Gaffney, O. et al. Sustainable development goals for people and planet. *Nature* 495, 305–307 (2013). <https://doi.org/10.1038/495305a>.

Hough, Heather, Julia A. Marsh, Jeannie Myung, David N. Plank, and Morgan Polikoff. July 2021. "Californians and K–12 Education Amid COVID-19 Recovery: Views From the 2021 PACE/ USC Rossier Poll" [Report]. Policy Analysis for California Education. <https://www.edpolicyinca.org/publications/pace-and-usc-rossier-polls-2021>.

Intergovernmental Panel on Climate Change. 2022. "Sixth Assessment Report." Accessed November 18, 2022. <https://www.ipcc.ch/assessment-report/ar6/>.



IPBES. (2019). "Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services (Summary for Policy Makers)." IPBES Plenary at its seventh session (IPBES 7, Paris, 2019). Zenodo. <https://doi.org/10.5281/zenodo.3553579>

Johnson, Hans, Kevin Cook, Marisol Cuellar Mejia, Jacob Jackson, Olga Rodriguez. 2022. "The Pandemic's Effects on Higher Education." Public Policy Institute of California. March 15, 2022. <https://www.ppic.org/blog/the-pandemics-effects-on-higher-education/>.

Kaukko, Mervi, Stephen Kemmis, Hannu L.T. Heikkinen, Tomi Kiilakoski, and Nick Haswell. 2021. "Learning to Survive Amidst Nested Crises: Can the Coronavirus Pandemic Help Us Change Educational Practices to Prepare for the Impending Eco-Crisis?" *Environmental Education Research* 27, no. 11 (August): 1559–73. <https://doi.org/10.1080/13504622.2021.1962809>.

Khalifa, Shaden A. M., Mahmoud M. Swilam, Aida A. Abd El-Wahed, Ming Du, Haged H. R. El-Seedi, Guoyin Kai, Saad H. D. Masry, et al. 2021. "Beyond the Pandemic: COVID-19 Pandemic Changed the Face of Life." *International Journal of Environmental Research and Public Health* 18, no. 11 (May): 5645. <https://doi.org/10.3390/ijerph18115645>.

Kharas, Homi, and John W. McArthur. 2020. "Sustainable Development Goals: How Can They Be a Handrail for Recovery?" The Brookings Institution, November 17, 2020. <https://www.brookings.edu/research/sustainable-development-goals-how-can-they-be-a-handrail-for-recovery/>

Leach, Melissa, Hayley MacGregor, Ian Scoones, Annie Wilkinson, Post-pandemic transformations: How and why COVID-19 requires us to rethink development, *World Development*, Volume 138, 2021, 105233, ISSN 0305-750X, <https://doi.org/10.1016/j.worlddev.2020.105233>.

Lennox, Janet, Nicolas Reuge, and Francisco Benavides. 2021. "UNICEF's Lessons Learned From the Education Response to the COVID-19 Crisis and Reflections on the Implications for Education Policy." *International Journal of Educational Development* 85 (September): 102429. <https://doi.org/10.1016/j.ijedudev.2021.102429>.

Mattar, Sennan D., Tahseen Jafry, Patrick Schröder, and Zarina Ahmad. 2021. "Climate Justice: Priorities for Equitable Recovery From the Pandemic." *Climate Policy* 21, no. 10 (November): 1307–17. <https://doi.org/10.1080/14693062.2021.1976095>.

- McConville, Shannon and Paulette Cha. 2022. "Health in California Two Years into the Pandemic." Public Policy Institute of California. March 8, 2022. <https://www.ppic.org/blog/health-in-california-two-years-into-the-pandemic/>.
- Pier, Libby, Heather J. Hough, Michael Christian, Noah Bookman, Britt Wilkenfeld, and Rick Miller. 2021. "COVID-19 and the Educational Equity Crisis: Evidence on Learning Loss From the CORE Data Collaborative [Commentary]. Policy Analysis for California Education. <https://edpolicyinca.org/newsroom/covid-19-and-educational-equity-crisis>.
- Ramanathan, Veerabhadran, Marcelo Suárez-Orozco, Marquita Grenot-Scheyer, Fred Uy, Richard Arum, Karen Cowe, Jill Grace, et al. "Achieving Climate Stability and Environment Sustainability: PK-12 Education as Part of the Solution for Bending the Curve." Published by the UC-CSU Environmental and Climate Change Literacy Project and Summit Steering Committee. Ed: Leigh Leveen, Published by the University of California at Los Angeles 2019.
- Reid, Alan, Justin Dillon, Nicole Ardoin, and Jo-Anne Ferreira. 2021. "Scientists' Warnings and the Need to Reimagine, Recreate, and Restore Environmental Education." *Environmental Education Research* 27, no. 6 (June 3): 783–95. <https://doi.org/10.1080/1350462.2021.1937577>.
- Ripple, William J., Christopher Wolf, Thomas M. Newsome, Mauro Galetti, Mohammed Alamgir, Eileen Crist, Mahmoud I. Mahmoud, William F. Laurance, 15,364 scientist signatories from 184 countries. 2017. "World Scientists' Warning to Humanity: A Second Notice" *BioScience* 67, no. 12 (December), 1026–1028, <https://doi.org/10.1093/biosci/bix125>.
- Ripple, William J., Christopher Wolf, Thomas M. Newsome, Phoebe Barnard, William R Moomaw, and 11,258 scientist signatories from 153 countries. 2020. "Corrigendum: World Scientists' Warning of a Climate Emergency." 2021. *BioScience* 70, no. 1 (December), 8–12. <https://doi.org/10.1093/biosci/biz152>.
- Roy, Arundhati. 2020. "The Pandemic Is a Portal." *Financial Times*, April 3, 2020. <https://www.ft.com/content/10d8f5e8-74eb-11ea-95fe-fcd274e920ca>.
- Roy, Arundhati. 2020. "The Pandemic Is a Portal." *Rethinking Schools*. Accessed April 28, 2022. <https://rethinkingschools.org/articles/the-pandemic-is-a-portal/>.
- Servant-Miklos, Virginie. 2022. "Environmental Education and Socio-Ecological Resilience in the COVID-19 Pandemic: Lessons From Educational Action Research." *Environmental Education Research* 28, (August) 18–39. <https://doi.org/10.1080/13504622.2021.2022101>.
- Steffen, Will, Katherine Richardson, Johan Rockström, Sarah E. Cornell, Ingo Fetzer, Elena M. Bennett, Reinette Biggs, et al. 2015. "Planetary Boundaries: Guiding Human Development on a Changing Planet." *Science* 347, no. 6223 (January): 1259855. <https://doi.org/10.1126/science.1259855>.
- The Association for the Advancement of Sustainability in Higher Education. 2021. *Sustainable Campus Index*. <https://www.aashe.org/wp-content/uploads/2021/11/SCI-Nov-2021.pdf>.
- The Association for the Advancement of Sustainability in Higher Education. n.d. "The Sustainability Tracking, Assessment & Rating System." Accessed November 18, 2022. <https://stars.aashe.org/>.
- UNESCO. 2016. "Education for People and Planet: Creating Sustainable Future For All. Global Education Monitoring Report." September 6, 2016. <https://en.unesco.org/gem-report/report/2016/education-people-and-planet-creating-sustainable-futures-all>.
- UNESCO. 2017. "Education for Sustainable Development Goals: Learning Objectives." Paris: United Nations Educational, Scientific and Cultural Organization. <https://unesdoc.unesco.org/ark:/48223/pf0000247444>.
- UNESCO. 2021. "Teachers Have Their Say: Motivation, Skills, and Opportunities to Teach Education for Sustainable Development and Global Citizenship. Brussels: United Nations Educational, Scientific and Cultural Organization." <https://unesdoc.unesco.org/ark:/48223/pf0000379914?posInSet=1&queryId=3a878796-466b-4b3c-bdcb-17810b2bca2e>.

United Nations. 2015. The Paris Agreement. Geneva: United Nations. <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.

United Nations. 2022. "Secretary-General Warns of Climate Emergency, Calling Intergovernmental Panel's Report 'a File of Shame', While Saying Leaders 'Are Lying', Fuelling Flames." Press Release. April 4, 2022. <https://press.un.org/en/2022/sgsm21228.doc.htm>.

United Nations. 2015. "Transforming Our World: The 2030 Agenda for Sustainable Development." <https://sdgs.un.org/publications/transforming-our-world-2030-agenda-sustainable-development-17981>.

United Nations Department of Economic and Social Affairs. 2022. "The 17 Goals." Accessed November 18, 2022. <https://sdgs.un.org/goals>.

UNDP (United Nations Development Programme). 2020. "Human Development Report 2020: The Next Frontier: Human Development and the Anthropocene." New York. <https://hdr.undp.org/content/human-development-report-2020>.

UNDP (United Nations Development Programme). 2022. 2022 "Special Report on Human Security." New York. <https://hdr.undp.org/en/2022-human-security-report>.

UNEP (United Nations Environment Programme). 2021. "Making Peace With Nature: A Scientific Blueprint to the Climate, Biodiversity, and Pollution Emergencies." Nairobi. <https://www.unep.org/resources/making-peace-nature>.

United Nations Sustainable Development Goals. 2020. "Policy Brief: Education During COVID-19 and Beyond." <https://unsdg.un.org/resources/policy-brief-education-during-covid-19-and-beyond>.

Varghese, Agnes M., and Misaki N. Natsuaki. 2021. "Coping With the Pandemic: Implementing Social and Emotional Learning in the California K-12 School System." *Policy Insights From the Behavioral and Brain Sciences* 8, no. 2 (October): 136–42. <https://doi.org/10.1177/23727322211033003>.

Vogel, David. 2018. "California Greenin': How the Golden State Became an Environmental Leader." Princeton: Princeton University Press. <https://press.princeton.edu/books/hardcover/9780691179551/california-greenin>

Yeghonian, Andra. 2021. "Climate Change Is the Ultimate Teachable Moment." *EdSurge*, August 26, 2021. <https://www.edsurge.com/news/2021-08-26-climate-change-is-the-ultimate-teachable-moment>.





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