



Report on the NOAA Office of Education Environmental Literacy Program Community Resilience Education Theory of Change



National Oceanic and
Atmospheric Administration
U.S. Department of Commerce

Authors: Genie Bey, Carrie McDougall,
and Sarah Schoedinger | Version: July 2020

ACKNOWLEDGEMENTS

The authors would like to thank everyone who gave their time, attention, and expertise to reviewing and commenting on various iterations of the ELP Community Resilience Education Theory of Change and this report. In particular, input from the ELP Resilience Education Community of Practice and the NOAA Climate Program Office's Climate and Societal Interactions and Communication, Education, and Engagement Divisions was critical to shaping this theory of change. Finally, special thanks to Judy Braus, Executive Director of NAAEE, for providing a detailed review of the full report and authoring the foreword.

Authors: Genie Bey, Carrie McDougall, and Sarah Schoedinger, NOAA Office of Education

Contributors: Maggie Allen, John Baek, Gabrielle Corradino, Jaime Frungillo, Louisa Koch, John McLaughlin, Christos Michalopoulos, Bronwen Rice, and Brianna Shaughnessy—all from the NOAA Office of Education—and Frank Niepold from the NOAA Climate Program Office.

Illustration & Design: Jessica Bromley Bartram Illustration & Design (jessicabartram.ca)

© This publication may be redistributed non-commercially in any media, unchanged and in whole, with credit given to the NOAA Office of Education.

Published in 2020

Suggested citation: Bey, G., C. McDougall, & S. Schoedinger. 2020. Report on the NOAA Office of Education Environmental Literacy Program Community Resilience Education Theory of Change. National Oceanic and Atmospheric Administration, Washington, DC. doi:10.25923/mh0g-5q69



Published by the NOAA Office of Education

noaa.gov/elp-resilience-TOC

An accessible version of this report and other related materials are available at the site listed above.

Contact us: oed.grants@noaa.gov

SECTION V

Bibliography



SECTION V

Bibliography

Adger, W. N., Barnett, J., Brown, K., Marshall, N., & O'Brien, K. (2013). Cultural dimensions of climate change impacts and adaptation. *Nature Climate Change* 3, 112-117. <https://doi.org/10.1038/NCLIMATE1666>

American Association for the Advancement of Science | Center for Public Engagement with Science & Technology. 2016. *Theory of Change for Public Engagement with Science*. Washington, DC. https://www.aaas.org/sites/default/files/content_files/2016-09-15_PES_Theory-of-Change-for-Public-Engagement-with-Science_Final.pdf

Armitage, D., F. Berkes, A. Dale, E. Kocho-Schellenberg, and E. Patton. 2011. Co-management and the co-production of knowledge: Learning to adapt in Canada's Arctic. *Global Environmental Change* 21 (3):995-1004. <https://doi.org/10.1016/j.gloenvcha.2011.04.006>

Bach, R., Doran, R., Gibb, L., Kaufman, D., & Settle, K. 2010. Policy challenges in supporting community resilience. *Multinational Community Resilience Policy Group*. <http://www.jik.com/SupportingCommunityResilienceLondon2010.pdf>

Bonney, R., Ballard, H., Jordan, R., McCallie, E., Phillips, T., Shirk, J., and Wilderman, C. 2009. Public Participation in Scientific Research: Defining the Field and Assessing Its Potential for Informal Science Education. A CAISE Inquiry Group Report. Washington, D.C.: Center for Advancement of Informal Science Education (CAISE). <https://www.informalscience.org/sites/default/files/PublicParticipationinScientificResearch.pdf>

Bours, D., McGinn, C., and Pringle, P. 2014. Guidance note 3: Theory of Change approach to climate change adaptation programming. *Sea Change*. <https://ukcip.ouce.ox.ac.uk/wp-content/PDFs/MandE-Guidance-Note3.pdf>

Bozeman, B. 2007. *Public Values and Public Interest: Counterbalancing Economic Individualism*. Washington, D.C.: Georgetown University Press. <https://www.jstor.org/stable/j.ctt2tt37c>

Bozeman, B., and Sarewitz, D. 2011. Public Value Mapping and Science Policy Evaluation. *Minerva* 49(1), 1-23. <https://doi.org/10.1007/s11024-011-9161-7>

Brulle, R. J., and D. N. Pellow. 2006. Environmental justice: Human health and environmental inequalities. *Annual Review of Public Health* 27 (102):103-24. <https://doi.org/10.1146/annurev.publhealth.27.021405.102124>

Bulkeley, H., G. A. S. Edwards, J. Carmin, V. Casta, and S. Fuller. 2013. Climate justice and global cities: Mapping the emerging discourses. *Global Environmental Change* 23:914-925. <https://doi.org/10.1016/j.gloenvcha.2013.05.010>

Center for Research on Learning and Teaching. 2020. *Crlt.umich.edu*. <http://www.crlt.umich.edu/tstrategies/tsal>

Cole, L., and S. Foster. 2001. *From the ground up*. New York, NY: New York University Press. <https://nyupress.org/9780814715376/from-the-ground-up>

Clayton, S., Manning, C. M., and Hodge, C. 2014. Beyond storms & droughts: The psychological impacts of climate change. Washington, DC: *American Psychological Association and ecoAmerica*. https://ecoamerica.org/wp-content/uploads/2014/06/eA_Beyond_Storms_and_Droughts_Psych_Impacts_of_Climate_Change.pdf

Cushing, L., R. Morello-Frosch, M. Wander, and M. Pastor. 2015. The haves, the have-nots, and the health of everyone: The relationship between social inequality and environmental quality. *Annual Review of Public Health* 36 (1):193-209. <https://doi.org/10.1146/annurev-publhealth-031914-122646>

Cutter, S., L. Barnes, M. Berry, C. Burton, E. Evans, E. Tate, and J. Webb. 2008. A place-based model for understanding community resilience to natural disasters. *Global Environmental Change* 18 (4):598-606. <https://doi.org/10.1016/j.gloenvcha.2008.07.013>

Doherty, Thomas J., and Clayton, S. 2011. The Psychological Impacts Of Global Climate Change. *American Psychologist* 66.4, 265-276. <https://doi.org/10.1037/a0023141>

Dubois, B. and Krasny, M. E. 2016. Educating with resilience in mind: Addressing climate change in post-Sandy New York City, *The Journal of Environmental Education* 47:4, 255-270, <https://doi.org/10.1080/00958964.2016.1167004>

English, P., M. Richardson, and C. Garzón-Galvis. 2018. From Crowdsourcing to Extreme Citizen Science: Participatory Research for Environmental Health. *Annual Review of Public Health* 39 (1):335-350. <https://doi.org/10.1146/annurev-publhealth-040617-013702>

Ehrlich, Thomas. 2000. Civic Responsibility and Higher Education. *American Council on Education/Oryx Press Series on Higher Education*. <https://eric.ed.gov/?id=ED439659>

Figueres, C., and T. Rivett-Carnac. 2020. *The Future We Choose: Surviving the Climate Crisis*. New York, NY: Knopf Doubleday Publishing Group. <https://www.climatecouncil.org.au/actions/download-extract-the-future-we-choose-here>

Flora, J., Saphir, M., Lappé, M., Roser-Renouf, C., Maibach, E., and Leiserowitz, A. 2014. Evaluation of a national high school entertainment education program: The Alliance for Climate Education. *Climatic Change* 127(3-4), 419-434. <https://doi.org/10.1007/s10584-014-1274-1>

Folke, C., J. Colding, and F. Berkes. 2001. Synthesis: building resilience and adaptive capacity in social-ecological systems. *Navigating Social-Ecological Systems* 352-387. <https://doi.org/10.1017/CBO9780511541957>

Frankenberg, E., B. Sikoki, C. Sumantri, W. Suriastini, and Thomas, D. 2013. Education, Vulnerability and Resilience after a Natural Disaster. *Ecology and Society* 18(2). <https://doi.org/10.5751/ES-05377-180216>

Harlan, S., D. Pellow, J. Roberts, S. Bell, W. Holt, and J. Nagel. 2015. Climate Justice and Inequality. *Climate Change and Society* 127-163. <https://doi.org/10.1093/acprof:oso/9780199356102.003.0005>

Hoffman, J. S. 2020. Learn, Prepare, Act: "Throwing Shade" on Climate Change, *Journal of Museum Education* 45:1, 28-41. <https://doi.org/10.1080/10598650.2020.1711496>

Hollweg, K. S., Taylor, J. R., Bybee, R. W., Marcinkowski, T. J., McBeth, W. C., and Zoido, P. 2011. Developing a framework for assessing environmental literacy. Washington, DC: North American Association for Environmental Education. <https://naaee.org/our-work/programs/environmental-literacy-framework>

Kretser, J., and K. Chandler. 2020. Convening Young Leaders for Climate Resilience, *Journal of Museum Education* 45:1, 52-63. <https://doi.org/10.1080/10598650.2020.1723994>

Leiserowitz, A. 2019. Building public and political will for climate change action. In Esty, D. (ed.) *A Better Planet: 40 Big Ideas for a Sustainable Future*. New Haven: Yale University Press. <https://climatecommunication.yale.edu/publications/building-public-and-political-will-for-climate-action>

Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Bergquist, P., Ballew, M., Goldberg, M., & Gustafson, A. 2019. *Climate change in the American mind: April 2019*. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication. <https://doi.org/10.1080/00139157.2019.1589300>

Lempert, R., J. Arnold, R. Pulwarty, K. Gordon, K. Greig, C. Hawkins Hoffman, D. Sands, and C. Werrell. 2018. "Reducing Risks Through Adaptation Actions. In Impacts, Risks, and Adaptation" in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1309-1345. <https://nca2018.globalchange.gov/chapter/28>

Matin, N., J. Forrester, and J. Ensor. 2018. What is equitable resilience? *World Development* 109:197-205. <https://doi.org/10.1016/j.worlddev.2018.04.020>

Meerow, S., J. P. Newell, and M. Stults. 2015. Defining urban resilience: A review. *Landscape and Urban Planning* 147:38-49. <https://doi.org/10.1016/j.landurbplan.2015.11.011>

Morello-Frosch, R., M. Pastor, C. Porras, and J. Sadd. 2002. Environmental justice and regional inequality in Southern California: Implications for future research. *Environmental Health Perspectives* 110 (SUPPL. 2):149-154. <https://doi.org/10.1289/ehp.02110s2149>

Morello-Frosch, R., M. Zuk, M. Jerrett, B. Shamasunder, and A. D. Kyle. 2011. Understanding the cumulative impacts of inequalities in environmental health: Implications for policy. *Health Affairs* 30 (5):879-887. <https://doi.org/10.1377/hlthaff.2011.0153>

Moser, S. C., & Dilling, L. 2007. Toward the social tipping point: Creating a climate for change. In S.C. Moser and L. Dilling (Eds.), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* 491-516. 1st ed. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511535871.035>

Moser, S. C. 2014. Communicating adaptation to climate change: the art and science of public engagement when climate change comes home. *WIREs Climate Change* 5(3), 337-358. <https://doi.org/10.1002/wcc.276>

Moser, S., and C. Pike. 2015. Community engagement on adaptation: Meeting a growing capacity need. *Urban Climate* 14:111-115. <https://doi.org/10.1016/j.uclim.2015.06.006>

Muttarak, R. and Lutz, W. 2014. Is Education a Key to Reducing Vulnerability to Natural Disasters and hence Unavoidable Climate Change? *Ecology and Society* 19(1), 42. <http://doi.org/10.5751/ES-06476-190142>

- National Research Council. 2012. Disaster Resilience: A National Imperative. Washington, DC: *The National Academies Press*. <https://doi.org/10.17226/13457>
- National Research Council. 2014. Civic Engagement and Social Cohesion: Measuring Dimensions of Social Capital to Inform Policy. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18831>
- National Academies of Sciences, Engineering, and Medicine (NASEM). 2016. Science Literacy: Concepts, Contexts, and Consequences. Washington, DC: *The National Academies Press*. <https://doi.org/10.17226/23595>
- National Academies of Sciences, Engineering, and Medicine (NASEM). 2018. Learning Through Citizen Science: Enhancing Opportunities by Design. Washington, DC: *The National Academies Press*. <https://doi.org/10.17226/25183>
- National Academies of Sciences, Engineering, and Medicine (NASEM). 2019. Building and Measuring Community Resilience: Actions for Communities and the Gulf Research Program. Washington, DC: *The National Academies Press*. <https://doi.org/10.17226/25383>
- National Geographic Society. 2020. What is Geo-literacy? National Geographic Society. <https://www.nationalgeographic.org/media/what-is-geo-literacy>
- National Community-Based Organization Network. 2011. *Sph.umich.edu*. <https://sph.umich.edu/ncbon/whatis.html>
- National Oceanic and Atmospheric Administration. 2015. Education Strategic Plan 2015-2035. http://www.oesd.noaa.gov/leadership/edcouncil/education_plan.html
- National Oceanic and Atmospheric Administration (NOAA) National Weather Service Strategic Plan 2019-2022, Building a Weather-Ready Nation. 2019. https://www.weather.gov/media/wrn/NWS_Weather-Ready-Nation_Strategic_Plan_2019-2022.pdf
- National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters. 2020. <https://www.ncdc.noaa.gov/billions>
- Niebold, F., K. Poppleton, and J. Kretser. 2018. Climate Change Education: Building Hope and Social Capacity in 21st Century Students. *Green Schools Catalyst Quarterly* V (4). <https://catalyst.greenschoolsnationalnetwork.org/gscatalyst/Store.action>
- North American Association of Environmental Educators (NAAEE). 2017. Community Engagement: Guidelines for Excellence. Washington, DC: North American Association for Environmental Education. <https://naaee.org/eepr/resources/community-engagement-guidelines>
- Norström, A.V., C. Cvitanić, M.F. Löf, et al. 2020. Principles for knowledge co-production in sustainability research. *Nat Sustain* 3 182–190. <https://doi.org/10.1038/s41893-019-0448-2>
- Organisation for Economic Cooperation and Development (OECD). 2019. PISA 2018 Assessment and Analytical Framework, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/b25efab8-en>
- Ojala, M. 2012. Hope and climate change: the importance of hope for environmental engagement among young people. *Environmental Education Research* 18(5), 625–642. <https://doi.org/10.1080/13504622.2011.637157>
- Pettit, J. 2004. Climate Justice: A New Social Movement for Atmospheric Rights. *IDS Bulletin* 35 (3), 102–106. doi: 10.1111/j.1759-5436.2004.tb00142.x
- Reed, M. S., A. C. Evely, G. Cundill, I. Fazey, J. Glass, A. Laing, J. Newig, B. Parrish, C. Prell, C. Raymond, and L. C. Stringer. 2010. What is social learning? *Ecology and Society* 15(4): r1. <http://www.ecologyandsociety.org/vol15/iss4/resp1>
- Pulido, L. 2000. Rethinking environmental racism: White privilege and urban development in Southern California. *Annals of the Association of American Geographers* 90 (1):12–40. <https://doi.org/10.1111/0004-5608.00182>
- Roth, C. E. 1992. *Environmental Literacy: Its roots, evolution, and directions in the 1990s*. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education. <https://files.eric.ed.gov/fulltext/ED348235.pdf>
- Schubel, J. R., J. Enzler, A. Munroe, and T. Schmid. 2013. *Increasing Community Resilience to Extreme Weather-Related Events through Coastal America's Coastal Ecosystem Learning Center Network*. Long Beach, CA: Aquarium of the Pacific. http://www.aquariumofpacific.org/downloads/Extreme_Weather_Related_Events_Report.pdf
- Sharpe, J., Swartling, A. G., Pelling, M., and Pearson, L. 2019. Social Learning and Resilience Building in the emBRACE Framework. In *Framing Community Disaster Resilience: Resources, Capacities, Learning, and Action*, ed. H. Deeming, M. Fordham, C. Kuhlicke, L. Pedoth, S. Schneiderbauer, and C. Shreve, 43-59. Hoboken, NJ: John Wiley & Sons, Inc. <https://doi.org/10.13140/RG.2.2.31730.25285>
- Spitzer, W. and Fraser, J. 2020. Advancing Community Science Literacy, *Journal of Museum Education* 45:1, 5-15. <https://doi.org/10.1080/10598650.2020.1720403>
- The Greenlining Institute. 2019. *Making Equity Real in Climate Adaptation and Community Resilience Policies and Programs: A Guidebook*. <https://greenlining.org/wp-content/uploads/2019/08/Making-Equity-Real-in-Climate-Adaption-and-Community-Resilience-Policies-and-Programs-A-Guidebook-1.pdf>

The Ocean Project. 2009. *America, the Ocean, and Climate Change: New Research Insights for Conservation, Awareness, and Action*. <https://theoceanproject.org/reports>

The Ocean Project. 2011. *America and the Ocean: Annual Update*. <https://theoceanproject.org/reports>

United Nations Educational, Scientific and Cultural Organization (UNESCO). 1977. *Intergovernmental Conference on Environmental Education Tbilisi Declaration*. Paris, FR. <https://www.gdrc.org/uem/ee/Tbilisi-Declaration.pdf>

U.S. Climate Resilience Toolkit. Glossary. 2020. Toolkit.climate.gov. <https://toolkit.climate.gov/content/glossary>

U.S. Global Change Research Program (USGCRP). 2009. *Climate Literacy: the Essential Principles of Climate Sciences: a Guide for Individuals and Communities*. Washington, DC. https://downloads.globalchange.gov/Literacy/climate_literacy_highres_english.pdf

U.S. Global Change Research Program (USGCRP). 2018. *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 <https://nca2018.globalchange.gov>

U.S. Global Change Research Program (USGCRP). Glossary. 2020. GlobalChange.gov. <https://www.globalchange.gov/climate-change/glossary>

White, G.F., R.W. Kates, I. Burton. 2001. Knowing better and losing even more: the use of knowledge in hazard management. *Environmental Hazards* 3(3/4) 81-92. [https://doi.org/10.1016/S1464-2867\(01\)00021-3](https://doi.org/10.1016/S1464-2867(01)00021-3)

White House and Department of Homeland Security (DHS). 2011. Presidential Policy Directive-8. <http://www.dhs.gov/xlibrary/assets/presidential-policy-directive-8-national-preparedness.pdf>

Yale Program on Climate Change Communication. 2019. *Yale Climate Opinion Maps 2019*. Yale Program on Climate Change Communication. <https://climatecommunication.yale.edu/visualizations-data/ycom-us>

