SUSTAINABILITY PLAN

Version 1 · June 2021

978-264-4200 • 177 Main Street (Route 27) • Acton, MA 01720 • discoveryacton.org

I. Introduction

Everything we need to survive and thrive—air, water, food, energy, raw materials for industry—has its origins in our natural environment. It is therefore incumbent upon us as a society to steward these resources sustainably. This plan outlines concrete steps Discovery Museum will take over the next several years to increase operational sustainability, as well as strategies for motivating the next generation of environmental stewards.

Sustainability, according to the most basic definition, entails meeting the needs of the present without compromising the ability of future generations to meet their own.[1] Over time, the concept of sustainability has evolved to recognize that practices can be sustainable in one dimension but unsustainable in another—environmentally sustainable development cannot truly be considered sustainable if its economic benefits fall only to the wealthiest nations, for example. Becoming more sustainable then is about more than just leaving our children a planet with adequate resources, it is also about achieving greater harmony in the present between the environmental, economic, and social impacts—both locally and globally—of our actions. As a children's museum, we also see it as our obligation to help inspire and prepare the next generation to face these complex issues.

Since 1982, Discovery Museum has dedicated itself to creating opportunities for children to learn through playful exploration. Our mission has always been to spark children's curiosity and encourage them to experiment, invent, and imagine. In so doing, we are helping them build essential skills—the ability to solve problems, think critically, work together, and engineer solutions—all essential for addressing complex environmental challenges. The Museum's formal vision statement, adopted in 2018, says "that all children will feel inspired to explore their world and be confident in their natural abilities so they can fulfill their unique potential and embrace a dynamic future." Given the magnitude of the problem, it's vital we acknowledge this dynamic future will undoubtedly be defined by global environmental crisis.

In just the last century, the blink of an eye in human history, we have put the planet on a perilous path through overpopulation and overuse of fossil fuels, forests, fisheries, freshwater resources, and agricultural land. Global temperatures are rising at an alarming rate; we are seeing a dramatic increase in destructive weather events and forest fires; we are rapidly losing biodiversity; and access to basic resources is diminishing. More than 90% of the world's population breathes polluted air and more than half are exposed to unsafely managed water resources.[2] Moreover, the disparities in access to natural resources between, and even within, nations is growing. The crisis we are handing off to future generations, with its interconnected environmental, social, political, and economic challenges, is formidable.

This Sustainability Plan establishes concrete goals, strategies, and benchmarks for the Museum to tackle these issues in our own community and beyond. The plan outlines steps to reduce the environmental impact of the Museum's operations; inspire children and families, through our example and through Discovery Museum visitor programs, to appreciate nature and act on its behalf; and advocate for our values as they pertain to sustainability and the environment. Because technology is evolving and we are

[1] Brundtland, G. (1987). *Report of the World Commission on Environment and Development: Our Common Future*. United Nations General Assembly document.
[2] World Health Organization. (2020). *WHO Global Strategy on Health, Environment and Climate Change: The Transformation Needed to Improve Lives and Well-being Sustainably Through Healthy Environments*. Geneva: World Health Organization.

continually learning, this document should be considered a work in progress and will be updated periodically. We also will align our activities with the Town of Acton's current work to develop a Climate Action Plan, as well as participate in and learn from such organizations and initiatives as America is All In and Sustainable Museums. In addition, the Discovery Museum's Sustainability Plan should be viewed within the context of our other organizational goals. In seeking to become a more sustainable organization we will continue to adhere to our values as outlined in our 2019 Strategic Plan, 2019 Learning Experience Framework, and 2021 Diversity, Equity, Access, and Inclusion Plan, particularly with respect to racial and environmental justice, as it is strikingly clear that the impacts of climate change and pollution disproportionately affect vulnerable communities around the world.

II. History of Sustainability Initiatives at the Museum

The Museum first articulated its commitment to environmental sustainability in 2007. Asserting that "we are keenly aware of the interrelationships of humans and the natural world and our obligations to be good stewards of that world," the Museum set formal goals for becoming a "green" organization and encouraging others to take responsibility for the environment. The Museum also established as its formal vision statement becoming "a premier community museum which embodies discovery learning and environmental stewardship." Two years later, the Museum completed a Master Plan for Campus Expansion that included a concept for building a new Environmental Discovery Museum, featuring photovoltaic panels, a windmill, a composting area, an aquifer recharge zone, and other sustainable technologies and nature-based solutions. Unfortunately, the recession of the late 2000s, coupled with stagnant visitation, staff reductions, and below-target revenue, forced the Museum to focus almost exclusively on shoring up its finances and building its audience. It was not until 2013 that the Museum was in a place to contemplate a future campus renovation and initiate a capital campaign to fund it, this time with a focus on accessibility, which by then had become a pressing need and a programmatic focus.

In the meantime, in response to an alarming rise in children's screen usage—and a growing body of research on the importance of outdoor play for children's health and development—the Museum expanded its nature programming, hiring its first Outdoor and Environmental Educator in 2015. The following year, the Museum opened Discovery Woods, an award-winning, one-acre, fully accessible nature playscape and treehouse abutting 180 acres of town-owned conservation land. With a goal of encouraging "every kid, every day, outside to play," the Museum also deepened its Backyard and Beyond program series to offer a range of year-round outdoor experiences for children of all ages and levels of comfort with outdoor play. Coinciding with the opening of its expanded and renovated, accessible building in 2018, the Museum also changed its longtime "Hands On, Minds at Play," tagline to "Science. Nature. Play.," to reflect this programmatic evolution and a recognition that getting kids outside is first step to developing an appreciation for the natural world and a sense of responsible stewardship of its resources.

With its facilities needs addressed, the Museum was in a position once again to launch its vision for environmental sustainability. Early progress was made with the installation of two EV charging stations in the Museum parking lot and the completion of a solar feasibility study. In spring 2020, the Museum was awarded funding from the Massachusetts Cultural Facilities Fund to carry out site work needed to make possible the installation of a solar array in the parking lot. The Museum also inventoried its resource usage and CO_2 emissions to provide a basis for setting reduction goals. Despite the COVID-19 pandemic, which forced a four-month closure, the Museum is continuing to drive its sustainability initiatives forward and is on track to complete the solar array installation by late 2021.

III. Greenhouse Gas Emissions Audit

In spring 2020, the Museum assessed its greenhouse gas emissions, taking into consideration onsite electricity and energy usage, employee commuting, Traveling Science Workshop (TSW) school program instructor travel, air travel by staff to conferences, and travel by visitors between home and the Museum. Estimates were calculated using 2019 visitor zip code data and 2019 school program delivery records. Sources of greenhouse gas emissions onsite include gas burning furnaces in the main Museum building and the 183 Main Street offices and an oil burning furnace in the old Children's Discovery Museum. According to this analysis, the Museum emits an equivalent of 2,265 tons CO_2 annually, with visitor travel to and from the Museum accounting for 80% of it (Fig.1). Of the non-visitor sources, onsite electricity usage accounts for the majority of greenhouse gas emissions, followed by staff commuting and travel by TSW instructors to schools throughout the region (Fig. 2).

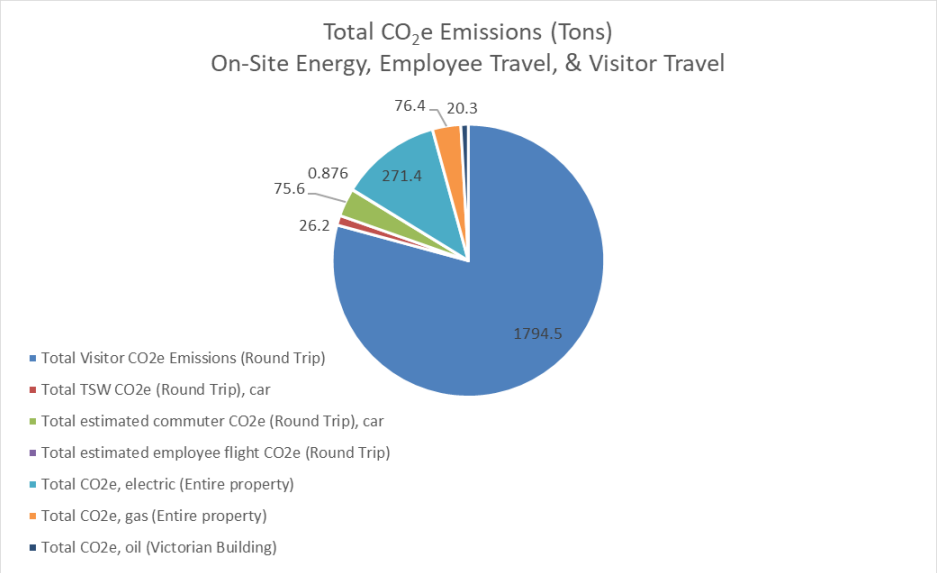

Figure 1: Total CO_2e (carbon dioxide equivalent) emissions from all sources

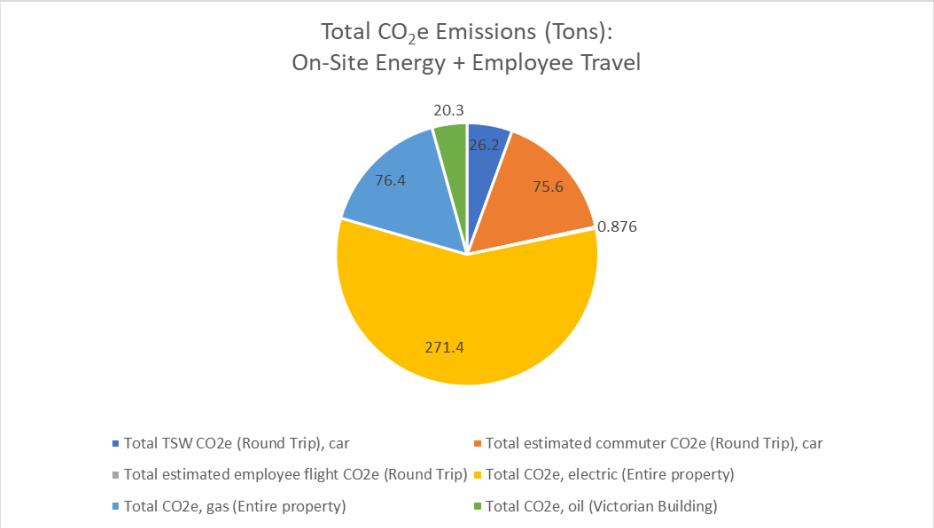

Figure 2: Total CO_2e (carbon dioxide equivalent) emissions, excluding visitor transportation

The Museum also assessed its water usage and solid waste generation. Based on 2019 water bills for all three buildings on the property, the Museum uses an estimated 65,000 cubic feet of water annually (Fig. 3). An analysis conducted this year of our waste generation found that the Museum generates 260 yards of trash and 140 yards of recycling each year.

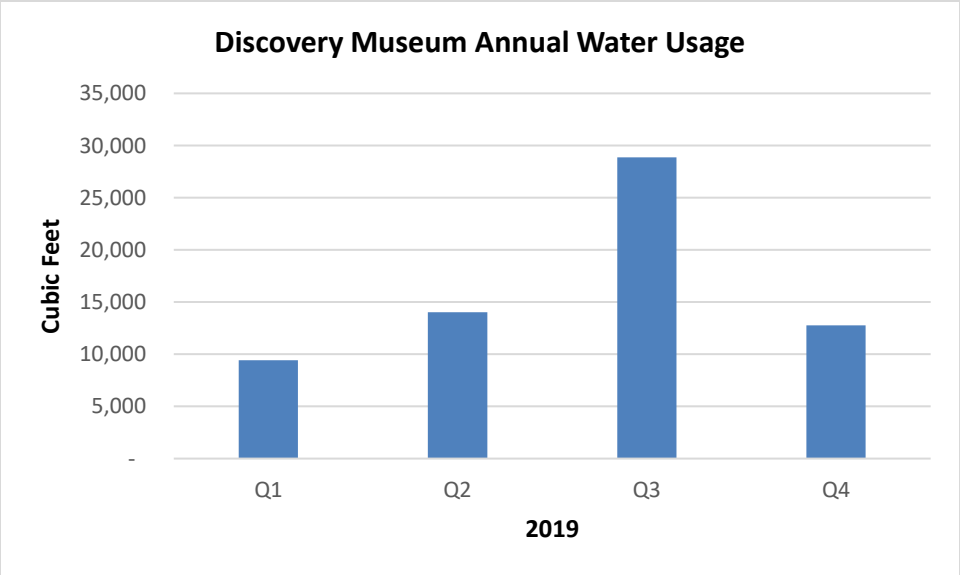

Figure 3: Total water usage for the three Museum buildings

IV. Goals

Building on our long-time commitment to inspiring life-long learners and encouraging children to appreciate nature, we have set ambitious, yet achievable goals aimed at reducing our carbon footprint, resource consumption, and waste generation—all to be carried out transparently and publicly in order to model environmentally sustainable practices. We will create a Sustainability Advisory Group of experts and practitioners to produce an annual report on progress and make periodic updates and amendments to the plan.

While the Museum has made substantial progress in some areas, it is taking its first steps others, including designing practices that have not been tested in a museum setting. As such, these goals and measures of progress are likely to evolve as we continue to learn more about our impact and the actions we can take to sustainably steward our environment.

Goal: Reduce Greenhouse Gas Emissions to Achieve Carbon Neutrality by 2024

Context

Human activities, particularly the burning of fossil fuels, are estimated to have caused 1.2°C of global warming on average since the start of the Industrial Revolution, the effects of which are evident in sea level rise, more frequent extreme weather, and a shrinking Arctic ice sheet. In 2019, global CO_2 emissions reached a record high—62% higher than 1990—and the period 2015-2019 was the hottest five years on record.[3] Nearly 30% of greenhouse gas emissions in the United States come from the burning of fossil fuels for transportation, a larger source even than electricity production or industry.[4] Likewise, Discovery Museum's biggest source of greenhouse gas emissions is visitor vehicles, which annually emit 1,800 tons CO_2e—80% of our total—through travel to and from our campus. In addition, Museum educators travel 26,000 miles by car per year to deliver Traveling Science Workshop programs to students in their schools, producing an estimated 26.2 tons of CO_2e. Employee commuting adds another 76 tons CO_2e to the atmosphere per year.

In 2018, the Intergovernmental Panel on Climate Change issued a report concluding that the difference between warming the planet 1.5° and 2°C would mean significantly more poverty, extreme heat, sea level rise, habitat loss, and drought. At our current rate of emissions, global temperatures are expected to increase 3-5°C by the end of the century. The Paris Agreement, adopted by nearly every country on Earth in 2015, is a legally binding international accord in which nations commit to reducing greenhouse gas emissions, with the goal of limiting global warming to 2°C, and ideally 1.5°C. The agreement also provides a pathway for developed nations to support developing nations. While the cascading effects of global warming impact every nation, they are borne disproportionately by vulnerable populations in countries least responsible for the problem. When the United States, currently the second biggest emitter of greenhouse gases, withdrew from the treaty under President Donald Trump, the Museum signed onto We Are Still In, a commitment to delivering on the promise of the Paris Agreement (which the U.S. has since re-joined under President Joe Biden). The following actions will support our reduction of CO_2 emissions:

[3] https://www.un.org/en/climatechange/science/key-findings

[4] U.S. Environmental Protection Agency. (2021). *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019*. Washington, D.C.: U.S. Environmental Protection Agency.

Strategies

- ***Install a 338kW DC solar canopy that will produce more than enough energy to meet 100% of the Museum's electricity needs***
  The Museum has signed a contract with Resonant Energy authorizing the company to secure an installation partner, assist the Museum in securing financing to purchase the solar panels, obtain necessary permits, and install the solar array. Installation is expected to be complete by late 2021.

- ***Demolish the 183 Main Street office building***
  Removing the building, which is in poor condition and contains a natural gas-powered furnace, will reduce CO_2 emissions by an estimated 30.7 tons/year. Demolition is necessary to optimize placement of the solar array on the Museum's property. The building's administrative functions can now be accommodated elsewhere on the property. The Museum has obtained a $200,000 grant from the Massachusetts Cultural Facilities Fund, which has been matched by a private donor, to carry out this work and other site improvements necessary for the solar installation. Prior to demolition, the building has been offered for free to anyone able to move and reuse it. We will invite a salvage company to the site prior to demolition to determine if any building materials can be recycled or reused.

- ***Replace the oil burning furnace in the former Children's Discovery Museum with an electric heat pump***
  The furnace in the original museum building—the Victorian house at 177 Main St.—emits an estimated 40.8 tons CO_2 per year. The building closed to the public in 2018 and is currently used for office space and storage; administrative functions currently housed in the 183 Main Street building will be moved to this building.

- ***Sell excess solar electricity through a community solar partner***
  The Museum will produce more electricity from the solar array than is required onsite. Through a community solar partner, the Museum will sell solar electricity to selected subscribers, extending the overall community impact of this project.

- ***Mitigate carbon emission through visitor-supported carbon offset purchases***
  With carbon offsets, a visitor can counteract their personal carbon footprint by helping build clean energy and support carbon-reducing projects. The Museum will, via our point-of-sale admission process, calculate the estimated CO_2 emissions of a visitor's drive to and from the Museum, explain the carbon offset concept, and offer the visitor the opportunity to purchase an offset as an addition to their admission price. This will provide a way to affect our carbon footprint, educate visitors, and demonstrate publicly our commitment to reducing greenhouse gas emissions. To our knowledge, no museums have implemented visitor carbon-offsets.

- ***Explore the feasibility of purchasing or leasing electric vehicles for use by Traveling Science Workshops (TSW) instructors; deliver some programs virtually***
  Had COVID-19 not forced us to cancel in-school programs in spring 2020, TSW would have reached 46,000 students during the 2019-2020 school year, a 26%, increase over the previous year, in more than 100 towns throughout the region. Because this program brings hands-on STEM exploration to students right in their classrooms, it is critical to our efforts to reach

children facing barriers to Museum access. In 2019, TSW instructors drove more than 26,000 miles to deliver programs to students in their schools, a total that is expected to increase given the 6% per year average growth in the program over the last decade. Supplementing or replacing our instructors' use of gas-powered vehicles with electric vehicles would improve on our annual environmental impact. Delivery of school programs virtually rather than in-person, a capability that was developed during the pandemic, can provide another way to reduce the program's CO_2 footprint.

- ***Promote the use of public and alternative transportation to the Museum***
  Located just 0.4 miles from the South Acton Commuter Rail Station, the Museum is easily accessible via train and on foot. We will also encourage—through incentives, better information, added bike racks, and wayfinding along the path to the Museum—local visitors and staff to walk or bike to our campus.

- ***Accommodate staff telework when possible***
  Because of the COVID-19 pandemic, staff whose roles can be effectively conducted from home are now capable of working remotely and equipped to do so. Management will review positions, determine feasibility, and set goals for reducing environmental impact through telework.

- ***Consider virtual delivery of lectures and events***
  In 2019, the 8th year of our Discovery Museum Speaker Series, we held four lecture programs attended in-person by 362 people, all of whom likely traveled to the events by car. Due to the pandemic in 2020, we transitioned these programs to a webinar format, which has both boosted attendance and allowed us to expand our reach widely. With the learning curve related to virtual delivery behind us, we will continue to consider this format as a more environmentally sensitive complement or alternative to in-person gatherings. This also helps to address inequalities in access to transportation and childcare.

Goal: Reduce Consumption and Waste Generation

Context

Unless humans change consumption habits, we are on pace to double our use of natural resources globally by 2050 and increase waste production by 70%, with the wealthiest nations consuming 10 times more resources per capita than people in the developing world.[5] Given the urgent need to transform how we produce, consume, and dispose of materials, Discovery Museum is committed to setting ambitious targets for waste reduction and recycling, as well as more closely considering the entire life-cycle of the materials we consume. The Museum has already taken some steps to reduce consumption and waste, as well as purchase more environmentally friendly products, including: switching from plastic to paper bags in the Museum store; composting yard waste on site and mulching lawn clippings; using environmentally friendly trash bags for our waste; purchasing only "green certified" cleaning supplies, such as those with a Green Seal label; installing Energy Star rated appliances; and using organic lawn care and pest control products. In addition, Discovery Museum already fosters a culture of reuse through its educational programs, which make common household goods and recyclable objects—including cardboard boxes shipped to the Museum—the raw materials for creation and experimentation. Through the following actions, the Museum will extend these efforts:

[5] International Resource Panel. (2017). *Assessing Global Resource Use*: *A Systems Approach to Resource Efficiency and Pollution Reduction.* Nairobi, Kenya: United Nations Environment Programme.

Strategies

- ***Decrease waste generation from special events***
  In 2019, the Museum reached more than 10,000 people through events and functions, including the annual Discovery Gala, Speaker Series, and the Treehouse Takeover evening event for adults. Additionally, visitor birthday parties and rentals often utilize disposable products. The Museum will use its own reusable tableware, tables, and linens for its own events, and compost event food waste. Rented reusable supplies will only be utilized when necessary, and party and rental event hosts will be encouraged to compost and use reusable products.

- ***Use environmentally friendly trash bags for 100% of the Museum's trash***
  This year, the Museum committed to transitioning to an environmentally sound replacement for its trash bags for solid waste. At the current rate, the Museum uses 500 12-16 gallon trash bags and 100 40-45 gallon trash bags per month.

- ***Eliminate single-use plastic water bottles***
  The Museum has already eliminated the use of single-use plastic water bottles at meetings and indoor events and will explore alternatives for the vending machine and outdoor events.

- ***Conduct a waste audit for educational and outreach programs and exhibit operations and develop strategies to reduce waste generation***

- ***Conduct a sustainability audit of materials and supplies and explore options for purchasing more sustainably sourced and packaged products***
  The Museum will inventory materials routinely purchased for programs, educational outreach, office use, events, exhibit construction and maintenance, Museum store, vending machine, and cleaning and develop a preferred purchases list of lower-impact products. This could include materials made from post-consumer recycled content; replacing traditional plastics made from fossil fuels with biopolymers; purchasing zero waste laundry and dishwasher detergents; and purchasing from suppliers who use compact and biodegradable packing materials.

Goal: Reduce Water Usage

Context

Due to a combination of population growth, economic development, and changing patterns of consumption, water usage has been increasing globally by about 1% per year for the last four decades, meaning that by 2050 water consumption will be 30% higher than it is now.[6] In the U.S. approximately nine percent of the total water use in commercial and institutional facilities takes place in office buildings and six percent takes place in educational facilities such as schools, universities, museums and libraries.[7]

Apart from depleting water resources, climate change has altered precipitation patterns around the world, with some regions becoming drier and others wetter. More than 2 billion people now live in countries experiencing high water stress, and about 4 billion people experience severe water scarcity

[6] UNESCO World Water Assessment Programme. (2019). *The United Nations World Water Development Report 2019: Leaving No One Behind*. Paris: UNESCO.

[7] https://www.epa.gov/watersense

during at least one month of the year.[8] In Massachusetts, annual precipitation has been increasing in recent decades, however much of it falls during extreme weather events punctuated by periods of lower-than-average rainfall. [9] More intense rainfall produces high precipitation totals, but also leads to flash flooding and is not as effective at recharging groundwater as smaller, more frequent storms. The following strategies are aimed at reducing water consumption at the Museum and managing our water resources more sustainably.

Strategies

- ***Develop reduction goals***
  The primary focus of water reduction efforts will be on reducing irrigation water usage, the largest component of Museum water consumption.

- ***Capture storm water and redirect it for groundwater recharge***
  This will include installing additional rain barrels and rainwater collection systems on the property to provide water for irrigating the Discovery Woods garden and grounds. Collection systems will also capture rainfall on the solar panels and direct it to a rain garden, reducing runoff into the town storm water drainage system and recharging groundwater.

- ***Replace outdoor paved areas with pervious pavement***
  In locations where rainwater cannot be easily captured and redirected to the ground, the Museum will prioritize the use of pervious pavement.

Goal: Educate and Communicate Our Intentions and Actions to the Public

The importance of building environmental literacy in changing habits and perceptions is profound, and organizations and institutions trusted to convene the community are among the most impactful educators. Parents and adult caregivers also play an important role in helping children develop a concern for the environment. Studies have shown that children's attitudes about the outdoors form early. Kids who play outside regularly from a young age—and whose parents also value being in nature—are significantly more likely to spend time outside, develop a connection to nature, and become conscientious environmental stewards as adults. Research has also demonstrated that, like any skill or ability, forming a strong connection to nature happens progressively and dynamically, with children first gaining comfort being ***in*** nature, then gradually developing the ability to be ***with*** nature—learning from it and feeling attached to it—before ultimately becoming motivated to act ***for*** nature—to care for it and take actions to protect it.[10] Since 2015, Discovery Museum's Backyard and Beyond program series has provided children and their families with a range of nature experiences tailored to different ages and levels of comfort with the outdoors. From simple observation, such as cloud gazing and weather watching, to more in-depth activities aimed at teaching children about such topics as gardening, animal adaptations, and astronomy, the Museum has a solid foundation upon which to deepen its nature programming and develop new learning experiences that inspire children to act for nature.

[8] https://www.unwater.org/water-facts/scarcity/
[9] Massachusetts Executive Office of Energy and Environmental Affairs and Massachusetts Emergency Management Agency. (2019). *Massachusetts Drought Management Plan.* Boston, MA.
[10] Giusti, M., Svane, U., Raymond, C.M., and Beery, T.H. (2018). *A Framework to Assess Where and How Children Connect to Nature*. Front. Psychol. 8:2283.

Strategies

- ***Expand and enhance the Museum's nature, outdoor, and environmental education programs to inspire kids to take action on behalf of the environment***
  While messages about climate change and the need for action surround us all, it's only the least sophisticated ideas that are typically packaged for young audiences. Yet, as the future stewards of our natural environment, children will bear the greatest responsibility for action and intention on this important issue. To support phased outdoor and environmental education experiences that teach children to stand up for nature, the Discovery Museum will expand the "In, With, For" approach to environmental education: First, give children (and their families) the opportunity to be IN nature, through appealing outdoor programs in Discovery Woods and in the 180 acres of conservation land it abuts. Then, encourage children to learn WITH nature, by exploring independently and becoming sympathetic to the patterns and needs of the outdoor world—and respectful of its inhabitants. Finally, we will model advocacy and seek to inspire children to speak up FOR nature and against climate change, from positions both of authority as knowledgeable outdoor explorers and of responsibility as enthusiastic agents of change.

  We will also continue to encourage young children to engage with natural spaces to support their health and well-being. From the physical benefits of gross-motor exercise to the mental health support of being in an accepting and soothing environment, getting outside to play is an essential part of childhood and has been core to the Discovery Museum experience for many years.

- ***Continue partnering with the Town of Acton to encourage access to the neighboring Great Hill conservation land via a trailhead on the Museum property***

- ***Develop partnerships with environmental organizations to provide additional educational opportunities and offer concrete ways for visitors to take action to promote sustainability***

- ***Continue to foster dialogue and discussion on environmental issues through the Discovery Museum Speaker Series and other means, particularly with older kids and adults***

- ***Publicly report sustainability goals and progress and use our practices as examples for others***

- ***Create a page on our website dedicated to the Museum's sustainability efforts, including updates to this Sustainability Plan***

- ***Include our sustainable practices in exhibits, programs, and other educational opportunities in order to model ways to better steward the environment***

- ***Advocate for our values as they pertain to sustainability***
  The Museum believes that sustainability is a necessity for a healthy and just society. Our educational efforts will, in audience-appropriate ways, advocate for collective action on sustainability by people of all ages.

Goal: Prioritize Sustainability in Portfolio Analyses and Decision-Making

Context

Investments in corporations or other vehicles that exhibit sustainable practices encourage such behavior. Their actions can have an important impact on sustainability. While tools are imperfect to make sustainable investment decisions, it is important to encourage sustainable business practices through financial decisions.

Strategies

- ***Create a Museum investment policy that maximizes investments in environmentally sustainable entities***

V. Conclusion

For 40 years, Discovery Museum has sought to create a setting in which children of all ages, backgrounds, and abilities feel empowered to play and explore the world around them. Through our hands-on exhibits, programs, outdoor spaces, in-school programs, and with the encouragement of our dedicated staff, our message is clear: *play is welcome here*. By implementing the strategies outlined in this plan, we aim to convey an additional message, that everyone can and should take action to protect our world. In harnessing solar energy to power the Museum, collecting rainwater to recharge aquifers, composting our waste, and other eco-friendly initiatives, we will make plainly visible our commitment to environmental sustainability. Through our exhibits and programs, we will also build children's knowledge about the environment and make apparent the pressing need to act on its behalf. As we put this vision into practice, we are committed to partnering with others in the community and in our field to continuously learn and evolve, and to share our knowledge and experience. It is our sincere hope that these collective actions will have an impact in the short term as well as motivate and prepare children to address complex environmental challenges in their future.

Acknowledgements

Much of the research and development of this plan was completed by Elizabeth Skorski as a volunteer intern.

Review and advice of the draft plan was provided by Sarah Sutton and Cameren Cousins.

Writing and editing was completed by Elizabeth Dorsey.

The plan was unanimously approved by the Discovery Museum Board of Directors on June 10, 2021.