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VISUAL & PERFORMING ARTS | RESEARCH ARTICLE

Environmental art: A path to civic progress in a time of policy retreat in the United States

Laura J. Perovich^{1*}

Abstract: Over the past forty years, the environmental movement has won important victories, from the Clean Air Act to the Paris Accord, yet the overall environmental outlook for our planet remains dire. At a moment in the United States where policy approaches to climate change are stalled, art is positioned to contribute to this movement and complement existing strategies in environmental policy, education, and research. This paper surfaces a number of examples of environmental art, from public art to products to speculative design and explores theories of social change and behavioral research that help explain the challenges and limitations of traditional approaches and suggest the potential of art in creating environmental action. How can environmental art move us forward in a time of policy retreat in the United States? How can we assess environmental art as a form of socially engaged art and in light of avant-garde perspectives?

Subjects: Environmental Issues; Environment & Society; Conservation - Environment Studies; Environmental Politics; Environmental Change & Pollution; Technology; Environmental Anthropology; Contemporary Art; Design; Visual Arts

Keywords: environmental art; theories of change; cultural intervention; eco art; activism; politics

1. Environmental policy and politics in the United States today

Policy has been a major focus of the environmental movement in the United States since the Clean Air Act in 1963 and the founding of the United States Environmental Protection Agency in 1970 (US EPA, 2015). But what happens when policy and regulation become an unlikely path to progress? Can the arts step in to guide a revitalized environmental movement?



Laura J. Perovich

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Laura J. Perovich is a PhD candidate in Media, Arts, and Sciences as part of the Object-Based Media group at the MIT Media Lab. In her research, she considers the potential of art and technology to increase engagement and action around environmental issues, and builds installations that leverage these approaches to address environmental challenges with communities and individuals. Her research on data physicalization uses aesthetics to draw out emotional and intuitive data perspectives and considers how measuring can become a mechanism for intervention. She works in multiple media including textiles, digital media, and light painting.

PUBLIC INTEREST STATEMENT

Climate change and pollution are some of the most pressing global issues of our time. These human-driven forces can destroy our homes, our health, and our happiness—they may even make the Earth inhospitable to humans in the coming centuries. Behavioral research and theories of civic change suggest a role for the arts in tackling these kinds of wicked environmental problems. This paper looks at examples of environmental art including public art, visual art, products, and speculative prototypes. I also look at other civic movements that draw on the arts and can inspire new environmental works that contribute to creating a better future for all.

There is no better time to answer this question than the present. In his first year and a half in office, President Donald Trump has thrown the United States' environmental policy dramatically off-course with implications that could imperil humankind for generations. The damages of 2017 are exhausting. In February, Trump's first head of the EPA, climate denier Scott Pruitt, was approved, causing mass departures of EPA staff and fueling talk of deep cuts to the EPA's budget before he was forced to step down in 2018 amid ethics scandals (Dillon et al., 2018; Whyte, 2018). In March, Trump supported the reversal of a 2015 decision to ban a high-use pesticide that harms children's development and has been linked to autism (Rabin, 2017). In June, Trump withdrew the United States from the Paris Climate Change Accord, the first global agreement committing all countries to act to reduce CO₂ emissions over the next ten years (The White House, 2017; UNFCCC, 2018). In December, Trump drastically cut the size of Bear Ears National Monument and Grand Staircase-Escalante to open them to mining, oil drilling, and other development (McBrayer & Roberts-Cady, 2018). These environmental setbacks continue in 2018, with the nomination of long-time Dow Chemical lawyer Peter C. Wright as a lead administrator of the EPA Superfund program (The White House, 2018) and the introduction of Scott Pruitt's replacement, EPA acting administrator Andrew Wheeler who has weakened coal regulation as part of the rollback and replacement of Obama's Clean Power Plan (US EPA, 2018).

These drastic changes undo decades of activism and policy work globally, nationally, and locally. They go against well-established scientific evidence funded by billions of United States federal research dollars over the past forty years (FCCE, 2014; Stocker, 2014). And they almost guarantee that we will see devastating environmental changes that will impact our health and infrastructure within the next century (Diffenbaugh et al., 2017; McMichael, Woodruff, & Hales, 2006).

Some governments, industries, and citizens have started to respond to Trump's damaging new direction on a local scale. Cities like Pittsburgh have committed to abide by the Paris Accord even if the United States will not (Watts, 2017), and states like California continue to be leaders in local legislation to protect human health around chemical exposures from consumer products (Washam, 2006). Tech companies like Apple and Facebook have committed to transitioning to 100% renewable energy and improving their electronics recycling programs (Apple, 2017; Greenpeace, 2017). Over one million individuals in more than 600 cities attended the March for Science on Earth Day 2017 to demand that governments accept the scientific consensus on climate change (Figure 1) (Appenzeller, 2017). Dissent has also emerged from within the federal government, where individuals at national agencies such as the Parks Service have put forward alternative social media accounts in order to share accurate environmental information with the public (Boerner, 2018).

Policy and education efforts from industry, local government, and individuals provide a necessary first response to the environmental damage caused by the United States federal government. They also show how trust in political systems is eroding: we no longer turn to our political leaders to bring us forward on these issues. If the government can't bring people together to take on urgent challenges that impact us all, then how else can we unite a diverse nation around big problems? This moment provides us with an opportunity to reflect on the past forty years of the environmental movement in the US. We have made huge advances in environmental research, education, and diplomacy, and yet we have struggled to make significant lasting progress on many environmental issues. What else can we do to create change?

2. Environmental education, communication, and values

Along with policy, education has been the primary focus of environmental activism efforts for decades. Many groups are working to educate people about environmental issues as they believe that increasing people's knowledge will lead them to change their behavior. Researchers, non-profits, and federal agencies have been creating and sharing climate change curricula for up to two decades (Gold et al., 2012; Mayer, 1995; Stanford University, 2018) and professional organizations such as the American Geophysical Union offer programming to help scientists share their

Figure 1. March for Science, Washington DC, April 22nd, 2017 (img: Becker1999, Wikimedia Commons).



work with a general audience in an effort to add expert voices to the national conversation on the environment (American Geophysical Union, 2018). Celebrities have also been educating people and drawing attention to environmental issues. Al Gore first presented his *Inconvenient Truth* lecture by flipchart in 1989 and his movie of the same name became a surprise hit over a decade ago (Guggenheim, 2006; Sumner, 2016). Actors and musicians including Leonardo DiCaprio and Sheryl Crow have also produced films or dedicated tours to supporting climate change action and education (Boykoff & Goodman, 2009).

Bringing environmental scientists into the public conversation and raising awareness about issues like climate change is certainly a well-intentioned and logical step toward taking on these tough problems. It is also a necessary counterpoint to groups such as the George C. Marshall Institute (now the CO2 Coalition) that spread misinformation about environmental issues and oil companies like Exxon-Mobile that have a history of funding scientists who raise doubt on climate change (Oreskes & Conway, 2011). Education and policy have helped us make great progress on some environmental issues; the ozone hole has healed significantly since the 1987 Montreal Protocol banned production of ozone-depleting chemicals (Solomon et al., 2016) and acid rain damage has reduced since a series of regulatory victories in the 1980s and 1990s (NAPA, 2011). Yet despite decades of work, we find ourselves progressing far more slowly than other nations on other issues like climate change. Spreading and growing our knowledge hasn't been enough to take on these wicked problems (Buchanan, 1992).

Recent findings in social science may provide some insight on these challenges. Behavioral researchers have shown that raising awareness can backfire for tough issues that cross into cultural spaces. People who are presented with well-established scientific information that challenges their beliefs do not adopt the more accurate information, instead they become more polarized and hold even more tightly to their beliefs (Kahan, 2015a, 2015b; Kahan, Braman, Gastil, Slovic, & Mertz, 2007; Kahan et al., 2012). This is particularly true when the information threatens the values of the individual and his or her group belonging. For example, conservatives

are less receptive to evidence of climate change when it is prefaced with information about carbon-emissions limiting solutions and more receptive when it is prefaced with information about geoengineering solutions (Kahan, 2015b). Geoengineering appeals to many conservatives because it allows us to maintain our traditional industry practices while also adding new engineering solutions to the market, so a geoengineering framing of climate change is aligned with conservative values, instead of threatening them.

There is a long history of artists creating works that temper the threats to our values presented by big social challenges through engaging with us emotionally and aesthetically. Organizations like the Center for Artistic Activism are revisiting and refreshing these techniques to create “emotionally resonant experiences that lead to measurable shifts in power” (Center for Artistic Activism, 2018). Artistic activism may help us make progress on difficult problems that resist our educational efforts by combining art (affect) with activism (effect). For example, theater-inspired die-ins led by AIDS Coalition to Unleash Power (ACT UP) shifted the national perspective on AIDS in the 1980s and forced President Reagan to publicly recognize the problem and allocate national resources to reducing the suffering of thousands of people (Gould, 2009). Pop culture can also be effective in renewing a cultural perspective. Former Vice President Joe Biden credited popular television shows like *Will & Grace* for shifting the national conversation on marriage equality (Silverman, 2013) and researchers demonstrated that these shows could reduce people’s prejudice against gay men (Schiappa, Gregg, & Hewes, 2006). What can environmental art do to support ongoing work in environmental policy, education, and research today?

3. Selection and evaluation of environmental artworks

In this paper, I discuss over twenty environmental artworks that are significantly engaged with the public sphere in order to understand the potential for environmental art in creating civic progress. Several of these pieces are part of the pop culture space, others come from critically acclaimed artists with deep cultural reach, some are tied to particular environmental policies, while a few are consumer products. Many sit physically in public space. The pieces were selected to span a variety of disciplines and media, including works from designers, architects, artists, technologists, and activists using media that is visual, nature-based, performative, and novel. This paper is not an exhaustive overview of environmental art—an expansive and highly varied space that has ties to eco-art, land art, speculative design, ecovention, public art, ecofeminist art, and many others—but is instead a broad sample intended to illustrate some existing approaches in the public consciousness. I examine these pieces in the context of theories of civic change that focus on how culture, norms, and imagination create social practices that can be equally powerful as laws in shaping behavior at scale.

In the near past, critics have attempted to evaluate the success of these types of culturally focused artworks using traditional measures such as critical acclaim, reach and viewership, acquisition or market value, artistic narrative, and aesthetic success. Recently, people have suggested that these measures cannot sufficiently describe new forms of socially engaged art. Instead, they recommend a pragmatic and outcomes-based approach to evaluating socially engaged art that looks at the work’s actual impact in the world and compares it to other forms of intervention. Simoniti says that “if socially engaged artworks are to be good art, they ought to make a real difference” (Simoniti, 2018). For environmental art, the resource burden of the piece is also important—successful works should not do more environmental harm than good. While this is a high bar—and not yet a widely accepted approach—it may also be a crucial perspective and important to our aim of understanding how art can help us make progress on environmental issues.

Avant-garde thinkers can also provide insight on the potential and the perils of environmental art for social change. The avant-garde movement was founded on the idea that “the power of the Arts is the swiftest and most expeditious” way to reform society and that artists, scientists, and industrialists should work together to create a better future (C. Harrison, Wood, & Gaiger, 1998). At

the same time, avant-garde thinkers also point to the danger of artworks that are insufficiently critical in pursuing change and emphasize the importance of being “critically aware of the conditions of [the art’s] possibility, which usually means, the conditions of its production” (Buden, 2009). Without this awareness of the social context and institutions of their art, artists may facilitate superficial social change that provides modest benefits while leaving the root of the problem untouched and preventing radical change. In the context of environmental art, we ought to keep an eye toward whether and how the pieces engage with embedded structures and attitudes including consumerism, capitalism, racism, and techno-utopianism that are connected to many of our environmental challenges (Anderson, 2015; Cole & Foster, 2001; Klein, 2015). In this paper, I will focus on the social impact route to evaluation recommended by Simoniti, while also offering reflections on the possible limitations of the works based on an avant-garde perspective.

4. Environmental art

4.1. Visual art with environmental storylines

Visual artists have shown us the state of the Earth since the early days of the environmental movement. John McKee’s 1966 Bowdoin College exhibit *As Maine Goes* paired color photographs of Maine’s natural beauty with black and white photographs of roadside trash, industrial waste, and other human-made refuse also found in the outdoors of Maine (Beem, 2018; Fenton, 1966). Placing these images side by side shows us our shortcomings and misconceptions and also suggests a better future that could exist. This exhibit was a founding piece of broader environmental efforts in the state. Local politician Horace Hildreth Jr. credited the exhibit for turning Maine’s state policy toward environmental issues, and enlisted McKee to create a second series of photos for a report that led to the creation of Maine’s Land Use Regulation Commission. Even more locally, the exhibit led to the first Bowdoin College environmental studies course taught in 1969 and to the addition of the environmental studies major at the school in 1972 (Beem, 2018).

Many present-day visual artists also try to help us see environmental issues, though the efficacy of this approach is less clear now that most people already have some environmental awareness. Contemporary films such as *Chasing Ice* and *Antarctic: Ice and Sky* try to add to our knowledge by including science storytelling and bringing us to places we don’t normally see at the extremes of the world (Cortese, 2018; Grocholski, 2016). Photographer Richard Misrach and designer Kate Orff document issues closer to home in *Petrochemical America*, an “ecological atlas” that includes photographs, drawings, and maps from “cancer alley” along the Mississippi River (Misrach & Orff, 2014). The piece aims to represent a full system by combining the emotional attributes of art with the analytic perspectives of history, economics, and ecological research to start conversations about creating a more just future. While visually stunning, the real world impacts of these present day works are unclear in this time of general environmental awareness but low environmental action. Photography and video may allow viewers to remain passive and keep their distance from the work and the environmental issues it presents.

New visual media such as virtual and augmented reality may bridge this distance and bring people toward more active roles. In the haptically augmented virtual reality experience *Tree* by Milica Zec, Winslow Porter, Xin Liu, and Yedan Qian participants experience life as a rainforest tree from birth to death (Figure 2) (Lui, 2017; Zec & Porter, 2017). They begin by planting a seed in the real world, and then enter the virtual world as the seed itself, soon becoming a sapling, and then a tree that falls victim to human destruction. Participants are immersed in both the visual and the tactile experience of being a tree through controlled air movement, heat, and vibration that reinforces the storyline throughout the experience. When participants return to the real world, they encounter a clear path to action—they see a projection of a tree where they initially planted a seed and are sent home with their own seed to plant. Being the tree itself may increase viewers’ empathy for nature and motivate them to plant a tree. Yet this action is more of a token gesture, not a real path to environmental impact. Effective action on environmental issues requires

Figure 2. *Tree*, Milica Zec, Winslow Porter, Xin Liu, and Yedan Qian, 2017 (img: Yedan Qian).



collective effort that may be hard to encourage in virtual reality, a media that isolates individuals in an alternative world.

4.2. Environmental art in public spaces

A number of artists create environmental artworks in public spaces which may be more suited to creating collective action on environmental issues than virtual or museum spaces. In 2014, artists Olafur Eliasson and Minik Rosing created a publically situated representation of climate change with an explicit political focus. They installed *Ice Watch*, a piece created from 100 tons of ice placed in a twelve pointed circle like a clock, during the United Nations IPCC Climate Change negotiations in Copenhagen (Figure 3) (Weber, Bauman, & Eliasson, 2014). The melting of this Greenland ice was meant to shift people's perception of climate change by giving them a tangible physical representation of it. Installations like this can create a visceral sense of the problem and the project was intended to push climate negotiators to come to an agreement. At the same time, this non-interactive installation does not inspire us with new solutions to our known problems and the creation of the piece presents a significant environmental cost that may outweigh its benefits. In particular, critics questioned whether the social and policy impact of *Ice Watch* was worth the CO₂ burden of bringing the huge ice pieces to Copenhagen (Herbert, 2014).

Other public environmental artworks recreate our shared spaces to produce new possible futures. Amy Franceschini's *Victory Gardens 2008+* and Lauren Bon's *Not a Cornfield* (Figure 4) are two examples of this approach. *Victory Gardens 2008+* modernized the idea of victory gardens from World War I and World War II to create a series of urban gardens in San Francisco, including the historic garden site at City Hall (Carruth, 2014). The gardens provide green space, an urban food supply, and an opportunity to engage the community with local environmental issues. *Not a Cornfield* by Lauren Bon turned a 32-acre plot of abandoned public land in the center of Los Angeles into a cornfield which attracted herons, hummingbirds, and butterflies back to the urban environment. It also created a community by hosting over 120 events in a year including bike tours, gardening classes, and open-mic performances (Bon, 2005; Christensen, 2015). Both of these pieces use public space in a surprising way that prompts people to rethink what their city can be and helps us see ourselves as an active part of an enjoyable new environmental future that is tied to our past. They also have immediate small scale environmental benefits such as increased green

Figure 3. Ice Watch, Olafur Eliasson and Minik Rosing, 2014
(img: Blink O'fanaye).



space and local biodiversity. Yet there is a risk that these interventions may not endure or scale since they don't challenge the institutions and structures that influence the availability and allocation of urban public spaces, such as real estate and financial systems.

4.3. Environmental art that challenges the present and creates models for the future

Natalie Jeremijenko is a contemporary leader in environmental art for civic change who grounds her work in community systems and real-world interactivity and challenges existing social structures in order to point toward new models for the future. She mixes environmental science with visual arts, systems design, and community building to create projects that span an impressively large space of environmental issues and reduce them to an understandable scale. In the early 2000s, Jeremijenko built feral robotic dogs that sniff out industrial pollution in communities (*Feral Robotic Dogs*) (Figure 5) (Lane et al., 2006) and soon after she founded the Environmental Health Clinic where patients can get prescriptions for environmental actions to improve their community and their health (*xCLINIC*) (Schaffer, 2008).

Jeremijenko's works are particularly powerful as they align with avant-garde perspectives to challenge deep social structures and institutions. *Feral Robotic Dogs* reclaims a consumer toy and turns it on itself to create a tool that searches for pollution that is an outcome of consumerism, while *xCLINIC* questions the limits we place on medicine that excludes the relevance of environmental issues to our health. In her piece *EELATION*, Jeremijenko hosted eel themed cocktail parties with drinks for both species and discussion that surfaced the impact of New England dams on aquatic ecosystems (Sterling, 2013). At the end of the party, participants are invited to facilitate the increasingly difficult migratory journey of the glass eels by releasing them into local waterways which are the eel's native habitat, supporting environmental sustainability goals often held by Democrats. Yet participants are warned that releasing eels in this manner violates federal environmental regulations, even though it does not pose a risk to the eels or the ecosystem, showing that laws can be nonsensical, an argument consistent with the small government goals of Republicans. Each participant must decide how to move forward, and many find this to be a disorientating space that causes them to investigate their unexamined beliefs in a new light.

Figure 4. Not a Cornfield,
Lauren Bon, 2005 (img: Marie
Velde, Wikimedia Commons).



Jeremijenko's fame and her community-based projects likely lead to increased environmental awareness and curiosity around alternative futures in the general public. Her works succeed in providing a deep structural critique and may help local communities, politicians, or companies reflect on their practices and begin action toward alternative solutions. At the same time, these provocations are only a start toward a new future and must be followed by considerable work in policy, advocacy, engineering, community organizing, and environmental science to achieve scalable social change.

Jeremijenko's work is part of a history of environmental art that Helen Mayer Harrison and Newton Harrison began forty years ago. The Harrisons' works viscerally demonstrate a seemingly intractable problem and then help us stay with the problem despite the emotional burden by engaging us with possible solutions. For example, the first piece in their project *Greenhouse Britain* shows people the potential impact of climate change by projecting rising water levels onto a large-scale model of the United Kingdom. The next four pieces in the series present possible responses to this future including images of carbon-friendly resettlement villages that coastal dwellers could relocate to, plans for "defending" the city of Bristol from the rising waters, sketches of city watershed redevelopment, and designs for a vertical town that recreates the feel of small-town main street in an ecosystemic self-contained building. This work creates public dialogue on an issue that has deep and seemingly tragic personal impact—visitors can see their homes and towns disappearing within a lifetime—and yet avoids despair by pointing toward alternative futures that are inventive, concrete, and tied to current societal values. As their installation states, "...the news is neither good nor bad it is simply that great differences are upon us that great changes are upon

Figure 5. Feral Robotic Dogs, Natalie Jeremijenko, 2007 (img: Jeff Warren).



us as a culture whether we will it or not...the news is really about how we meet these changes and are transformed by them or in turn transform them” (The Harrison Studio, 2009).

The Harrisons’ work has been crucial in creating a space for environmental art within the art world that was slow to accept it. At the same time, *Greenhouse Britain* and many of their other works remain primarily within museums or traditional art spaces and do not circulate in digital spaces, popular news sites, or community spaces as much as some of Jeremijenko’s pieces. The Harrisons’ most recent work ventures closer to environmental policy and research impact through the founding of the Center for the Study of the Force Majeure at the University of California Santa Cruz (The Harrison Studio, 2018). The Center is in the early years of its 50 year research plan and would benefit from tracking the project’s social and environmental impact in the coming decades so we can better understand the role of long-term artistic projects in creating change (H. M. Harrison, Harrison, & Selz, 2012).

4.4. Environmental art in and with nature

Other environmental artists create pieces that focus on beauty and drive us to reflect on fundamental environmental questions. Andy Goldsworthy’s environmental sculptures use natural materials and tools found on-site to create a piece of nature outside of our expectations (National Gallery of Art, 2017). His piece *Ice Spiral: Tree Soul* shows us an icicle spiraled around a tree and *Stone House* (Figure 6) puts a round boulder in a round hole in a rock wall built into a hill—both surprising, manipulated realities that also blend perfectly into the landscapes they come from (Herring Island, 1997; Morning Earth, 2018). His sculptures blur the boundaries between the human-made and the natural. Like us, they are subject to nature and are impermanent. His works cause us to reflect on fundamental questions around our position in the environment—what is natural and what is human? Is there a difference? How do we create as a part of the environment? Goldsworthy has achieved considerable fame and critical acclaim within the art world which speaks to the aesthetic success of his work. Environmental impact is not his primary focus, but we can estimate that his work has a net positive impact. His reach in popular culture

Figure 6. Stone House, Andy Goldsworthy, 1997 (img: GailLeenstra, Wikimedia Commons).



suggests an increase in environmental appreciation and points to his success in getting urban dwellers to see nature as an artwork and to consider their environmental impact. His nature-based sculptures and materials add virtually no environmental burden to counteract these positive impacts.

Listen Tree (Figure 7) by Edwina Portocarrero and Gershon Dublon further challenges the boundaries of the natural. When a person places their ear on the tree they hear poems, ecological monitoring data, or live audio from a marshland brought to them via bone conduction from audio transducers hidden in the roots of the tree (Dublon & Portocarrero, 2014). *Listen Tree* makes us literal tree huggers. As we hold the tree in order to hear its stories we also smell it, feel it, see it up

Figure 7. Listen Tree, Gershon Dublon and Edwina Portocarrero, 2015 (img: Edwina Portocarrero).



close, and hear its other sounds. *Listen Tree* is also a very public and collective spectacle—in an installation in a public park in Mexico, each tree listener caused a cascade of passer-byers to follow suit (Dublon & Portocarrero, 2015). By placing us in close contact with the tree and giving it the illusion of speech the artists prompt us to see nature in a new way and may increase our collective environmental empathy.

Harpreet Sareen's piece *Elowan: Cyborg Botany* works similarly by making the agency of plants visible to humans (Sareen, 2017). This plant-machine hybrid is able to drive itself toward light by using robotic augmentation controlled by sensors that detect the plant's internal signals. Like *Listen Tree*, *Cyborg Botany* gives plants human skills and may increase our empathy for nature as we're forced to see it with fresh eyes. At the same time, humans have a long history of exploiting nature and there is a risk that a less artistically motivated form of both of these pieces could bring us back to our long-held view of nature as a human tool.

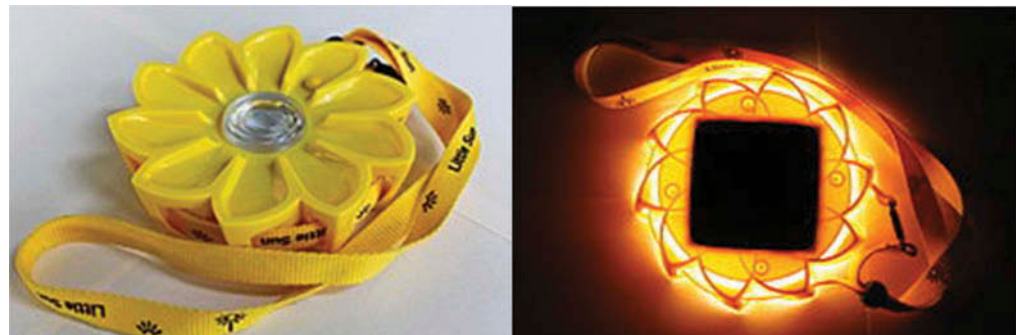
4.5. Product-based environmental art

A number of technology and design studios create product-based environmental artworks that aim to leverage markets for social change. Founded in 2012, Olafur Eliasson's *Little Sun* product family is one of the most widely known works in this area and includes two solar powered lamps, *Little Sun Lantern* (Figure 8) and *Little Sun Diamond*, and a solar powered phone charger, *Little Sun Charge* (Eliasson, 2018). It is an artistic and market solution to an environmental and social issue. How do we provide light and connectivity to the 1.6 billion people who live without electricity? How do we change our lives to consume less energy? *Little Sun* is an experimental solution that has scaled into the homes of hundreds of thousands of people.

The original *Little Sun Lantern* was part of a number of London installations that push further reflection on these questions, including a nighttime walk through the Tate Modern lit by *Little Suns* and 16 short films by teams from countries with limited electricity. In 2016, Olafur released *Little Sun Charge* in response to the increased importance of cell phones around the world and in hopes of expanding the renewable energy market in Africa (Carter, 2017). As Olafur says, "the way that this is a work of art for me is the combination of how it raises questions and a critical discussion around the same questions" (Lachno, 2012). The product's website frames the work as socially engaged art and claims broad goals including environmental sustainability, education, energy access, gender equality, health, and poverty eradication.

To quantify the product's impact, the *Little Sun* website cites the impressive number of products sold (661,578), countries reached (38), and money saved (\$35,531,865), as well as sharing personal testimony from customers all over the world. Yet these statistics fall short of truly assessing impact on these broad goals and some critics question the efficacy and the financial model of the product. Simoniti encourages us to measure the impact of *Little Sun* against other on-the-ground and non-artistic solutions to electricity scarcity, such as *Liter of Light*, though the data to actually perform this comparison is not available (Simoniti, 2018). Ebbesen draws from an avant-garde

Figure 8. Little Sun, Olafur Eliasson, 2012 (img: Anton-kurt, Wikimedia Commons).



perspective and examines the context in which *Little Sun* is created, including the potential impact of its financial model which depends on “Western” countries purchasing products at a mark-up to subsidize prices in other areas. He also examines the framing of the product as an artistic piece (Ebbesen, 2017): who is the real customer here—the art world Olafur belongs to and seeks approval from, the consumers from wealthy nations subsidizing the product with their purchases, or citizens in electricity-scarce nations—and what are the tradeoffs in designing for all these communities at once? Can a piece that relies on consumerism to thrive make a deep impact on the environmental issues and inequality that consumerism creates? The creation of artistic products in response to environmental issues may negatively impact the way we think about environmental challenges. Products like *Little Sun* may lead us to believe that we can purchase our way out of the energy problem or cause us to feel like we’ve done our part by buying a lamp, and allow us to avoid looking more deeply at how environmental and social issues are embedded in our society. At the same time, the significant reach of *Little Sun* shows that Olafur was successful in activating a population and channeling their desire to contribute to solving this problem. People want to do something—can we find ways to help them do more?

A number of designers are taking a similar market-based approach and turning pollution into products. *Air Ink* by Graviky Labs is an arts ink created from particulate matter pollution captured from the tailpipe of vehicles (Graviky Labs, 2018). Each air ink pen is roughly an hour of emissions from one vehicle. Graviky Labs has partnered with artists to create public installations using these inks in cities across Asia and aims to reduce the health and environmental impact of pollution. Similarly, artist Daan Roosegaarde created a family of air filtration systems for public spaces, including *SMOG FREE TOWER* (Figure 9) and *SMOG FREE BICYCLE*, and turns the collected material into *SMOG FREE JEWELLRY*. The *SMOG FREE TOWER* stands 7 m tall and uses positive ionization to reduce local concentrations of particulate matter pollution, cleaning roughly 30,000 cubic meters of air per hour—about the volume of an Olympic sized swimming pool (Roosegaarde, 2018). It has been deployed in parks in China with future installations planned in Poland. Both *Air Ink* and the *SMOG FREE* family began as technology-supported provocations intended to draw attention to a problem and activate our creative energy around environmental issues that can be emotionally challenging.

Figure 9. SMOG FREE TOWER, Daan Roosegaarde, Dalian, China, 2017 (img: World Economic Forum).



These products face similar challenges to the *Little Sun* family as they may appear to offer a solution but likely only create superficial change and do not challenge institutions in a way that could meaningfully alter our environmental trajectory. The artists recognize that their products are not environmental solutions, saying “unless [*Air Ink*] is deployed on a large scale and there is an entire ecosystem around it, its effect will be minimal” (Joshi, 2016) and that the *SMOG FREE* family “is not the real answer for smog. The real answer has to do with clean cars, different industry and different lifestyles” (Hunt, 2013). Yet in the last five years, Roosegaarde has continued to focus on the technology behind the provocation, creating technical revisions to *SMOG FREE TOWER*, quantifying and validating the air purification outcomes, and suggesting a bicycle based form (Garfield & Thompson, 2018; Peters & Peters, 2017). Nothing about the technofuturistic form factor of the tower suggests its vulnerability and extremely limited efficacy to the public who encounter it. Instead of a provocation, these products can become a mirage of a solution that normalizes pollution and distracts us from the hard social issues and deeply held institutions we need to take on in order to effect large scale environmental improvements.

4.6. Performance-based environmental art

A performance piece by Brother Nut speaks to the same pollution challenges as *Air Ink* and *SMOG FREE TOWER* and uses similar technology but has a very different message. In 2015, Brother Nut spent 100 consecutive days vacuuming the air in public spaces in Beijing and sharing his daily progress on social media (Huang, 2015; Rivers, 2015). After 100 days, he turned the pollution he collected into a brick, stating that he aimed to raise environmental awareness and make pollution into a tangible relatable object. The piece did seem to succeed at these goals; the work went viral in China and Brother Nut received a great amount of attention during his four hour daily vacuuming performances. Yet perhaps the greatest success of the performance was its exhibition of the scale and the humanness of this problem. The futility of one person vacuuming smog out of a city’s air is abundantly evident in the piece and stands in contrast to the technological approaches of *Air Ink* and *SMOG FREE TOWER*. Brother Nut’s performance clearly shows us that this is not the solution, that individual action and technology will not save us, and that we need collective approaches and societal changes to truly address air pollution. While this is certainly not an optimistic message, it may be the one that we need to hear.

Brother Nut’s performance draws on a history of activist performance popularized by the *Theater of the Oppressed* created by Augusto Boal in Brazil in the 1970s based on Paulo Friere’s research (Boal & McBride, 2008). Boal’s performances brought facilitators and citizens together to create solutions to pressing social issues such as homelessness, poverty, disease, and civil war. The theater used a variety of performance techniques to open a safe and creative space to explore solutions to seemingly impossible problems: for example, actors might set the scene by playing out an example of the social issue and then replay the scene as the audience intervenes to suggest alternative possibilities (Boal & McBride, 2008; Sullivan & Parras, 2008). On the environmental side, *Climate Change Theater Action* uses a similar media to try to create new narratives and action around environmental issues (Bilodeau, 2017; Center for Sustainable Practice in the Arts, NoPassport Theatre Alliance, The Arctic Cycle, Theatre Without Borders, and York University, 2017). In 2017, participating sites in 32 countries put on short environmentally-related plays in classrooms, theaters, homes, and outdoors in support of the United Nations Climate Change Conference. Local organizers were encouraged to include opportunities for action in their events and some of the theater pieces were speculative and forward looking. Unfortunately, these performances did not incorporate the interactivity crucial to Boal’s model of theater action. Though some environmental artists like Jeremijenko begin to include the performance of potential solutions in their works, this remains an under-utilized approach in environmental art.

In recent years, social activists have adopted “laughtivism” approaches that could serve as inspiration for environmental groups, which are often perceived to be humorless. Influenced by Gene Sharp, Otpor used “laughtivism” as part of the successful movement to topple Slobodan Milosevic in Serbia in 2000 (Popovic & Miller, 2015). The student group used street theater, posters,

and installations to mock the dictator and gain cultural support, including one installation that invited citizens to sign a birthday card for Milosevic with a gift of handcuffs and a prison uniform (Sombatpoonsiri, 2015). Otpor's actions helped turn students from fearful and passive victims into passionate actors for a cause. The creativity and empowerment that "laughtivism" inspires might also help us take on more abstract and diffuse issues like climate change and Inside the Greenhouse's contest *Standing Up for Climate: An Experiment with Creative Climate Comedy* is one early example of leveraging humor for the environmental movement (Inside the Greenhouse, 2018). The organizers recognize that "humor is a tool underutilized in the area of climate change; yet comedy has power to effectively connect people, information, ideas, and new ways of thinking/acting" and invite entries of short funny videos and stand up sketches about environmental issues (Inside the Greenhouse, 2018). While this is a starting point for introducing humor to environmental activism, there is much more room for growth into interactive artistic media as seen in the "laughtivism" on other civic issues.

5. Reflecting on environmental art and theories of change

This paper has highlighted over twenty environmental art pieces that operate in the public sphere, from Brother Nut's air pollution performance to the virtual reality experience *Tree* to the public installation *Ice Watch*. These pieces largely work in the emotional space and can creatively help us grapple with the challenges to our values that environmental issues present in a way that education, policy, and research efforts cannot. Theories of civic change proposed by Jenkins, Zuckerman, and Lessig respond to findings in behavioral research and help us better understand how these artworks may prompt progress on environmental issues.

Researcher Henry Jenkins explains how culture can create a "civic imagination" of a new future that opens space for social change: "Before we can change the world, we need to be able to imagine what a better world might look like, we need to believe that change is possible, we need to see ourselves as agents of change, and we need to develop empathy for the plight of others whose experiences are different from our own" (Jenkins, 2017). The Harrisons' leverage the civic imagine in their speculative works discussed above; for example *Greenhouse Britain* concretely engages communities with the local environmental tragedy that they all may face, shows them possibilities for new homes and cities of the future, and enlists and inspires them to step toward possible but difficult solutions.

Beyond the civic imagination, Ethan Zuckerman has built on work from Lawrence Lessig to identify a number of routes to change including passing laws, influencing norms, leveraging markets, and coding (Gordon & Mihailidis, 2016; Lessig, 1999). While environmental activists often focus on passing laws, the environmental artworks discussed in this paper pursue change through influencing norms. For example, *Not a Cornfield* makes us rethink our assumptions about what kinds of landscapes belong in cities and *Cyborg Botany* challenges our perception of the agency of plants. Many of the environmental artworks discussed here combine norm space change with additional paths to change. As *Maine Goes* and *Ice Watch* both had specific legal and policy routes of action that were tied to the cultural norms they influenced. *Little Sun* and *Air Ink* focus on changing markets by introducing new products and new models of consumption. These pieces also make people feel like they can be part of the solution and can begin to engage with an issue that seems daunting. Jeremijenko's works may be the most successful in spanning all the routes to social change: *EELATION* has immediate ties to specific regulation and challenges these rules in its enactment, *xCLINIC* creates a market demand for environmental health advice, a service rarely provided by medical professionals, and *Feral Robotic Dogs* creates new tools that can disrupt long established spaces through the coding mode of social change. Jeremijenko's integrated approach to social change captures the attention of many people, as well as making a local positive environmental impact, and the summation of all these impressions and influences open the doors to cascading change.

6. Conclusion

The Trump presidency is a frightening time for the planet. Lack of strong action by the United States—the world’s second biggest polluter—will ensure that climate change continues swiftly and devastatingly (McMichael et al., 2006; Olivier, Schure, & Peters, 2017; US EPA, 2017). The changing environment is already forcing large scale human migration and causing enormous destruction in cities slammed by more powerful storms (Diffenbaugh et al., 2017; Missirian & Schlenker, 2017). Over the past decade, our knowledge and awareness of environmental issues has increased by orders of magnitude and helped society take on issues such as acid rain and the ozone hole. Yet knowledge and awareness have not created sufficient improvements on many issues, suggesting that we need to add another line of offense to take on these wicked problems.

The environmental art and activism projects above serve as scattered shards of optimism, creativity, and energy in an environmental movement that is likely to continue to face setbacks in the coming years of the Trump presidency. In order to move forward in this challenging political climate, we need more artists to integrate environmental issues and other civic challenges into their practices. Artists, environmental researchers, advocates, and educators must connect with each other to tackle this wicked problem as some avant-garde thinkers suggest, and groups like the Center for Artistic Activism and Inside the Greenhouse can facilitate these connections. To maximize impact, we should look closely at where environmental art is experienced and by whom—who is our audience for asking and replying to these big questions, and where can we best engage with them? Public art, products, and speculative prototypes have an important role to play by increasing access to environmental art, opening us to solutions, and letting us try on the future via interactive real world pieces. We should also look closely at the environmental impacts and the long term implications of environmental artworks—as Simoniti points out, we rarely have the information necessary to fully assess the impact of these pieces. Was *Ice Watch* worth its CO₂ footprint? Moreover, we should heed the advice of avant-garde thinkers such as Rodrigues and Buden and consider the context of creation of environmental artworks and their ability to critique the root of environmental problems to create truly impactful change. Do technofuturistic pieces like *SMOG FREE TOWER* invite environmental complacency or drive environmental action? Can products like *Little Sun* create deep change when they rely on the systems of consumption that are major contributors to our environmental issues? By better understanding the context and impact of environmental artworks we can more effectively navigate toward a better future.

Artistic activism helped jump start progress on AIDS in the 1980s by challenging norms around the disease. Today environmental artists can empower us to take on our international environmental challenges. As Elke Weber, Usairena Bauman, and Olafur Eliasson say in a 2004 op-ed that is even more relevant today: “it’s time to realise that we are not going to solve the climate crisis through our rational mind alone. Action on climate change requires more than information provided by IPCC reports and other sources. It requires inspiration. We need to be inspired and motivated to change” (Weber et al., 2014).

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