Article

Making the Invisible Visible: Eco-Art and Design against the Anthropocene

Carmela Cucuzzella

Design and Computation Arts, Concordia University, Montreal, QC H3G 1M8, Canada;
carmela.cucuzzella@concordia.ca

Abstract: This paper examines a series of art and design installations in the public realm that aim to raise awareness or activate change regarding pressing ecological issues. Such works tend to place environmental responsibility on the shoulders of the individual citizen, aiming to educate but also to implicate them in the age of the Anthropocene. How and what these works aim to accomplish, are key to a better understanding the means of knowledge transfer and potential agents of change in the Anthropocene. We study three cases in this paper. These are examined through: (1) their potential to raise awareness or activate behavior change; (2) how well they are capable of making the catastrophic situations, which are invisible to most people, visible; and (3) how well they enable systemic change in the catastrophic situations. In the three cases studied, we find that they are successful in helping to raise awareness and even change individual behavior, they are successful in rendering the invisible visible, but they are incapable of engendering any systemic change of the catastrophic situations depicted.

1. Introduction

Earth has experienced many planetary-scale shifts in its 4.5-billion-year history. The first signs of life, in fact, forcefully altered the future of the planet. There is a great difference between previous disturbances and the one we are currently experiencing, however. This is the first world-wide disruption that has been caused by the human species, and where that same species is aware of its influence.

As the impacts of human activity on the environment have begun to outpace 'natural' systems and processes, we have also begun striving to find innovative ways to address this imbalance [1]. It is therefore no surprise that research around mitigating or even preventing environmental crises has grown exponentially in the past 50–60 years. Further, with the estimate that 70% of the world's population will be living in cities by 2050, specific attention must also be placed on how urbanization can provide quality of life to all. As new materials, technologies, and data are increasingly being considered staples of the future city, however, we are beginning to lose both our sight and sense of stewardship as to the primary causes of the planet's condition [2]. Artists, designers, and architects are realizing that sustainability is quickly moving towards a technocratic paradigm just as studies are showing that geoengineering our way out of the environmental crisis, as a method on its own, fails to show signs of real worldwide improvement [3,4].

In this age of the Anthropocene, a geological epoch in which the relationship between humans and nature has been forever altered, (Crutzen, 2006), I am arguing that art and design in public spaces can be part of a larger domain of collective exploration and dialogue for addressing unsustainability. This is not to be confused with Land Art, a conceptual movement where art abandoned the constraints of the gallery in favor of alternative sites: urban, bucolic, and post-industrial, gaining force as a movement against the ruthless commercialization of the art world, and the rigorously minimal aesthetics of modern art.

Rather, I am referring to public installations with their own specific preoccupation. I am referring to an art and design practice that intends to explore the causes and implications of the Anthropocene.

How do artists, designers, and architects think about their practice in the Anthropocene? Some public works of art, architecture, and design that contend with the environmental crisis have begun to occupy a new, discursive terrain as agents of public enlightenment. The variety of these has been extensive, ranging from designs that aim to generate income from ecological tourism, to radical forms of ecological design [5].

Can ecological art, design, and architecture continue to focus only on direct ways of reducing the world's environmental and social devastations? It is well known that technology cannot be the only way out of the unsustainability crisis. It is equally important to consider that our way out of our predicament must involve new means of living within the earth's ecological processes.

The way humans understand the environment with respect to their own existence is no longer justifiable. In the past four decades, a multitude of mitigatory measures, policies, tools, and regulations have been developed. These have often been embedded in a world of risk assessment and avoidance, however, aiming to reduce devastation without changing dominant market practices. Do these various measures and tools limit how architects, designers, and artists respond to questions of sustainability?

The search for data has been a large part of some new forms of practice. Can this data be used to show the horror of humanity's past several decades of development? Indeed, some recent practices have focused on finding ways to illustrate, explain, or even teach about the damages resulting from our contemporary practices. They have adopted a type of educational stance, choosing to address politics, culture, ethics, economics and business, or even provide solutions to problems of sustainability.

This paper focuses on three works of art and design in the public realm that do not simply demonstrate an alignment with pressing ecological issues, but are driven by an urgent need to reveal and explain, placing "eco-lessons" squarely in the public realm [6]. Some of these practices are even using urban fragments for place-based eco-education. This paper therefore examines the teaching potential of a series of public works of environmental art, design, and architecture. The diversity of such works, from how and what they aim to accomplish, to the audience they wish to engage, are key to a better understanding of the means of knowledge transfer and potential agents of change in the Anthropocene.

2. Art, Design and the Anthropocene

From corporations and communities to individual humans, we are all well aware of the environmental crisis and the need to change our modus operandi [7,8]. Every day, tens, if not hundreds, of new texts present methods, technologies, and standards for achieving sustainability in architecture and the built environment. As we increasingly embrace technology as the solution to our problems—pollution in the air, soil, and water, increasing CO_2 emissions, resource depletion, loss of biodiversity—we may be turning the design of our cities into a sort of managerial science of risk. This represents what Jason W. Moore has called *Green Arithmetic*, which is the basic procedure that environmental studies have adopted over the past decades. Even if Green Arithmetic has been a powerful model for understanding the what of our planetary condition, it also has, to a great extent, stymied our understanding of how the present crisis will unfold in a world-system [9]. This treatment of society and nature may have been necessary and even productive, providing us with the ease to calculate environmental consequences, but it may also have led to a dire inability to foresee the future as a whole system [9]. It has also engendered a mindset that seeks to demonstrate human mastery of the planet via all types of engineering methods, frequently considering them the only way to adapt to inevitable environmental crises. This persists even as it is contested by activists [10] for everything from its fragmentary methods for identifying solutions to its isolated treatment of problems in a planet where environmental issues are inseparable from each other [11].

Visual imagery, on the other hand, has been central to building a universal conception of the Anthropocene. However, the problem is that much of this imagery rarely contributes to educating the audience for which it is intended [10], often retaining a techno-scientific and even militaristic visual lexicon. According to T.J. Demos, Anthropocene rhetoric, joining images and texts, frequently acts as a means of universalization, enabling military, state, and corporate apparatuses to disavow responsibility. These images effectively blur the true accountability behind the growing eco-catastrophe and make us all complicit in humanity's destructive project [10].

If current Anthropocene imagery is hindering the responsibilities that political bodies and corporations should be taking, does this responsibility now fall solely on the individual? What if this individual feels powerless against the extent of the damage around them? What do visual and experiential practices that aim to politicize the Anthropocene look like? Additionally, how can they accomplish the challenging feat of eco-teaching?

In 2016, Donna Haraway published a counternarrative to the Anthropocene in a book entitled, *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism* [9]. In her chapter, *Staying with the Trouble: Anthropocene, Capitalocene, Chthulucene*, she, along with many other scholars, sees the Anthropocene's focus on the human as a problem in itself. Haraway adopts Hannah Arendt's analysis of a war criminal and his inability to think. In the war criminal's surrender to authoritative thinking, lies the 'banality of evil' [12]. Haraway describes this lack of compassion as inconsequentiality, or in Arendt's words, thoughtlessness. This same thoughtlessness has been driving our planet to a dangerous tipping point [9].

As current discourses around environmental crises continue, a sense of despair and powerlessness emerges, a sensation that Glenn A. Albrecht describes as a form of eco-anxiety or *Solastalgia* [13]. This occurs when information or news about environmental distress inflects people's emotional relationship with Earth to one of distress. Artists have increasingly responded to this phenomenon in their work (Hayden Fowler's Hunger (2007) or Second nature (2008) are works that respond to this sense of anxiety, among others). Some of these works have remained abstract, however, and reside in the galleries, failing to reach broad audiences. Erle C. Ellis, in his short introduction to the Anthropocene, claims that Haraway's way of thinking, and the school of thought that abides by it, has inspired a diverse commotion of ideas and artistic expressions. He does not refer to the hindering technological expressions that Demos has presented, rather, but works exhibited in museums and public spaces, gatherings of scholars and artists, civic art with the potential to build community values. This type of civic art, dedicated to bridging art, design, architecture, and science with an educational slant is the focus of this paper—the eco-art installation [6].

Our research has found that the eco-art installation tends to be found in urban areas, placed in such a way that allows for multiple audiences and spectators. The eco-art installation does not simply attempt to persuade the viewer of ecological priorities; the very form and content of the work is shaped by the need to reveal and explain a spectacular yet dreadful aspect of our current ecological crisis. This manifestation suggests that action, even cognitive action, is a moral imperative. In contrast to most avant-garde practices of the twentieth century, these new forms of public art and architecture embrace didacticism as a means to communicate their message.

Such works tend to place environmental responsibility on the shoulders of the individual citizen, aiming to educate but also to implicate them in the age of the Anthropocene. Can such works, intended for the public, also influence corporations, governments, and policy? This question is beyond the scope of this paper. Here, we will study the diversity of eco-art works, and the means with which they aim to educate, and how they intend to render the invisibility of the damages addressed, visible.

3. Art and Design against the Anthropocene

The fields of art, eco-design, and architecture have long been addressing ecological anxieties. During the 1960s, there was a growing interest in design as a means to balance nature with the built environment [14]. Much of this work initially resulted in architecture and design that replicated nature [15,16]. These approaches also led to a form of rationality in design debates, where a series of design principles [17] and environmental management tools allowed for the quantification of environmental impacts [18–20]. This positivist attitude, where design and architectural practices were a means to secure environmental improvements in design outcomes, soon started to encounter limits in activating the imagination of architects, designers and artists [21–23]. There has been a critical appreciation of waste or even pollution as potential material for design innovations [24–26], where some new materials made from a complex mixture of compounds (recycled or new) present themselves as 'green innovation', yet are essentially monster materials that cannot be recycled or degraded into the earth [27]. These design approaches have sustained popularity, since they enable consumerist modes of production cleverly disguised under a cloak of environmental ethics [28–31].

Since the turn of the new millennium, there has emerged a moralistic discourse among the meanings inherent in art and design practices [32]. Some of these works, especially in the public realm, have sought to teach the public lessons [33–35]. This new form—public environmental art and design as didactic device—may be testimony to a change in citizens' relationships to environmental issues over the last thirty years. Timothy Morton, in *Being Ecological*, describes "dark ecology" as the philosophical counterpart of the Anthropocene [36]. Dark ecology advocates for a worldview that is 'darker', in which human existence is acutely aware of its entanglement in nature's fate. He explains how dark ecology "(. . .) reveals something slippery and evanescent" ([36], p.55). Indeed, Lydia Kallipoliti [5] describes this recent phase in the history of ecological design as "Dark Naturalism"s—the search for data in a sea of "hyperobjects" that are so massively distributed both spatially and temporally that they cannot be defined to any locality [37]. "Hyperobject" can refer to a variety of world conditions, such as the omnipresence of plastic or the ubiquity of car use, to name just two.

This may explain some key shifts in the creative response to environmental urgency that have taken place in the last few decades, specifically in the way that art and design respond to its imperatives in the urban context. The increasing collective awareness of climate change seems to further the individual desire to accept responsibility. Are these shifts tied to some form of eco-anxiety or even eco-distress at the individual level, even if the Anthropocene is a systemic condition that cannot be dealt with in such a way? [13]. In *Art in the Anthropocene*, Heather Davis and Etienne Turpin explain that the Anthropocene is not simply the result of activities undertaken by humans, which is what is often emphasized in the literature, but that it is rooted in a "particular nexus of epistemic, technological, social, and political-economic coalescences figured in the contemporary reality of petrocapitalism" ([38] p. 7).

This perspective of the Anthropocene highlights the notion of hyperobjects described by Timothy Morton [37], especially in the way that contemporary devastating conditions are perceived as pervasive and deeply embedded through space and time. In this way, hyperobjects, specifically emergent artificial environments that are indivisible from nature, present a dilemma to artists and designers. They become no longer solely concerned with saving the world through their practices. Rather, there arises a moralizing discourse associated with the acute recognition of pervasive waste, pollution, and associated social injustices.

These critical realizations by artists, designers, and architects have an influence in their practices and final works, specifically in how they advocate for justice and the common good. Demos has described this as anti-Anthropocene cultural activism, where practitioners are opposing the current petrocapitalist governmentality, which typically attempts to dominate the discourse on how to address the environmental crisis [10]. "These eco- art and

design practices, by their very nature are embedded in the politics of environmentalism" (Ingvardson and Nielsen 2018, p. 33).

Furthermore, such critical art and design practices are founded on deep interrogation [39]. Chantal Mouffe (2012) claims that there are practices that do not reproduce the prevailing common sense, but rather try to undermine it. They challenge the existing hegemony and try to disarticulate it [40]. Critical art and design practices aim to create an agonistic situation, a situation in which alternatives are made possible. They create a discourse and an aesthetic of dissensus: disagreement as a conceptual method [41]. Through all of this, contemporary art and design practices therefore seek to provide dialectical experiences.

Even if some art and design installations in the public realm have gained relevance because of their focus on the Anthropocene's degradation, they have not been without theoretical or even practical predicaments. Some questions that may be asked are:

- Do these types of works, especially those that seek to propose solutions, simply standardize our dire situation by providing little more than expedient remedies for more systemic problems?
- Does the assumption that individuals may come to change their quotidian through these interactions undercut the need for a deeper systemic change?
- Do these installations provide a means for a bottom-up dialogue to foster change at the municipal and even provincial levels?
- What is the place of science in these works?
- Are these practices critical to the dominant practices of climate change mitigation, which are proving ineffective?

With the current urgency of climate change, it seems understandable that artists and designers would rely on creative works as agents of change for communities, with clear messages for action. These public *agents of change* bring the sustainability conversation into the community by addressing deep social and cultural assumptions that impact daily behaviours. Using public spaces as ways to understand, experience, and even activate sustainable change relies on a hegemonic stability, which is prone to confrontation with counter-hegemonic practices [42]. By what means do these eco-art installations establish public platforms upon which eco-awareness can be raised?

4. Art and Design as Eco-Didactic Public Discourse

This study falls within a larger study on eco-didacticism in the public realm, a phenomenon that ties the art, architecture, and design fields to a righteous discourse that seeks public enlightenment. Eco-didacticism is characterised by works designed to deliver an eco-message through expressive, informative, and educational means [6]. Another characteristic of this didacticism is a desire to inform viewers through specific communicative strategies—a *cognitive experience*. This implies that the intended eco-message must be made easily visible in order to deliver information that is clear and uncontestable through *formal qualities*. This requires a *communication approach* for disseminating the desired message, based on collective consensus. These characteristics—(1) cognitive experiences, (2) formal qualities, and (3) communicative approaches—represent three operative tensions for eco-art works that aim to teach.

We will therefore analyse and compare the three selected eco-art installations based on [6], specifically this will comprise the:

- Cognitive experience: between the desire to inform and the poetics of form;
- Formal quality: between the visibility and the invisibility of environmental characteristics;
- Communicative approach: between consensus (agreement) and dissensus (disagreement) as method for disseminating the message.

This study will consider these eco-didactic characteristics through the lens of the Anthropocene, namely how they respond to the lost relationship between humans and the environment. This expanded lens is embedded in a darker practice of ecological art and

design, one that aims to reveal the expansiveness and profound nature of the ecological disasters it addresses.

The three examples of eco-art installations selected for examination here do not simply aim to affect through their ecological discourse. They seek to be explicitly didactic, communicating a message that can be understood by the public.

4.1. Angela Pozzi: Washed Ashore

First, let us consider a work by Angela Pozzi (Figure 1) called *Washed Ashore*. Pozzi exhibited 17 sculptural works at the Smithsonian's National Zoo in Washington DC in 2016 and has created a total of almost 70 sea sculptures made from waste found along the ocean shore. She explains why she started the project,

> *"I walked onto this one beach and I was just shocked. There was a rack line of plastics going away as far as the eye could see. I was absolutely horrified. I saw people along the shoreline picking up agates and shells with their little buckets, and I thought, I have to figure out how to get those people to pick up this stuff. And I have to get them to see. Because we can't not see it—this is bad. So I decided to only use garbage from the beach as my medium."* (Taken from URL: https://oceanic.global/angela-pozzi-of-washed-ashore/ *12 February 2021)*

Figure 1. 2 of the 17 Sculptures exhibited outside the Smithsonian's National Zoo in Washington, DC by Angela Pozzi (2016). Source: https://www.americansforthearts.org/news-room/art-in-the-news/dc%E2%80%99s-national-zoo-debuts-%E2%80%9Cwashed-ashore-art-to-save-the-sea%E2%80%9D-exhibit, accessed on 15 October 2020.

Pozzi's underlying motivation is to rally volunteers to clean beaches so that the collected debris can be used to create more impressive sculptures of the marine life affected by ocean trash. The repetitive and extensive nature of this work is a token of the unimaginable volume of debris washed ashore. The experience is grounded in a garbage aesthetic yet makes references to a children's schoolyard attraction. It is not clear if the sea creatures depicted are suffering or playing—a kind of ironic intonation.

Her work (Figure 1) reminds viewers that the problem of ocean trash is entrenched in multiple systems of consumption practices, from organizational to recreational, from individual to communal, and from single-use plastics to objects of long-use.

The exhibition delivers a strangely amusing yet troubling experience. The colourful plastics used to construct the works, even if not intended, convey a sense of humor. The malleability of the works adds to their playfulness, too. The prominence of biological analogies, such as the octopus or jellyfish, contribute to a language of design elements that would be expected in an amusement park setting. None of these characteristics necessarily speak to an urgent situation, even if the installation was conceived as a way to reach many viewers and make a specific call to an epidemic. A closer look, however, reveals the work's

message of planetary gloom, as we notice the various types of waste used to construct the pieces.

Washed Ashore's eco-lesson is delivered in a way that is once unsettling and ludic. The work prioritizes a desire to inform in a manner that also provides a visceral experience. Angela Pozzi adopts a method of communication based on consensus and teaches us a lesson that we all already know very well. Furthermore, she includes a moralizing message of duty. Pozzi explains how little an impact this has actually achieved:

> *"We've created, in six years, 66 sculptures out of about 18 tons of garbage that just came ashore in a 300-mile stretch. And it's only just a few people picking it up. What if we got people around the world picking up garbage?" (Taken from https://www. americansforthearts.org/news-room/art-in-the-news/dc%E2%80%99s-national-zoo-debuts- %E2%80%9Cwashed-ashore-art-to-save-the-sea%E2%80%9D-exhibit, 5 November 2020)*

Her analogical tropes, particularly biological, suggest meaning through familiar points of reference [43–45]. These analogies make obvious references and adopt a method of consensus and agreement for communicating an eco-lesson well known by the majority of viewers. The eco-lesson delivered is related to conspicuous consumption and is based on the notion of massive amounts of waste, particularly single-use plastics and the general debris of daily habits, even if much of this waste is an outcome of *ecological* production. Ecological production is a type of production practice that aims to adopt eco-efficiency measures in their design and construction process. They aim to reduce production impacts, but not consumption habits. This is a deep-seated problem, and one that occupies the imaginary of people around the world, especially since the discovery of large islands of single-use plastics polluting water systems and intoxicating fish, wildlife, and natural habitats (Figure 2). However, very few will ever have access to such ocean disasters. Pozzi's work is intended to rouse visions of this "invisible" devastation by concretizing these visions along the shore. It is however, not clear if it is successful in terms of changing consumption habits, production processes, or the ways in which waste is managed. It does however create communities of practice around ocean trash and collection [46,47], even if this will not solve ocean plastic's massively dispersed problem.

Figure 2. Left: 'Great Pacific Garbage Patch' is massive floating island of plastic, now 3 times the size of France (Source: https: //abcnews.go.com/International/great-pacific-garbage-patch-massive-floating-island-plastic/story?id=53962147 acc- sessed on 15 October 2020). Right: Pile of automobile tires sunk into the Pacific. Images from the creative commons.

Pozzi's desire to inform spectators through oversized sea creatures sprawled over piles of debris provides an aesthetic experience that places blame on overconsumption [9]. This blame seems to be placed directly on the individual consumer, adding to their eco-anxiety. The cause of this debris, however, is capitalist production processes that enable overcon-

sumption. This leads to a question about the method Pozzi uses for raising awareness: Is her work critiquing the practice of overconsumption using a method directly in line with the dominant discourse of ecological capitalism? An interesting paradox.

4.2. Particle Works: Particle Falls

Let us consider a second eco-art installation. *Particle Falls*, by Particle Works of California, was exhibited in 2010 in California (Figure 3). The work provides a real-time visualization of particulate pollution in the San Fernando Corridor. It includes a billboard that announces how the visualization must be read, a key part of the piece, since it allows for comprehension of changes in the projection. This, in combination with the data visualization of the projection, characterizes Particle Falls as a piece that aims to inform. Indeed, the work aims to raise awareness about air toxicity, making the quality of the air in its region visible to passers-by.

Figure 3. Left: Particle Falls provides a real-time visualization of particulate pollution in the San Fernando Corridor (Source Figure 3: http://01sj.org/2010/artworks/particle-falls/, accessed on 15 October 2020). Right: Billboard announcing the art installation (Source Figure 4: http://01sj.org/2010/artworks/particle-falls/, accessed on 15 October 2020). Work by Andrea Polli and Chuck Varga, San José, CA, USA, 2010.
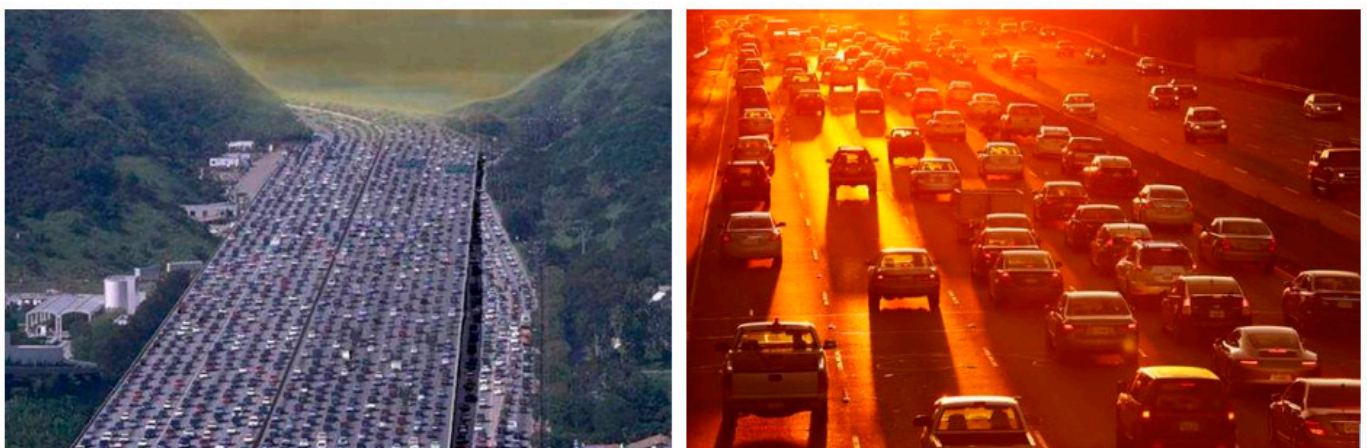

Figure 4. Typical morning and afternoon traffic conditions in the San Fernando Valley. Creative Commons.

The projection visualizes data collected through toxicity sensors so passers-by may be able to interpret its status in relation to real-time facts. Viewers of the projection may perceive it as fact since it is displaying real-time conditions. The viewer's exchange with the piece is thus simply one of reading for information, as one reads a thermometer or

barometer. In this case, however, the information is displayed using a visual representation of a waterfall. Considering this work from the set of analysis questions invoked above, the blue projection, which looks like a waterfall, is calm when the air toxicity is low. On the other hand, when the air toxicity is high, the waterfall becomes an agitated boiling sludge seeping down the side of the building. These biological analogies provoke the imaginary with images of either tranquility (waterfall) or agitation (bubbling sludge) and relate well to the eco-lesson delivered.

The message is placed in public view for passers-by to see, read, understand, and possibly act. It is not clear what every outcome of this viewing would be, but most would fall under one of four different categories: (1) the viewer ignores the projection entirely; (2) the viewer understands the projection and chooses to drive less—to contribute to the 'calming down' of the visualization and possibly the reduction of toxins in the air; (3) the viewer understands and decides to stay inside to avoid the toxic air—avoid ingesting toxins, in order to protect their health; or (4) the viewer understands the piece but decides not to change behavior and ignores the information depicted in the projection.

In all cases listed above, there is little change that will be engendered to the larger problematic of the compulsive car use habit and urban morphology. This piece presents a first level solution to the air toxicity problem, since it can only change individual choices of mobility. The problem depicted in the visualization is part of a much larger problem, that stems from municipal planning practices, and one that cannot be solved through an individual's choice of mobility alone. This is a systemic and structural urban problem, one embedded in the form and services of the city.

In this case, the traffic in Los Angeles, where this work was first displayed, is the worst in the world, and inhabitants of the area regularly worry about the level of toxins in the air. Looking at Figure 4, we can see morning and afternoon traffic in the San Fernando Valley. Therefore, the Particle Falls projection is simply conveying what is already widely known, and, in this case, what is already visible through the level of traffic, even if the air toxicity may be invisible. The waterfall is thus didactic and provides a clear message to the public but does not go far enough in helping them understand what can be done to improve the level of toxins in the air. The region's environmental breakdown and overextended car use cannot be improved by citizens alone, as it requires overarching shifts in urban planning and design strategies that are the purview of the experts in the municipality.

Understand the urban form and the unbounded need for building multiple highways to accommodate this magnitude of car use, begins to move toward the source of the problem. The resultant overuse of cars then not only pollutes air quality, but also demands the building of expansive highways, streets that accommodate parking, with additional parking lots at every corner, and gasoline stations to refuel, decreasing any opportunity for dynamic people-filled neighborhoods. Building this type of urban infrastructure inevitably cuts through and destroys natural habitats, drastically decreasing the chance of any urban biodiversity, and leads to much roadkill.

Is the playfulness of Particle Falls simply meant to entertain, or does it actually indicate a profound skepticism about the aims of the work? According to T.J. Demos [48], artists that create 'pragmatic' environmental art, such as Particle Falls, are aware of questions about the deep causes of the environmental breakdowns. However, can such works also provide guidance at the level of policy and municipal planning? Nils Norman further elaborates that artists are now inscribed permanently within urban regeneration strategies. He asserts that they need to create more disruptive and experimental approaches to help critically rethink the current urban situation [49].

This leads to our last example, which focuses on one of the most ignored consequences of ubiquitous car use and highway driving—roadkill.

4.3. Gerard Beaulieu: Where the Rubber Hits the Road

Where the Rubber Hits the Road is an example of a work that seeks to place the message of roadkill directly in the public realm (Figure 5). The piece, from Charlottetown, PEI,

Canada, is by Gerard Beaulieu. This 2018 eco-art installation was placed halfway between the road and a public park and depicts a dead crow. It is intended to educate passers-by of the impact of collisions between wildlife and vehicles. Much literature surrounding roadkill has focused on human deaths [50]. However, more recently, research has started to be dedicated to the loss of biodiversity from roadkill [51]. Beaulieu's work is concerned with the latter, placing a very large sculpture of a dead wild crow on the road.

Figure 5. Where the Rubber Hits the Road, 2018, Gerard Beaulieu, in Charlottetown, PEI, Canada (Source: http://www.watchforwildlife.ca/blog/roadkilledcrows-gbeaulieusactivistart-bywandabaxter?fbclid=IwAR3NAjH1 BMY625U3js3Z00JchjEmjo14sIr7HQIXXwMbeIGZMtDXk1Hd218, accessed on 10 November 2020).

The sculpture is made of discarded tires—the material that kills these crows—representing a circular logic between creation and death. It is intended to raise awareness about the impacts of vehicle collisions with wildlife and represents the irreconcilable juxtaposition of human and natural worlds. For the artist, the human-made materials, heavy deadweight, are highly contrasted with the weightlessness of feathers. The dramatic five-meter-long sculpture begs to be noticed, placed precisely where it cannot be ignored: the middle of the road.

Furthermore, the crow, a symbol of death, at least in North America, is meant to memorialize the dead and can be viewed as a memorial to the dead wildlife in the same heroic manner that leaders are portrayed (Figure 5). Gerald Beaulieu explains that,

> "I admire Crows, and other wildlife that adapt to us. They are intelligent and capable of eating a variety of things. It is not uncommon to see crows eating the consequences of our commuting, and roadkill makes a substantial contribution to their diet. As scavengers it is

what they do: clean up a lot of our mess. One of the risks of scavenging is being hit by vehicles, which doubles the impact of collisions. So the crows don't just represent 'roadkill', but also the layers of the impacts of driving." (Taken from http://www.watchforwildlife.ca/blog/ roadkilledcrows-gbeaulieusactivistart-bywandabaxter?fbclid=IwAR3NAjH1BMY625U3 js3Z00JchjEmjo14sIr7HQIXXwMbeIGZMtDXk1Hd218*, accessed on 8 October 2020)*

The intended eco-lesson is clear—the large crow on the road aims to explain that roadkill is a result of the pervasive human habit of car use. This eco-installation is didactic, as it not only has a moralizing connotation but is delivered in an extremely simple and clear manner. Breaking the work down into didactic components, an unmistakable teacher-subject-student trilogy appears (Figure 6): (1) the teacher delivering the eco-lesson is the actual eco-art installation; (2) the subject that is being taught is the eco-lesson about roadkill, clearly conveyed through the form of the sculpture; and (3) the student is characterized by the spectators observing the work's materiality, scale, weight, and darkness.

Figure 6. Where the Rubber Hits the Road, 2018, Gerard Beaulieu, in Charlottetown, PEI, Canada (Source: http://www.watchforwildlife.ca/blog/roadkilledcrows-gbeaulieusactivistart-bywandabaxter? fbclid=IwAR3NAjH1BMY625U3js3Z00JchjEmjo14sIr7HQIXXwMbeIGZMtDXk1Hd218, accessed on 10 November 2020).

This piece symbolically screams its message to viewers. Even the title, *When the Rubber Hits the Road*, an urban expression referring to, 'the moment of truth of something' is significant in highlighting the anthropocentric nature of this devastation. Even if the work is explaining what is widely known, it concretizes the human aspect of a violence that goes unnoticed by the majority of car drivers. Based on the framework by Cucuzzella et al. [6], its method for communicating the eco-message is one of agreement, founded on an established consensus of the impacts of humans on the ecosystems. There is a clear desire to inform.

It is important to highlight that the biological representation of *Where the Rubber Hits the Road* is so life-like that imagination moves directly to its actual references: the dead birds that remain lifeless and unnoticed on the highways. The contradiction is that animals killed by moving vehicles, driven by humans, are both, "*one of the most common ways that Americans encounter wildlife and one of the most unexamined phenomena by scholars*" ([52] p. 4). This eco-art installation represents a method for raising awareness, even if it cannot provide any assurances that the conflicts between animal mobility and automobility can be

mitigated. It also highlights how nonhuman animals are affected by and need more from human infrastructures (Figure 7).

Figure 7. Roadkill and scavengers, one of the damaging consequences of driving—beyond the omnipresent ecological corridor devastation as a result of road infrastructure.

Scholars, like Stephanie R. Fishel explore how social theory can think creatively about how nonhuman animals are impacted by and require more attention from infrastructures built for human mobility [53]. Anthropocentric environments that are principally designed to accelerate industrialized human beings and their goods are shared with other species. These human-designed spaces have fragmented these once-continuous landscapes and ecosystems into isolated patches of natural habitat, and animals must use them when coming out of the neighboring forests. Furthermore, birds are born to travel, with their migratory patterns crossing this world. How can these roads be shared? (Figure 8).

Figure 8. Who owns the road, (Source: https://howwedrive.com/2010/03/17/birding-while-driving/, accessed on 15 November 2020).

When comparing this example to the previous example (*Particle Falls*), the two appear different, since this current work does not explain how to fix the problem of roadkill, but simply explains that it exists. In *Particle Falls*, there was an attempt to provide a real-time indicator of the air quality that could help passers-by make informed decisions in the moment. However, these two works are similar in that they both do not and cannot be part of the solution to the larger problems they address. This current example shows the

viewers the outcome of a car dominated society, but does not explain how this can be solved. This work is also different from our first example—*Washed Ashore*—since it does not call for action, as Angela Pozzi strove to. Pozzi's goal was to bring people together to help collect waste, even if this action would not solve the systemic problem of ocean trash. The three works however do succeed to make the invisibility of their catastrophic situations much more visible and therefore potentially more tangible, to the public viewer.

5. Discussion

Public spaces play a key role in these eco-art installations that aim to make visible the invisible effects of humans on flora and fauna. This paper is not claiming that such works will have any impact on the outcome of human actions in the future, since the gaps between collective awareness, individual responsibility, and organizational responsibility are wide enough that we remain cautious about claiming any substantive effect resulting from these types of art and design experiences. The public realm, however, does need to become the place where the will to change and embrace sustainable futures can be a shared conversation and basis for action. The potential of public space, as a key element in the work towards such bottom-up change, is central to altering not only individual perceptions and actions, but corporate ones, more importantly. Since these works reach out to a diverse, and sometimes completely disinterested, public, there is a need for future research to investigate their outcomes in terms of reception.

This study contributed to a clarification of the original research questions from previous work on eco-didacticism in the public realm by Cucuzzella et al. [6]. This was complemented with a reflection on how its eco-art installations aim to confront the Anthropocene by enabling the visibility of the invisible phenomena they seek to represent. Much of the destruction addressed in the three works is widespread, both temporally and spatially, yet paradoxically invisible to the majority of humans in their daily lived experiences. People cannot see damages to the environment because they often appear either spread out or out of view. Ocean trash is floating far off into the ocean; roadkill looks like a seemingly isolated incident; air toxicity is invisible. The invisibility of these damages makes public eco-art all the more essential, since it renders things very visible through its fabricated scenarios. Table 1 aims to summarize these invisible characteristics and the means used to make the damages represented visible.

None of these types of works seek to propose solutions, since real solutions require deep systemic shifts from industrial systems that are embedded in our damaging practices. Of the three works studied, one (When the Rubber Hits the Road) simply aimed to make damages visible to urban citizens in order to align them more closely with their everyday experiences. The other two (Washed Ashore and Particle Falls) aimed to bring about some behavioral shift from their viewers. The paradox, however, was that they could not influence the industries or sectors of development at the base of these damages. These directives may actually be providing little more than expedient remedies for the much broader and complex systemic problems that their pieces represent. The assumed individual change that could take place following these two latter examples only presents an extremely small fraction of the work needed to revert the damages depicted.

However, even if these pieces may not present productive solutions, they contribute to fostering a bottom-up dialogue—a necessary preliminary condition for change to occur. The works are a result of well-known anthropocentric damages, but their displays are key to help move away from these modes of development, since they critique dominant practices of climate change mitigation, which are not proving to be effective. Even if people are well aware of our disastrous conditions, they rarely have a chance to come close and see what it all concretely comprises. These eco-art installations may enable viewers to develop disturbing images of the often-abstract anthropocentric manifestations of environmental destruction.

Table 1. Summary of observations of the eco-art installations investigated from the lens of the invisibility-visibility tension.

INVISIBILITY of Anthropocentric Damages		
	Washed Ashore	**Particle Falls**	**Where the Rubber Hits the Road**
Damage category addressed	Omnipresent ocean waste and plastic islands.	Air toxicity from car combustion. Although this toxicity may be assumed through the level of car traffic in the neighbourhood.	Roadkill from highway roads and driving.
Spatial scale of damage	Across world's water systems.	Limited to local air quality.	Across major urban road infrastructures around the world.
Temporal scale of damage	Since golden years of advertisement and the increased use of packaging.	Since the last century, with the increase of individual motorized road vehicles.	Damage over the past century with booming global urbanism.
Systemic intensity of damage	Stems from industries that continue to use single and low-quality materials, especially plastics, and their habits of quick turn-around to trash.	Stems from both poor access to public urban transport (or other more sustainable modes of urban mobility) and from poor urban enabling of walkability.	Stems from motorized vehicles of all types used for long distances on large road infrastructure that cuts across and scars ecological systems.
Level of development shifts needed to revert damages	Requires shifts in industries around the world that use single use or low-quality plastics and the conversion to more sustainable materials.	Requires shifts in regulations for individual auto use for urban mobility, which itself requires shifts in quality of public transport.	Requires shifts in the intensity of overall car use, not only in urban areas, but for long distances. Therefore, requires shifts in constant highway development as well.
VISIBILITY of Damages Characterized through Eco-Art Installations		
	Washed Ashore	**Particle Falls**	**Where the Rubber Hits the Road**
Eco-message (content)	Ocean waste collected for ocean sculptures as a way to raise awareness and incite action to collect ocean waste.	The level of toxicity in the air as a result of automobile use in a neighbourhood.	Roadkill as a result of highway driving and expansive highway infrastructure cutting through ecosystems.
Spatial scale	Series of life-sized sculptures of ocean creatures lined up along shore.	Agitated waterfall projected on side of a building in neighbourhood of air toxicity.	Two Life-size crows (16 feet long) made from car tires placed in the middle of the road.
Temporality	A travelling exhibition which started along the shore	A short-lived projection in the public realm.	A short-lived exhibition in the public realm—stayed on the road for about 6 months.
Cognitive experience (type of communicative strategy)	The formal qualities of the ocean creatures require no interpretation. The materiality used (ocean trash) is a key part of the message. This series of sculptures is directly readable by any passer-by.	The agitated waterfall is meant to awaken the passersby. It requires some interpretation to understand the connection between the agitated state of the waterfall and the toxic air.	The formal qualities of the dead crows require no additional interpretation. The material (car tires) of the crow is a key part of its message and connects to the bird form immediately. It is directly readable by any passer-by.
Action expected	Collection of ocean waste incited.	Decision can be made once waterfall becomes agitated.	No action required.

In the artworks studied, the use of didacticism to communicate critical messages was a key element of the works. These new art and design practices aim to raise civic awareness while tied to a form of instrumentality and moral discourse that, while not entirely unprecedented, is distinctive. They not only attempt to persuade the viewer of ecological priorities, but are shaped by a need to elucidate something specific within our current ecological crisis, suggesting that action—even cognitive action—is a moral imperative.

Can these eco-didactic practices, where dialogues and conversations about current crises are placed in the civic commons, help prepare for or even mitigate the climate change crisis, or do they simply spectacularize these conditions?

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