

Symphony of the Stones: A Research-Creation Exploration on the Animation of Heavy Metal Residues in Contaminated Urban Landscapes

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Abstract

In the late 1980s, the Canadian Pacific Railway abandoned a rail yard on the outskirts of Montreal's Mile End district. Within a few years, the return of animal and plant species encouraged the citizen community to reinvest this site known as Le Champ des Possibles. Despite community efforts to rehabilitate this site, hydrocarbon and heavy metal pollution persists in the soils and thus requires rethinking the engagement with the imperceptible mutations of ecosystems. *Symphony of the Stones* was created in response to this context. This research-creation project consists of several urban art installations that activate residual metals in soils by their magnetic characteristics to make these imperceptible pollutants visible. The following paper unfolds the different processes, methodologies and strategies that led to in site interventions blending art installation, collaboration with different communities and associations and leading to a rethinking of art practices in the urban environment.

Keywords

Digital arts, research-creation, art-science practices, situated artistic interventions, environmental installations, contaminated urban soils, active residual materials, material agency, pedological studies, environmental participation, socio-environmental issues.

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Introduction

Although invisible, heavy metals abundant in soils have the potential to contaminate natural environments, thereby increasing the risk of serious diseases. In recent years, the discovery of new polluted sites underlines the extent of this pollution. Over a century of industrial activities has led to this pollution spreading at an alarming rate throughout urban areas. Nowadays, 54 percent of the global population lives in an urban area,¹ and, in Quebec alone, 10 percent of the identified sites are located within Montreal.² In this regard, citizens' exposure to these toxic residues requires a rethinking of engagement with the imperceptible mutations of ecosystems due to anthropogenic activities.

Despite the fact that Karl Marx anticipated ecological urgency and soil loss by what he theorized as the "metabolic rift," soils have only recently gained interest from social and biological/geological sciences and science and technology studies (STS).³ On the other hand, the works of contemporary artists and artist-researchers such as Debra Solomon, Amy Balkyn, Martin Howse, Joana Hadjithomas, Khalil Joreige or Disnovation.org, illustrate this urgency by raising awareness on biodiversity loss and soil degradation. As the push intensifies to transition these discussions out of strictly academic and artistic realms, the pressing challenge becomes: how can we expand the conversation on soil contamination, and more broadly, urban pollution, ensuring it resonates with the general public, especially the communities and stakeholders most affected by it?

Écotones is a collaborative research-creation project which arose from this question. Led with artist Philippe Vandal and in collaboration with the citizen association Les Amis du Champ des Possibles and more precisely with the coordinator Sugir Selliah and the co-president and climate policy analyst Émile Boisseau- Bouvier, *Écotones* operates as an *in situ* urban laboratory. It melds experimental exhibitions and artistic interventions, articulating an aesthetic, critical, and social perspective on soil pollution. This research-creation project, blending art-science methodologies, seeks to explore heavy metals and hydrocarbon pollutant agencies to activate new experiences of soil pollution and offer critical visibility to these invisible residues. Two directions were taken: *Symphony of the Stones* (my own work) which explored heavy metal pollutants and *Fluorescent Forensic* by Philippe Vandal, which explored residual hydrocarbons. The first iteration of this project took place at Le Champ des Possibles in Montreal on October 14th. Le Champ des Possibles

(CDP), is a former marshaling rail yard left as a brownfield by the Canadian Pacific Railway company in the 1980s and rehabilitated as a green space in 2013. Despite community efforts to rejuvenate this land, hydrocarbon and heavy metal pollution still lingers in the soil. The ongoing proliferation of these pollutants presents dire ecological and health risks that cannot be overlooked. As the site was formerly used as a waste disposal site, the municipality and the association les Amis du Champ des Possibles (ACP) have therefore agreed to rehabilitate the site by excavation under section 22 paragraph 9 from the *Loi sur la Qualité de l'Environnement*.⁴ However, few citizens are aware of these hazardous materials, whose existence deserves to be discussed.

This article zooms in on *Symphony of the Stones*, an *in situ* art installation that seeks to enhance the understanding and perception of heavy metal residues in contaminated soils. The article contextualizes the making of the installation and the way it connects to CDP. First, the article focuses on recontextualizing what CDP is and how the concept "ecotones"—that gave the name to the series of interventions—emerged from exploring this site. The second part of the article delves into the art installation and how it activates soil's heavy metal contaminants to shine a spotlight on the invisible traces of pollution lying under the ground. Finally, the third part delves into the concept of public intervention, drawing inspiration from various contemporary *in situ* art installation practices.

Exploring the entanglements

Le Champ des Possibles as a space of negotiations

Le Champ des Possibles is located in the Mile-End district of Montreal. The district underwent significant gentrification, initially with the influx of artists in the 1980s and more recently due to the emergence of art galleries, design showrooms, and companies in the innovation and video game industries. Despite this socio-economic context, CDP remains in the state of a brownfield. The site is characterized by the entanglement of various plants, animals, and human communities living together with the traces and ruins of its past industrial activities. The foot paths laid by morning joggers and commuting wanderers are lined with campfire remains and industrial ruins (figure 1). Steel structures, now enveloped by diverse species of trees and plants, provide shaded resting spots for local workers. These makeshift sitting areas are occasionally rearranged by visitors to the site. The northern border of

CDP neighbors a railway which traces a separation between the Mile-End and the other districts. For years, these fenced borders have been the subject of debate among the citizens, the municipal authorities and the Canadian Pacific Railway that owns the railroad.⁵

Breaches in the fence allow for easy crossing to the other side of the railroad and the reconstruction of this same fence by the public authorities are thus common things to observe throughout the year. Because of the diversity of uses and communities that make CDP a unique space, it is not easy to give a single definition of the site as it conjures up different imaginary perceptions. Facing this post-industrial biotope and the entanglement of different human and more-than-human figures negotiating the site with each other, it appears that CDP was scientifically reminiscent of a concept in environmental science that would help us formalize and conceptualize a dialogue with the space: the ecotone.



Figure 1. Picture of Le Champ des Possibles. We can observe the biotope of the site as well as the railway and the fence in the background of the picture © Brice Ammar-Khodja

Ecotone as a conceptual framework

Ecotone is a term that emanates from environmental sciences. It describes areas of gradation between different ecological communities, ecosystems or even regions. In other words, places where diverse ecologies are put in tension.⁶ Although ecotones are not restricted to the natural environment, they can also be induced by

human activities.⁷ According to Jurek Kolasa and Maciej Zalewski's book *Ecotone attributes and functions*,⁸ these contact zones are hard to define. They point out that ecotones can range in size from a few centimetres to kilometres and can be distributed across spaces in different contexts with varying degrees of porosity and types of boundaries. Moreover, ecotones can be horizontal and extend over planar surfaces or vertical when localized in the atmosphere or water bodies. This overlapping inspired us to build a conceptual framework that would foster *insitu* exploration of CDP. This allowed characterizing the area, not only at the ground level but also by understanding the different vertical layers and boundaries on the distribution of natural elements and pollutants in the soils. This notion of ecological boundaries guided the exploration of the site. Discussion with members of the citizen association ACP, highlighted that these ecological boundaries were overlapping with a map from the Quebec government classifying soils by degrees of contamination within CDP. The map shows a satellite view of CDP where zones are divided into polygon sections, each providing information on the name and concentration of pollutants, and the possible effects of these residual matters. In addition to this map providing technical information about the site, the ecotones framework became a tool for understanding the socio-environmental interactions of the site. While the map showed CDP's contaminants split into polygons, the notion of ecotones revealed other boundaries that would appear through the exploration of the site: different paths generated by the users of the site oscillating between gravel roads and tracks where the grass does not grow anymore, the green rehabilitation zones scattered on the site to allow the vegetation to grow back, the campfires where only the waste of late-night rave parties remain, and finally the railroad, which illustrates the most significant transition zone of this unique ecotone. Through this first overview, CDP appears as a space of socio-cultural and biological diversity in constant mutation. From a natural space transformed into a rail yard to a half-industrial, half-green public space, and finally, to a space in the process of decontamination, the transition of this landscape is not only remarkable for the diversity of communities, boundaries, and uses of the space, but also its transformations through space and time.

While a simple walk in CDP would reveal the aforementioned ecological boundaries, the former use of CDP as a waste disposal site left traces of which a map alone cannot give a complete account. As the entanglement of the many elements that compose CDP

tends to blur what this site is composed of, the primary approach of the project consisted of developing art installations, unveiling imperceptible elements.

Sensing mutations

Residual invisibilities

Soils are dynamic systems composed of organic matter, living organisms, gases and water. When the amounts of naturally occurring elements, such as heavy metals (i.e., copper, lead, nickel, arsenic), increase abnormally due to external, and usually anthropogenic, factors, a pollution risk arises.⁹ When elements, not naturally occurring in soils, such as hydrocarbons, are found, the phenomenon is termed contamination.¹⁰ As with heavy metals, excessive levels of these external components can lead to pollution risks and disrupt the natural soil cycles. However, most of the dynamic interactions and transformations in the soils, even the most concerning, are not easily perceptible to the naked eye. Human relations with soils are largely limited to what human sensory organs can detect and interpret. Indeed, perception relies on a combination of the senses. Among these, vision, described by Plato as "the noblest of the senses," dominates as the "most informative" and "associated with the highly valued faculty of reason."¹¹ The effectiveness triggered by perception can contribute to increasing awareness, understanding, and care for soils. However, how can one foster these sensations when the soil's mutations are imperceptible? In *Thinking with Soils, Material Politics and Social Theory*, Anna Krzywoszynska, Manuel Tironi, Matthew Kearnes, Céline Granjou, and Juan Francisco offer socio-environmental and ethico-political ways to approach soils with a care-oriented analysis inspired by the work of Puig de la Bellacasa. In the book's second chapter, the authors point out that soil conservation is challenging because soil "is commonly presented as invisible, hidden under our feet, and lacking a recognizable 'face.'"¹² Since soils are composed of microscopic elements (living beings, organic matter, minerals, pollutants, etc.), soils' intrinsically animated and living nature is not always evident to those who observe them. Thus, the authors insist that the complex nature of soils and their non-zoomorphic and non-anthropomorphic characteristics make them more vulnerable and, therefore, more at risk of being neglected and damaged. However, this mixture of non-human entities, whether organic or inorganic, animate or inanimate, possesses their agency and the potential to influence and affect systems of which humans are part. This notion relates to what Jeanne Bennett calls "thing-

power", defined as "the curious ability of inanimate things to animate, to act, to produce effects dramatic and subtle."¹³

Soils are discrete entities, and pollution is invisible. In some contexts, and environments, the biotope sometimes contributes to weakening the perception of pollution. Let us recontextualize this assumption: at first glance, CDP looks like a site in the process of green rehabilitation. Since the Canadian Pacific Railway company left the site as a brownfield, species of plants, trees, and animals have begun to reoccupy the site. This reoccupation might have paradoxically contributed to blurring the distinction between the past and present of the site; that is, a place undergoing green rehabilitation versus a place where pollutants still lie and mutate beneath the soil. Discussions with the citizen association ACP have confirmed these suppositions by revealing that many of the citizens living next to the site were unaware of CDP's pollution. *Symphony of the Stones* emerged in response to these issues. This research-creation project explores how the activation of heavy metal pollutants can operate on perception and senses to engage in a critical dialogue with the communities bordering these sites. As part of the series of artistic interventions titled *Écotones*, this installation draws from practices and interests in active materials, material agency, material forensic and art-science practices and focuses on generating critical discussions with the riverside communities on the issues related to CDP discussed in the next section of the article.

Symphony of the Stones: a research-creation case study

Symphony of the Stones is a series of urban art installations that examine the correlation between the abnormally high presence of heavy metals and magnetic residues in CDP's soils. This first iteration was developed within the framework of the research-creation thesis, titled the *Cycles of Attraction* and derives its methodology from geomagnetism—a geosciences subfield specializing in identifying soil pollutants via magnetic fields.¹⁴ The installation reinvestigates this technique to activate heavy metal and magnetic contaminants in CDP's soils that present high responsivity to magnetic fields. The installation features two geometric aluminum sculptures, designed to harmoniously integrate with the landscape, reminiscent of the metallic remnants of CDP's past industrial activities (figure 2 and 3).



Figure 2. First interactive sculpture exhibited during *Écotones* at Le Champ des Possibles ©Etienne Massicotte



Figure 2. Second interactive sculpture exhibited during *Écotones* at Le Champ des Possibles ©Etienne Massicotte

The sculptures are flush with the ground and strong enough to be walked on. Using the Quebec Government map indicating soil classification by degrees of contamination, these ephemeral sculptures are strategically placed over highly polluted polygons and topped with CDP's soils. Concealed within and below the sculptures is a kinetic system comprising N45-grade permanent magnets. These magnets, driven by DC motors and controlled by a microcontroller (figure 3),

generate magnetic fields that create material tensions and attractions, activating the magneto- responsive constituents of the soils. This includes ferromagnetic residues, construction debris like nails, discarded municipal items like beer caps, and variously sized earth clumps. In a metaphorical sense, the installation seeks to visualize the invisible soil transformations. The movement of the soil creates a subtle yet captivating animation aimed at drawing attention to the ground. Concurrently, the installation delves into the acoustic properties of soils and residues. One sculpture integrates a piezo microphone, connected to a TDA2822M mini audio amplifier and a Bluetooth transmission system, relaying the audio signal to a discreetly placed Bluetooth speaker (figure 4). This system captures and amplifies sounds produced from the collisions of various materials. By amplifying these subtle soil movements, the installation adds an auditory dimension to the ambient sounds of the CDP environment. By animating both organic and inorganic residues and materials from CDP's soils—those seemingly inert to casual observation—*Symphony of the Stones* aspires to foster a renewed, sensory connection between humans and soils. The project is informed by the concept of "active materials" or "kinetic materials." These materials can react and adapt by changing colours, textures or events" moving in stimuli such as heat, magnetic fields, or moisture. In *Materials That Move: Smart Materials, Intelligent Design*, Murat Bengisu and Marinella Ferrara explore the potential of several active materials features and how their application in design changes users' relations with everyday objects. Drawing inspiration from Donald Norman, an expert in the application of cognitive science to design and the theorist behind emotional design, Bengisu and Ferrara highlight the potential of active materials to "materialize intangible information that is imperceptible to the human senses in daily life."¹⁵



Figure 3. Kinetic system hidden in the sculpture's shell. The horizontal rods containing the magnets are activated by motors and driving belts. © Brice Ammar-Khodja



Figure 4. Close up of the piezo microphone in contact with magnetic soils in motion © Brice Ammar-Khodja

The dynamic created by these objects, and materials, made possible by organic and organic-like movements, might signify the expression of something that is animated and living, triggering different senses and emotions. Exploring discarded materials, residues and contaminated soils coming "alive" by their activation, *Symphony of the Stones* aims to encourage the public to not only further observe soils but also get closer to the ground, carefully observe the different patterns drawn by the materials in motion and haptically engage. The project's first iteration showed promising results during the *Écotones* exhibition, where visitors would actually get closer to the installation and eventually touch the soil. The future versions of the installation will put more emphasis on the haptic aspect. As Puig de la Bellacasa points out in *Matters of Care*, haptic promises to develop new forms of knowledge based on attentiveness

through the body's engagement.¹⁶ The knowledge that the vision alone, by its distant and detached character, could not reach.

Intrusions, furtivity, and symbiosis

Making an *in situ* urban art installation involves intervening in the environment. The first part of this paper explained why CDP is a space in constant negotiation between human and non-human communities. In this context, *Symphony of the Stones* explores new ways to engage with the environment and its communities, rather than merely subjecting the site to a single artist's vision. This approach required working closely with ACP for a deeper understanding of the site (see section "Exploring the entanglements"). However, as illustrated in the first part of this article, there is no consensus on what CDP is or should be. Out of respect for the site, *Symphony of the Stones* was designed to neither disrupt nor damage the site's environment. In doing so, the installation diverges from the traditions of environmental art, especially Land Art, an art movement from the 1960s that showcased open-air artwork—often large-scale installations using natural elements found on site. Land Art sought to foster a dialogue between art and natural environments, underscoring the localized aspects of works now displayed beyond the confines of museums and galleries. Prominent examples include Robert Smithson's *Spiral Jetty* (1970), a 457-meter-long basalt stone dike spiraling counterclockwise over slightly reddish water at the Rozel Point peninsula on the northeastern shore of the Great Salt Lake, or Walter De Maria's *The Lightning Field* (1977), a permanent installation of 400 steel poles spread over a mile, designed to attract lightning in a desert plain in Quemado, New Mexico. While sometimes classified as a form of ecological art, Land Art is not without controversy. Sometimes equated as a form of ecological art, Land Art is also controversial. Some interventions were indeed drastic, leading to artworks that altered their environments¹⁷. Since then, myriad art forms have emerged, influenced by the practices of environmental and land art. Some extend their focus beyond the natural to encompass the built environment, with a growing emphasis on addressing socio-environmental and political challenges linked to the sites under consideration. Regrettably, a recurring issue with *in situ* urban or environmental art installations is the gap between the discourse of these practices and the methodologies they employ. In her article *Le Lourd Bilan Carbone de l'Art Contemporain*, Gill Gasparina argues

that many contemporary urban and environmental installations, while raising awareness of ecological concerns, still rely on processes detrimental to the environment, such as pollutant technologies, excessive energy use, and waste generation.¹⁸ Given the increasing integration of new technologies and the creation of custom artworks, the carbon footprint of contemporary—and particularly digital—art is undeniable. This highlights the pressing need to further evaluate energy consumption and material repurposing in the pursuit of more sustainable artistic practices.

Symphony of the Stones was conceived with the dual intention of minimizing its ecological and aesthetic impact on CDP. In pursuing this, *Symphony of the Stones* is influenced by what art critic and art historian Patrice Loubier terms “furtive practices.” Furtive practices are described as “multiple art practices that infiltrate the urban landscape through works without signs, not necessarily recognizable as artworks, serendipitously surprising the pedestrian, transforming them into an incidental observer” (My translation).¹⁹ In contrast to Land Art, furtive practices do not dominate due to their scale; instead, they subtly alter details within these environments. Underlying these practices are a range of artworks whose subtlety setting does not diminish their political, social, or environmental significance. Drawing inspiration from Danae Stratou’s *Concentric* (2019), a piece that produces continuous concentric ripples in Nirox Sculpture Park’s Lake, *Symphony of the Stones* integrates seamlessly with its surroundings, invoking elements already present. The aluminum’s polished surfaces help to camouflage the sculptures by mirroring the environment around them. Moreover, the installation is largely enveloped by CDP’s soils, which are retrieved from the topmost layer using DIY (Do It Yourself) permanent magnet soil collectors, thus avoiding any digging or excavation. Neither of the two sculptures, nor their concealed kinetic systems, needed anchoring or attachment. This adaptability ensures the installation’s portability and ease of removal. Such features position *Symphony of the Stones* as an artwork that may elude immediate notice, nudging site visitors to be more observant of their surroundings. Yet, the installation’s auditory aspect offers clues about where and what to focus on. The initial display of the artwork yielded varying reactions based on CDP’s ambience and foot traffic. On certain occasions, passersby might overlook the sculptures entirely, even walking over them without pausing. However, when the contours of these metal forms caught their eye, some would halt, scrutinize the sculpture more closely, and approach upon observing the animated soil atop the structures. During the *Écotones* outdoor exhibition, the

influx of visitors meant that some remained oblivious to the sculptures. Nonetheless, those who became aware of them through the animated soil often ventured closer, with a few even interacting directly with the residues by touching them (figure 5 and 6).



Figure 5. One of the *Symphony of the Stone*'s kinetic sculpture exhibited during the exhibition *Écotones* ©Etienne Massicotte



Figure 6. Close up to the residues activated by the kinetic magnetic system © Etienne Massicotte

After the opening, we organized a reception in a space adjacent to CDP, and allowed the installation to remain on site into the evening. Upon our return to disassemble the installation, the darkness had enveloped CDP, and a group of night-time explorers had kindled a campfire approximately a meter away from the sculptures. In spite of the resonating sounds and the movement of the residues, this group remained oblivious to the installation. By this attempt of creating an installation furtively within the site, it is hard to evaluate what are the best conditions for it to be perceived and understood in its message but also as a work of art. A consideration for future iterations of this installation, and more generally within the domain of furtive practices, might involve implementing strategies for artistic and cultural mediation for artworks displayed in urban settings.

Conclusion

This article sketches the premises of a methodological framework for research-creation practices that operates at the scale of urban spaces and more specifically spaces in the process of rehabilitation. Although contextualized on a specific site in Québec, I hope that this contribution will foster new ways of collaboration with outdoors spaces and hopefully participate in the debate on urban soil pollution. The CDP's case study has demonstrated that wild urban spaces, brownfields, and any other grey area are places of entanglements and negotiation between different communities. Amongst these communities that range from human wanderers and species of plants to toxic residues, different types of agencies whether positive or negative, might emerge or persist. Against this backdrop, a question emerges: how can artistic endeavors be realized in harmony with these intricate interconnections? By highlighting presence of heavy metal pollutants in the soil, *Symphony of the Stones* opted to harmonize with the CDP. By suggesting new forms of non-intrusive collaborations with the site and its communities, this research-creation project seeks to activate and increase the perception of contaminants. In this regard, the project does not only seek to redraw borders on the site, but rather amplify its already existing aspects. As part of the project *Écotones*, this first iteration is perhaps not immune from mutating towards a more radical but still furtive kind of intervention in the urban landscape.

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Author's Biography

Brice Ammar Khodja is an artist, graphic designer, and Ph.D. student based in Montreal and Paris. His work examines active materials, residual matter, and low-technologies to explore the socio-environmental and political interconnections pertaining to materiality and visual information.

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Co-director of the typography magazine *Pied de Mouche*, Brice Ammar-Khodja, creates workshops and educational tools for the general public.

His works have been exhibited at Ars Electronica (Linz, Austria), MUTEK (Montréal, Canada), Centre Pompidou (Paris, France), Biennale internationale du Design, la Cité internationale des Arts (Saint-Étienne, France), V2_Institute for Unstable Media (Rotterdam, Netherlands), Musée historique de la Ville de Strasbourg (Strasbourg, France) and Second International Print Biennale (Yerevan, Armenia).

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