



Original Research

Evaluating for Impact: The Role of Artists in Residence in Science–Land Management–Community Collaboration

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Abstract: This article uses a knowledge exchange (KE)-based approach to evaluation to explore the reported experiences of artists, scientists, and land managers participating in the NaturePLACE Program (formerly Urban Field Station [UFS] Arts), focusing on the period 2016–2024. The primary aim of the program is to build understanding of and engagement with urban social-ecological systems through the arts. The approach to this evaluation draws on a range of literature on research in the arts, as well as research and KE impact evaluation from the environmental research domain. The evaluation reported in this article is distinctive in focusing on the interactions of participants rather than on perceptions of beneficiaries. The data analyzed comprise evaluations ($n = 49$) submitted at the conclusion of the residency by six cohorts involved in the NaturePLACE Program (2016, 2017, 2018, 2020–2021, 2022–2023, 2024–2025). This article provides important insights into the impacts on artists, scientists, and land managers from transdisciplinary place-based work. Causes of impact not previously noted within the framework are identified as related specifically to the arts, including modes of sensuous aesthetic attunement, forms of focusing attention and eliciting public discourse, and shaping cultural imaginaries. Critical reflection also becomes evident as an aspect of capacity building.

Keywords: Artists, Land Management, Social-Ecological Systems, Knowledge Exchange, Monitoring, Evaluation, and Learning (MEL), Impact

Introduction

Urban social–ecological systems encompass a wide range of “wicked problems” (Rittel and Webber 1973) that often lack sufficient information and embroil multiple stakeholders with conflicting interests and values. They are characterized by the urgency of the developing problem projected out over space and time, entrenched stakeholders seeking to address the problem that are enmeshed in the creation of the problem, and complex, networked governance structures (Levin et al. 2012). Arts-based approaches are increasingly included within initiatives that seek to address “wicked problems” in urban social–ecological systems (Muñoz-Erickson 2014; Crawshaw and Gkartzios 2018; Saratsi et al. 2019). Rock and Taylor

(2019, 49–50) highlight the shared concerns of the arts and sciences in reimagining their respective relations with society, recognizing the challenge that this is sometimes understood in terms of “add-on advocacy campaigns” rather than collaborators. Yakamovich and Wright (2021, 50) articulate artists’ approaches in terms of self-making and world-making, saying, “Through making-with place, artists are engaging in acts of self-transformation as well as wider-than-self socioecological transformations.” The emerging conception of Culture-based Climate Action provides an important context for this work (Gul 2025; The Group of Friends of Culture-Based Climate Action 2024).

Black et al. (2023) provide a useful articulation of Socially Engaged Art and EcoArt (or Ecological Art), tracing the historical lineages and highlighting the key critical literature that informs contemporary practices. They note the different ontological, epistemological, and methodological positioning of artists in relation to social and natural scientists, as well as some of the commonalities. They aim to “address some of the current challenges and opportunities for collaborative arts-science research in the socio-ecological field” (Black et al. 2023, 2). The challenges highlighted are key to inter- and transdisciplinary projects, including the need for shared language, trust, and the recognition of epistemological equity (), as well as time and space in which to develop collaborations. They note several areas of difference, including the positionality of artists (some in academic positions and some freelance) as well as the ways that outputs are disseminated (academic journals for social and natural sciences, exhibition catalogues, and other forms of “gray” literature in the arts, although there are academic journals too).

Black et al. significantly draw on Edwards et al. (2016), who, in addressing the challenges associated with valuing ecosystem services, distinguish arts-led dialogue as a practice distinct from social science approaches involving, on one hand, the aggregation of individual preferences or, on the other, deliberative processes. Edwards et al. (2016) argue that artists bring aesthetic attention to the historical, cultural, and institutional contexts of topics or issues, maintaining a critical distance from established agendas and forms of knowledge. They go on to argue that this can lead to unexpected insights and outcomes that might not be recognized or realized by more conventional approaches. The authors highlight some key impacts of arts-led dialogue, including the potential for participants to experience “conceptual shifts” and benefit from “capacity building”—a greater or deepened understanding of the context and its ecological and cultural significance. Multiple articulations of “cultural shifts” are noted, including “respect for difference” and new “degrees of cooperation” in the context of “considerable disagreement” (Edwards et al. 2016, 322). Both papers make an effective case for the role of artists in the research and management of complex social–ecological systems.

However, there is a lack of meaningful evaluative frameworks and systematic evaluation to enable us to better understand arts impacts in terms of accountability, value, learning, and auditing to understand whether policy and practice are using the arts to support decision-

making and action (Nutley et al. 2007). Where evaluations are undertaken, multiple different approaches are used, ranging from using the Warwick-Edinburgh Mental Wellbeing Scale (Wimpenny and Savin-Baden 2014) to in-depth interviews with current and former participants (Stephenson and Moayerian 2024). The aim of this article is therefore to explore measures of success for collaborations between artists, land or natural resource managers (land managers, hereafter), and researchers. This approach contributes to public pedagogies and mutual understanding between the parties involved, encouraging sense-making and focusing on ways that the arts engage in the everyday life of urban socioecological systems.

NaturePLACE, formerly the Urban Field Station (UFS) Collaborative Arts program, was initiated by the U.S. Department of Agriculture (USDA) Forest Service, The Nature of Cities (TNoC), and its state, municipal, and nonprofit partners. The program locates artists within urban ecologies, in particular, urban forestry research and land management. It is based on a transdisciplinary approach which works across different domains (Nicolescu 2014), in this case including biophysical and social science research, practices of land management, practices of inhabitants and stewards of urban ecosystems, and arts research and practice. The program is oriented toward key emergent properties of new knowledge systems. Fazey et al. (2020) characterize these as: collaborative; embracing many ways of knowing; egalitarian; action-oriented responding to challenges with empathy, knowledge, and wisdom; integrating ethics and aesthetics; reflexive and transformational; polycentric, contextualized, and experiential.

The three aims of the NaturePLACE Program are:

- To build understanding and engagement in social–ecological systems through arts.
- Transdisciplinary collaboration between artists, scientists, and land managers.
- To curate events and public programs that explore ideas emerging from these collaborations.

This article assesses the impact of six cycles of artist-in-residence based on the aims of the program and drawing on completed end-of-residency evaluation forms ($n = 49$), triangulated with additional data drawn from participant observation, field notes, and team debriefs. Impact was assessed against an existing framework used for evaluating the impact of research and knowledge exchange (KE) activities. We consider the relevance of the framework for evaluating artist–scientist–land manager interactions and the types of impact occurring.

We have chosen to focus on KE impact evaluation because the impact aspect addresses the question “what changed?” and is therefore focused on relationality, and the KE aspect is appropriate to the transdisciplinary focus of the program (Nutley et al. 2007; Roux et al. 2010; Englund et al. 2022). We do not focus on quantitative monitoring of the number of individuals engaged, or on audience reception of the events and activities, because the focus of the program is experimental and “open” rather than “delivery” focused. The term “open”

here refers to the concept of the “open brief” developed by the Artist Placement Group and used by them as part of a program placing artists in public and corporate bodies over the period 1966–1989 (Hudek and Sainsbury 2012). An “open brief” enables the artist and collaborators to find the specific focus of a project as part of the process rather than it being determined by the “brief” at the outset (Black et al. 2023). Importantly, this correlates with the open and process-led character of social–ecological arts practices (Black et al. 2023; Helguera 2011; Douglas and Fremantle 2024). The one deliverable required as a condition of the NaturePLACE residency is a “public program,” defined in the call for artists as “a lecture, a panel session, a workshop, a walk, or some other format to be determined” or a piece of digital content (e.g., an essay, a photo essay, or a roundtable, published on TNoC website or elsewhere), which can include reflections on work in progress, and can be delivered in person or virtually. These events, for the purposes of this article described as “outputs,” are variously discussed in the evaluations and are presented in the Appendix: Roster of Participating Artists and Outputs (with the artists’ permission).

An outcome of the evaluative and reflective process has been the development of a Theory of Change for the Program (Fremantle et al. 2026). The Theory of Change proposes a way to understand how the various elements, including the objectives, assumptions, and outputs, address the current state of the problem and deliver long-term change. A version of the Theory of Change is included (see Figure 1). The Theory of Change is informed by the evaluations discussed in this article.

Theory of Change for the NaturePLACE program

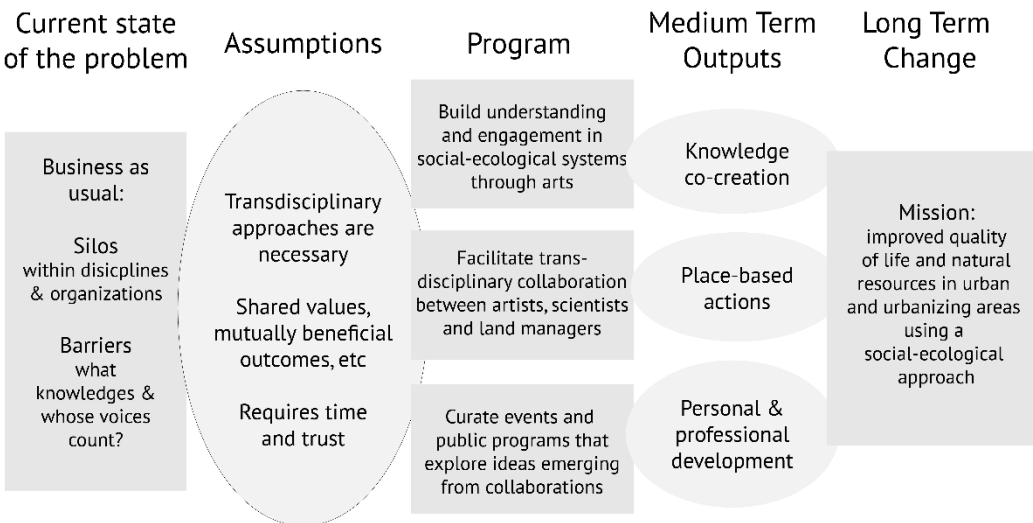


Figure 1: The Theory of Change for the UFS Collaborative Arts Program

Source: Created by the Authors and Dr. Cara Broadley

We begin by providing background on the UFS network and the NaturePLACE program, followed by a presentation of our research questions, and then we highlight the key aspects of the evaluation framework, including the data and our methodology. Finally, our conclusions focus on lessons learned on program impact and recommendations relating to methodology.

Background

The UFS Network is an urban and residential landscape-focused land and natural resource science-management network. UFSs operate as “place-based” centers that engage multiple disciplines to collect and analyze long-term data relevant to current challenges and thus provide a useful reference when new problems emerge. They engage in basic and applied research about urban social–ecological systems and informed adaptive management of land and natural resources. The UFS Network is an initiative of the USDA Forest Service—including several locations across the northeast United States (US) (New York; Springfield/Amherst, MA; Baltimore; and Philadelphia) and has supported their research into urban ecology and forest health as well as stewardship and stewardship mapping (Svendsen et al. 2016).

Developing out of, and now expanding beyond, the UFS Network, the NaturePLACE artist residency program enables artists to develop their own agendas in dialogue with environmental scientists and land managers. The open brief of the residencies provides opportunities for enquiry and experimentation—with foci of the calls ranging from urban ecosystems to stewardship, to resilience and resourcefulness. Artists are selected through an “Open Call.” Artists receive an honorarium, initially USD\$1,500 and later USD\$3,000 for the one-year affiliation; there is no budget for production of new works. The program was piloted in 2016 and has now supported six cohorts at the time of writing. The first three cohorts (2016, 2017, 2018) focused on the New York City UFS. Since 2020, the not-for-profit TNoC has partnered with the program, providing advice, networking, content development, and project management—and expanding the geography of the program to national and global scales (2020–2021, 2022–2023, 2024–2025).

Research Questions and Framework

The objective of the study is to address the lack of evaluation of the arts in environmental arenas and, more specifically, the role of artists in interdisciplinary work. The article, therefore, sets out to answer two questions:

- Is a research impact framework focused on KE useful for understanding the interactions between artists, scientists, and land managers?
- What patterns can be identified, from the feedback provided, as evidenced in the evaluation?

KE evaluation focuses on changes resulting from interactions. The framework for evaluating KE adopted for this article has evolved over fifteen years, as documented in Edwards and Meagher (2020). David Edwards was also the lead author on the 2016 paper on arts-led dialogue discussed earlier, and there are useful commonalities in terminology. The 2020 paper is an evaluation of KE activity by Forest Research, the research agency of the UK Forestry Commission, over a five-year period. The model is focused on the impacts of research, i.e., the contributions to society, the economy, or the environment, of KE across disciplines. There is an ongoing debate about the meaning of research in the context of arts practices. Although not always producers of facts or scientific knowledge, artists are not only users of research: they also create new ways of understanding through new framings and deploy different “ways of knowing,” including those created through artists’ “poetics” or ways of making (Nyrrnes 2006; Coessens et al. 2009). Loveless argues that art-based research, or “research creation” in her terms, offers “modes of sensuous, aesthetic attunement, and works as a conduit to focus attention, elicit public discourse, and shape cultural imaginaries” (Loveless 2019, 17). de Rijke (2023, 1), who also cites Loveless, notes that art research “can be used in different phases of research: as methods for data collection, in analytical processes, and in interpretation and wider dissemination of research outcomes as communicative or aesthetic elements.” Different participants are understood to have knowledge and approaches to the creation of knowledge that involve feedback loops and iteration as well as the joint framing of research questions and co-production of understandings (Edwards and Meagher 2020). Another key point highlighted by Edwards and Meagher (2020, 2) is the increasing sophistication of theory and practice, “which calls for greater interdisciplinarity between researchers, and transdisciplinarity between researchers and stakeholders, underscoring the importance of engaging multiple perspectives”. The framework includes forms of impact (What?), influencers and the influenced (Who?), and the causes of impact (How?), which are encapsulated in the graphic created by Forest Research (Figure 2).

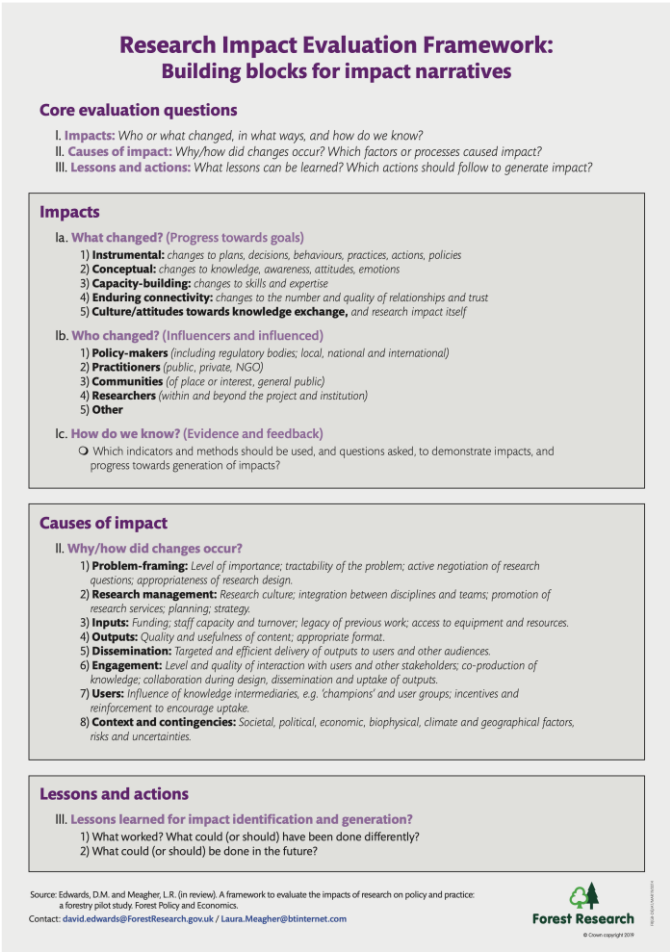


Figure 2: Research Impact Evaluation Framework
Source: Forest Research 2020

Approach/Methods

The evaluation materials from six cohorts comprise forty-nine completed evaluations, triangulated with participant observations, field notes, and team debriefs from events and project management notes. The evaluation questions were developed prior to the introduction of the framework (Figure 2). The questions were distributed by TNoC personnel via email as an attached word-processing document immediately after the end of the residency. In 2024, the evaluation questions were sent as a survey through the platform Airtable. Participation in the evaluation process is broken down by different roles (artist; scientist, land manager; organizer) in Table 1. There was one artist in the 2020–2021 cohort who dropped out of the program and therefore did not complete an evaluation, as well as four artists from the 2022–2023 cohort and three artists from 2024–2025 who did not

complete the evaluation; otherwise, all artists participated in the evaluation. The land manager they were partnered with did complete an evaluation, and their reflections are included in this article. The evaluations were coded according to the types of impact and the causes of impact. All named participants have been contacted and have agreed to the use of their evaluations in this article.

Table 1: Number of Evaluations Collected, by Role

<i>Year</i>	<i>Artists</i>	<i>Scientists, Land Managers</i>	<i>Organizers</i>
2016	3		
2017	3		
2018	2		
2021–2022	3	3	
2022–2023	8	5	2
2024–2025	9	9	1

Analysis and Results

The following subsections highlight data from the evaluations in relation to the framework, including the types of impact, as well as who changed and what causes of change can be usefully identified. We follow the same order as in Edwards and Meagher (2020).

Practical/Instrumental Impacts: Changes to Practices and Policies

Practical or instrumental impacts can include contributions to policy reports and strategies; influencing practices, processes, and debates; and securing additional funding (Raum et al. 2019). Edwards et al. (2016, 323) note that arts-led dialogue can be “more open-ended than an instrumental focus on decision-making.” In the evaluation forms submitted by NaturePLACE program participants, there are multiple references to changes to practices or initiatives that might influence policies (Practical or Instrumental impacts) from the evaluations, despite the residencies being “open” with a modest honorarium. The range of impacts described includes artists whose own practices have changed as a result of the residency:

My residency at UFS has inspired me to address environmental issues more explicitly and more accessibly with my work...I have used my experience with UFS as a jumping-off point to disengage from some aspects of the art world and pursue projects that prioritize accessibility and wider visibility. (Artist 1)

I think the most important change was that I realized that I didn’t need to collect and archive participants’ field notes. Rather, it was more important that they take them home and share them with those they care about. This is how large change happens. (Artist 2)

Another resident reports a very practical example, saying that as a result of the residency, they had become a “Citizen Pruner”—a volunteer trained and licensed to take care of street trees. Both of these examples indicate that artists are affected by working with other disciplines and practices and, as a result, have developed new non-traditional arts skills (urban tree pruning) or refocused their practice. This suggests that the “context,” the “users” (who are the KE intermediaries/champions), and the “engagement” are all causes of impact alongside the inputs of expertise. Another case of policy-related impact, in this case of aligning an art project with policy and program in a mutually reinforcing way, is framed in terms of the legitimization of an artist’s project through the involvement of the New York City Department of Parks and Recreation (NYC Parks) staff: “I was working on a New York City Tree Alphabet and thought it was important/vital that members of NYC Parks advise and help develop it. I could have created the alphabet on my own, but then it wouldn’t be ‘real’ or official” (Artist 3).

We can understand the cause of impact as the input of expertise, but there is a wider cause, which is the legitimization provided by working with government agencies. The value of the Forest Service and NYC Parks staff’s involvement in projects is further articulated in another evaluation as follows:

Through the UFS, I was able to obtain the correct permits for the project, and the UFS was very generous in asking NYC Parks for plant donations. The conversation I wanted to pursue...in NYC couldn’t have had a better microphone than the UFS. They were able to elevate the conversation to a citywide platform in a conversation that was bottom-up. (Artist 4)

This artist goes on to say:

The UFS Residency is an opportunity to facilitate new voices to be heard inside of the institutions that govern our public spaces. This is a truly profound space of inclusion on a governmental level, and it was an honor to be part of it. The responsibility and weight that comes with it are enormous. (Artist 4)

These comments reflect public officials recognizing value in artists’ projects and supporting them through institutional means. This project also led to a panel at which a particular policy operating in public parks was debated. While the policy did not change, the issue was debated, and examples from other contexts were highlighted, leading to reflection and learning among participants and exploration of new alternative land management approaches.

Conceptual impacts with the potential to deliver practical or instrumental changes are also reported by partnering scientists and land managers. One manager reported that the interaction with a resident artist contributed to thinking about the focus of the Parks Department Division they lead. Changes to the goals of a division, as suggested here, will have multiple causes and

involve different individuals. The role of the residency will only be one part of a process, but it is significant that residency activity can support strategic developments.

Some practical or instrumental impacts take the form of securing new resources. There are multiple examples of the value of the program and input from scientists and land managers in grant writing, a vital activity for artists working in public and social contexts. Whilst these are not all successful, they represent a significant value and can benefit both parties by increasing mutual understanding. The evaluations indicate that people from different disciplines and practices (artists and/or land managers in particular, e.g., Artists 4 and 6 both note working with land managers to secure additional resources to implement projects beyond the scope of the initial residency) are involved in the process of fundraising, lending diverse expertise and experience. Further, funders supporting projects, particularly ones that straddle conventional categories of arts or environment, have been encouraged to input new resources in the expectation of causing further impact. The evaluations highlight a number of changes to practice and engagements with policy for artists, scientists, and managers. The issue of “legitimization” becomes evident, including legitimizing other ways of knowing and working, and the authority lent by involvement with agencies. The establishment of the program and commitment of resources to involving artists in the UFS Network provided an initial, yet experimental, legitimization. The artists’ work (as highlighted in the Appendix) built confidence, leading to the expansion of the program beyond the NYC Field Station.

Capacity-Building: Skills and Expertise

Capacity building is most often in the form of learning “education, training or even development of collaborative abilities” (Meagher and Lyall 2013, 411). It can relate to the individual themselves, their colleagues, and other stakeholders, and might also have an impact on groups rather than just individuals. It can include taking understanding into “real world” contexts or “real world” contexts driving new inquiry and learning; the production of resources for others to use or benefit from; as well as building capacity in potential users and participants through engagement activities (Meagher and Martin 2017, 20).

Every evaluation evidences multiple examples of changes to skills or expertise. Multiple artists understood the NaturePLACE Program as an opportunity to engage with scientists and communities and sought participation because of the resulting learning opportunity. There is a clear recognition of where learning takes place—one artist highlights the value of on-the-ground experience as a means of learning: “Even tasks that might seem banal would be really interesting to follow along with and learn about: the nurseries, field research, brush clearing, site visits, cleaning efforts, stewardship activities” (Artist 5).

Aspects of another artist's evaluation can also be interpreted as "conceptual shifts" leading to "capacity building." That artist said of interactions with researchers and land managers:

These interactions changed the way I perceive the natural areas of NYC. Before the project, I experienced these ecosystems as add-ons to a man-made city. I now understand that these ecosystems are the base of the city, still functioning as ecosystems; it's easy to forget this as we walk through our cement grid! (Artist 6)

One of the characteristics of hybrid art and ecological practices is the development of specific environment-related skills and expertise, such that an artist builds a portfolio of qualifications to enable them to develop their work. In some cases, the interaction was very specific and technical:

Most importantly, we talked about using Ash for the letter A. As Ash trees can't be planted, I had been using American Beech for the letter A, but [named NYC Parks member of Staff] gave me the confidence to use Ash and use it as a way to discuss the issues: invasive insects, changing climate, and hopefully future planting. (Artist 3)

The process described here both indicates the learning between the artist and the scientist but also highlights how that goes on to inform a resource being created, indicating how it can address a much wider range of issues, including Emerald Ash Borer and Ash dieback, two significant threats to the worldwide Ash tree population.

Managers working on the NaturePLACE Program highlight the development of their skills and expertise both within their own discipline and in the process of program delivery, including gaining a deeper understanding of storytelling.

It was great to learn about some of the new technologies that researchers are using...the technology has advanced so much since I was in grad school...I like that I'm learning new scientific innovations through artists, too. (Scientist 1)

I typically talk about the idea of crafting methods of better storytelling in this area, storytelling that communicates across boundaries of discipline and practice...I feel this program helps us learn how to...better the story of storytelling to some key audiences (eg., funders and bosses). (Curator 1)

There are specific aspects of learning that artists reported on as a result of interactions with communities in particular localities.

I spent time with several local residents...Based on conversations I had with a resident...I formed a focus group with [their] help. The group helped me realize

how various groups interact with...Parks and what elements make them feel welcome or less than welcome. I kept these conversations very much in mind as I developed the project and also the opening. I worked to try to create an experience that is inclusive and where everyone will feel as comfortable as possible. (Artist 6)

Both artists and land managers are noting new understandings and engagements with social–ecological systems arising not just because of the KE but in particular through the arts. They note how the arts can open dialogue concerning opportunities and challenges associated with improved greenspaces. The cause of this new understanding includes problem-framing and engagement with the socioecological context. In the framework, Capacity is also interrelated with the description of Conceptual Shifts, which we turn to next.

Conceptual Shifts: “Aha” Moments and New Framings

Conceptual shifts are described as “where research changes ways of thinking, alerting policy makers and practitioners to an issue or playing a more general ‘consciousness-raising role’” (Meagher and Lyall 2013, 411). They can encompass more wide-ranging effects comprising the “complex and often indirect ways in which research can have an impact on the knowledge, understanding and attitudes of policy-makers and practitioners” (Meagher et al. 2008, 165). It can take the form of a better understanding of the importance of trees in general, in technical aspects, of wider value, as well as location-specific shifts of perception (Raum et al. 2019).

Every evaluation evidences conceptual shifts ranging from “aha” moments to significant reorientation of thinking, potentially leading to policy changes, as noted earlier. The comments range widely,

What I loved most about interacting with staff was everyone’s passion and curiosity, senses of humor, and willingness to go on tangents with me that often led to amazing breakthroughs in my project. (Artist 1)

I did not expect the salons and brown bags to be as beneficial as they were. (The Urban Field Stations hosts “Brown Bag” lunchtime discussions now called “lunch and learns” and “Stewardship Salons” [Campbell et al. 2024] as co-learning spaces to foster interdisciplinary working.) (Artist 5)

The interactions were like a brainstorming/think tank type of experience and really helped expand my current ideas and thinking. (Land Manager 1)

I found the salons inspiring. (Artist 3)

I felt my project in this residency did shift my thinking about working in public and public engagement. (Artist 8)

It opened my eyes to all the volunteers that help keep the street trees, and other natural elements and areas healthy. (Artist 10)

The specific words and phrases such as “inspiring,” “opened my eyes,” “shift my thinking,” “did not expect,” and “breakthrough” are all clear indicators of moments of realization. We also have artists reporting that the “aha” moments led them to re-evaluate their plans: “I also wanted to talk to people that visit the park, but after a few attempts, I realized that people may not be open to that. I had to reevaluate my position and try to understand how people in the park and community would see me.” (Artist 9)

These moments of realization lead to learning and changing practices. This link between conceptual shifts and learning is well articulated in the following quote:

I found books like the Urban Wilderness Handbook by Jean Gardner, which did something similar to my initial proposal, and made my work feel a little redundant in its initial conception. This is all part of the creative process for artists: when we start digging in, we often see trails and traces that were left by others...I learned...the extent to which wilderness areas were embedded within or served as connective tissue between city parks and further how many of these now “forever wild” sites had once been sites of industry. (Artist 10)

One of the NYC Parks staff reported: “[artist’s] work has gotten me thinking about how we can create/permit more soundwalks or educational public art projects in parks that have a great impact with a minimal physical footprint” (Land Manager 2). Another member of NYC Parks staff commented:

[artist’s] underwater sounds of the ferry in the East River also struck me. I know that sound travels farther in water than in the air, but to have that documented and connected to our recent review of the Environmental Impact Assessment of the Coney Island ferry was really valuable. This moment also made me see the ways that artists can add new ideas, viewpoints, etc., that can connect with my everyday work in a very meaningful way. (Scientist 1)

The artwork is the cause of a “conceptual shift,” which in this case creates a “problem-reframing.” The residency’s “open” brief with emphasis on research, relationship-building, and exploration enabled the artist to pursue their own ideas rather than “illustrate” existing or emerging research in response to a public art commission. The framework does not directly identify the aesthetic impact of an artwork as a “cause of impact,” and hence it is interpreted through being an “output” which can be understood in terms of “framing” (Loveless 2019, 17). The evaluation framework misses some distinctive aspects of artworks, including their capacity to create empathy through sensuous experiences, which focus attention.

There are further references to impacts related to the legitimization of “other ways of knowing,” which could influence policy and programs. A Forest Service manager highlights how, for partners in other cultures, Forest Service working with artists validates multiple “ways of knowing,” extending value to include traditional knowledge and spiritual dimensions. This impact can also be understood as a Conceptual Shift, involving both a significant shift of perception as well as indicating a change to the criteria in policy making. We might understand the cause of impact here as another example of “problem framing.” Along with capacity building, conceptual shifts are the most frequently reported impacts, ranging from apparently incidental comments to reflections on more significant realizations.

Cultural/Attitudinal Shifts: Valuing Working Across Disciplines and Practices

Changes to culture or attitude are about relational processes (Raum et al. 2019). They speak to working across disciplines or between scientists, practitioners, and communities in various combinations and can be understood at one level in terms of KE or at another in terms of transdisciplinarity. Within the framework, cultural or attitudinal shifts are considered important, and there is evidence of the program’s impact on perceptions and understandings of working across disciplines. One evaluation from an artist makes a number of points related to their perception of the opportunities and processes of working across disciplines and practices. Firstly, it highlights that this results from the form of the opportunity:

I was interested in learning more about NYC Parks and the Forest Service, and intrigued by the UFS’s location at Fort Totten. I did expect it to be different from other residencies in that it is organized by scientists/social scientists and not arts professionals, and that the framework is one of scholarship, stewardship, and land use projects. (Artist 11)

This highlights the desire of the artist for involvement with multiple stakeholder groups (scientists and practitioners) and the expectation of benefits resulting from “engagement.” It also highlights the value placed on the mix of “users.” The artist goes on to highlight the benefits of engagement with the different perspectives of other disciplines and practices:

While at the UFS, I continued my research on the NYC water supply. I was really interested in the work that folks are doing at the UFS around expansive ideas of public stewardship of public space and natural (or “natural”) resources. It was good to think about some of these issues from the...perspective of a social scientist/researcher. (Artist 11)

Several dimensions are highlighted in this statement—the interactions with agencies; agencies as a context for artists’ projects; specific expert input into a research focus; opening

up different agendas, such as stewardship; as well as engaging with different methodologies. They also highlight the benefits of the public program in terms of orientation toward work with environmental agencies, including opportunities to make contacts, as well as experience with the various agencies. Working across disciplinary boundaries can be challenging and requires “attitudinal shifts.” Advice offered by artists to future participants includes the acknowledgment that the organization and funding of different initiatives “can be really confusing.” This comment clearly recognizes the challenge of joining a research and practice community in a different domain. The artist goes on to give practical learning and confidence-focused advice on asking questions and spending time in the Field Station. There is a consistent refrain that there isn’t a substitute for immersion in the processes and context.

Whilst we have focused on what changed, it is worth noting that two managers working on the program commented in the evaluation that they didn’t experience attitudinal shifts, saying “No because we have been doing this for many years” and that they already “knew the value that artists bring to programs.” Some people have already “made the journey” and are committed to involving artists as part of transdisciplinary work.

Enduring Connectivity: Long-Term Relationships

Enduring connections lead to familiarity with the needs and modalities of collaborators. Connections can be between specialists within a domain, within and between departments (Raum et al. 2019), but the more challenging ones to maintain are across domains (Meagher and Martin 2017). Evaluations were completed at the end of a one-year residency, so we might not expect to see long-term relationships reported, but several participants do report continuing connections, including one saying: “I am now connected to more ‘tree people,’ aware of the agencies that preside over street trees, and have more confidence that there is an audience for a work of art about street trees. The project is ongoing” (Artist 5). Both other artists and partners reflected on how the residency ignited what they hope to be a continuing collaboration:

We see each other in our work and practices. I hope together we can bring these experiences and inspiration to others, possibly write a paper. (Artist 12)

I would love to do another workshop with [the artist] and maybe involve some of the urban planners in my division in designing it, since [their] work seems very relevant to them. (Scientist 1)

These statements highlight the longer-term value of relationships developed during the residency but also highlight the capacity building in terms of confidence. We were unable to include data in the Appendix on the “longer term evolution of the project” due to space considerations, although it does provide some additional evidence on enduring connections

that were fostered via the program. Reflections from the organizing team and debrief notes specifically pointed to the longer-term relationships between artists and agency partners—acknowledging that outputs take longer than a year to realize, and that ultimately the program supports networks and relationship-building. Specific approaches are used to grow a collaborative and mutually supportive group across cohorts. For example, artists from previous cohorts are asked to be part of the selection committees for upcoming cohorts. The program includes past artists in grant proposals and supports the proposal writing of artists. Finally, the program has an ongoing series of exhibits, events, and publications to which previous artists are invited as contributors.

Challenges to Securing Impacts

The evaluations also identify obstacles to impact, including time and resources, which are key inputs required for any impact to be achieved. The honorarium supports the artists to engage with the UFS program, the facilities and resources, and to contribute to a “public program,” but it is limited in the amount of time it funds. “Attending more activities and being more engaged with researchers [scientists] and land managers—just has to do with time. An artist...is most likely employed full-time in capacities outside what they are doing for their UFS research and projects” (Artist 8). One of the scientists echoes this saying: “I think it was challenging at times because I had so many competing obligations, so I had to be very strategic about carving out time for this program” (Scientist 1). This is closely linked with funding; many of the artists apply for funding to go beyond initial idea development, often with letters of support from scientists and/or land manager partners.

Two evaluations include comments on the current approach of “pairing” artists with scientists, suggesting that more group work could be beneficial, including grouping artists around topics to achieve more “cross-pollination.” There are strategic challenges identified that focus on the underlying obstacles to working across disciplines. One of the scientists says:

Justifying why it’s important to be involved in the [NaturePLACE] Program can be a challenge, and I find that I often have to do this to higher-ups over and over again in different ways. My advice would be to make sure to regularly document outcomes from the collaborations to the extent possible to justify time spent. (Scientist 1)

This is also articulated by one of the organizers: “Still, it is an uphill climb to convince people that coloring outside the lines is worth funding. ‘Transdisciplinarity’ and ‘beyond silos’ are common conversation pieces these days, but they can often seem more like metaphors than actual drivers of action, funding, and priority. It remains a challenge” (Curator 1). The challenges for the NaturePLACE Program are particularly articulated by these last two comments from scientists and managers. Making a compelling case for the investment of

time and resources into transdisciplinary working, bringing together different ways of knowing, and working to address “wicked problems” remains a significant challenge.

Conclusion

This article contributes to the development of the evaluation of the arts in environmental arenas and the role of artists in interdisciplinary work in three ways. It provides empirical evidence, collecting and analyzing multi-year data (2016–2024) on the impact of a specific transdisciplinary residency program in an urban social–ecological context. The article makes methodological contributions by adapting and developing an existing framework (adapting it from a forestry research and impact context to a transdisciplinary artist residency program), framing cross-disciplinary collaboration in terms of KE and highlighting evidence of impacts. From a theoretical perspective, the article connects critical literature with the impact framework, contributing to further understanding the dynamics of artists working in social–ecological contexts. This shifts the focus from “Does art have an impact?” to understanding the interactions between artists, scientists, and land managers and identifying the patterns of impact. In doing so, the article highlights emerging understandings of artists’ research and practices in support of greater institutional inclusion of artists within interdisciplinary and cross-sectoral work on social–ecological systems. The conclusions are relevant to a range of organizations in the public and not-for-profit sectors, including scientific, ecological, and municipal bodies, as well as arts organizations with public and, in particular, urban programs. The conclusions support the incorporation of art as an integral and legitimate part of the process of addressing complex social–ecological challenges, including contributing to the wider understanding of Culture-based Climate Action and the development of associated monitoring, evaluation, and learning (MEL).

The evaluations clearly demonstrate that artists, scientists, and land managers have been mutually affected by participating in the program. The three key aims for the NaturePLACE Program noted earlier and highlighted in the Theory of Change (Figure 1) lead to outputs and outcomes achieved through transdisciplinary collaborations between artists, scientists, and land managers. These are context-driven, rather than by disciplines or management, and bring together distinct ways of knowing and methods. The curated events and public programs that explore the ideas emerging from the collaborations, are significant activities that occurred before, during, and after the residencies and the evaluations point to the various ways in which these generate benefits, including opening up to new and different audiences, encouraging self-reflection (as highlighted by Natural Resource Manager 1 and Artists 5, 8, 9, 11, and 12); opening up to new and different audiences (as noted by Curator 1, Natural Resource Manager 3, and Artists 2, 4, 5, 6, and 9); and as well as rethinking approaches to public events that are more inclusive (as shown in the Appendix).

This article focuses on the impacts on program participants and provides evidence on the processes and challenges of transdisciplinarity. There is more evidence of the impacts on artists because only artists were evaluated in the first three cohorts, a limitation of the study that we recognize. The impacts on individual artists affect discourses in the arts through multiple forms of interactions, including the works they make being seen by other artists, curators, and critics, wider audiences, and, in some cases, through teaching. The analysis of the evaluations suggests that the approach, asking artists plus scientists and/or land managers, provides richer insights than evaluating resident artists alone and that the resulting evaluations can be analyzed individually but also in pairs or groups. There is evidence of the interdependency of different forms of impact, something documented and explored in more depth in other evaluations (Fremantle et al. 2016; Fremantle and Mabon 2021).

The major challenge identified is to make the value of the transdisciplinary approach, or as one respondent put it, “coloring outside the lines,” evident to agency leadership. Collecting more examples of what specific aspects of the program have had an impact on those not directly involved, such as decision makers, managers, funders, and community members, would be useful.

Two additional aspects were highlighted by the review of the evaluations that suggest areas for development of the framework. The first is the inclusion of “critical reflection” in the understanding of capacity building. Artists invite critical reflection by posing new questions that land managers and decision-makers might not otherwise pose, and opening space for dialogue, discovery, and change (Campbell et al. 2024). Two comments on the challenges associated with improving greenspaces suggest not merely learning about issues but recognizing the impacts in terms of creating opportunities and threats. The second relates to the multi-sensory aspects of the artworks and the role of those as causes of impact. The causes of impact identified in the framework (Figure 2) do not include sensory or affective aspects except in the general category of “outputs.” It is clear from evaluations, e.g., the underwater sounds from the ferry, that the auditory dimension created a conceptual shift. It seems reasonable to propose the inclusion of affective sensory experiences, particularly in relation to artworks, as potential causes of impact.

In addition to other noted limitations, the study is based on a single evaluation point immediately following the completion of the year-long residency. A longitudinal study tracking impact, including “enduring connectivity” and “attitudinal shifts,” would be valuable.

There are programmatic and pedagogical implications of the analysis, particularly in terms of an objective of capacity building for transdisciplinarity. The program supports mutual learning between artists, land managers, and researchers. One of the major areas of reporting was in terms of capacity, highlighting both a greater understanding and more networks. Both informal interactions and formal events are mentioned and facilitate learning. Involving the arts as part of transdisciplinary-focused programs, such as the UFS

Network, leverages the arts' skills in a range of areas, including "framing" of issues as well as engagement in experiences that open up new understandings. The arts benefit through extended engagement with land management, providing a context for understanding the complexity of urban socioecological systems and for developing "learning through doing" resulting from collaborative project work. Formal events such as salons, where both artists and land managers present and exchange knowledge, are valuable.

The evidence from reviewing the evaluations of practitioners participating in the NaturePLACE Program leads us to predict that transdisciplinary initiatives have a multidimensional, multicentered, and lasting impact among participants that will ensure innovation and creativity. Opportunities for artists to work within environmental research and management exist within a range of settings, including within Long Term Ecological Research (LTER) programs, nature-based solutions (NBS) initiatives (e.g., Peatland Restoration and Woodland Creation), as well as with intermediary bodies (e.g., the European Marine Board). This is important as it helps ensure that the field of natural resource and land management and artistic practice can, together, adapt in relation to the world around us.

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Informed Consent

This study was conducted with the informed consent of all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Appendix: Roster of Participating Artists and Outputs

<i>Artist and Location</i>	<i>Project or Topic (Titles in Italics)</i>	<i>Residency Deliverables</i>
2016		
Mary Mattingly, New York City, NY	<i>Swale</i> floating food forest—an artwork comprising a barge towed to multiple locations and constructed to provide an opportunity for public foraging and stewardship events	Organized panel “Public Food” with managers, scientists, and activists working on food systems held alongside Swale; participated in “City as Ecosystem” exhibit https://www.swalenyc.org/
Lize Mogel, New York City, NY	<i>Walking the Watershed</i> —politics and history of NYC drinking watershed https://www.walkingthewatershed.com/	Organized public panel “Liquid Geographies” on the watershed featuring historians and artists and performed human diagram of the watershed with the audience; participated in “City as Ecosystem” exhibit
Adam Stoltman, New York City, NY	<i>Parks and People</i> —photographic series of people in NYC parks	Organized public panel on “Parks and People”; participated in “City as Ecosystem” exhibit
2017		
Katie Holten, New York City, NY	<i>NYC Tree Alphabet</i> —a font based on NYC trees https://www.katieholten.com/new-york-city-tree-alphabet/	Participated in “City as Ecosystem” exhibit; participated in Arts in Parks day; NYC Parks stewardship team events interactive drawing with tree alphabet
Matthew López- Jensen, New York City, NY	<i>Tree Love</i> —photographic series of NYC street trees https://jensen-projects.com/category/tree-love:-street-trees-and-stewardship-in-New-York-City/	Participated in “City as Ecosystem” exhibit; gave public lecture on “Tree Love” at New York Botanical Garden
Heidi Neilson, New York City, NY	<i>Moon Arrow</i> —public sculpture pointing continuously at the moon https://www.moonarrow.net/	Eleven temporary installations in public waterfront parks around NYC with programming with NYC Park Rangers; Participated in “City as Ecosystem exhibit”
2018		
Dylan Gauthier, New York City, NY	<i>Forever and Ever Wild: A Field Guide to 51 Sites in New York City</i> —Initial project idea did not develop; went in a different direction	Participated in Lize Mogel’s “Liquid Geographies” panel; co-organized panel on “Pathways to Inspiration: art, nature, and education” https://dylangauthier.info/
Julia Oldham, New York City, NY	<i>Undiscovered City</i> —photographs and photo collages depicting alternative views of NYC urban ecology	Produced new photographic work featured in <i>Who Takes Care of New York?</i> exhibit and curator talk https://www.juliaoldham.com/

2020–2021		
Cecile Chong, New York City, NY	Social practice art, curating workshops, and learning opportunities for Sunset Park, Brooklyn students and residents	Organized a series of workshops (three) and invited speakers (five) in Sunset Park; hosted a Stewardship Salon with NYC UFS https://www.cecilechong.com/
Nikki Lindt, New York City, NY	<i>Underground Sound Project</i> —audio recordings, website, and soundwalk https://theundergroundsoundproject.com/	Soundwalk installed in Prospect Park; hosted Stewardship Salon; Lecture at Staten Island Museum; CBS Sunday Morning segment https://www.cbsnews.com/video/sound-artist-nikki-lindt-on-recording-a-hidden-universe/
2020–2023		
Kilia Llano, Santo Domingo, Dominican Republic	<i>Conexións</i> —murals depicting Cape May Warbler and other migratory species https://ufsarts.com/conexion/	Completed four <i>Conexións</i> murals (three in Dominican Republic and one in the US). First UFS Arts program residency outside the US, the first foreign artist and the first in a foreign country to participate in this program resulting from collaboration between the International Institute of Tropical Forestry, the NRS and the International UFS network
2022–2023		
Samih Abu Zakieh, Hebron, Palestine	Place-making art projects to foster peace	Hosted art workshops with youth in Hebron as part of leadership and environment education programs
Nalu Andrade, Honolulu HI	<i>Hoʻoilina</i> —stewardship, native tree planting, removal of invasive, non-native trees that then are used for wood carving projects	Hosted a series of carving workshops utilizing invasive strawberry, guava
Michele Brody, New York City, NY	<i>Nature in Absentia: Monarch Migrations</i> —paper making and immigration stories https://michelebrody.com/nature-in-absentia-monarch-migrations/	Organized paper-making workshops throughout the Bronx and NYC Attended the Monarch Institute (Summer 2022)
Amir Campbell and Aaron Terry, Philadelphia, PA	<i>Seeding Newtopia</i> —collecting local tree stories, memories, connections https://www.aaroneliahterry.com/public-works	Organized and hosted tree story-telling events
Tommy Cheemou Yang, New York City, NY	<i>Ecologies of Chinatown Project</i> —storytelling and embodied research	Hosted a Stewardship Salon

Franklin Cruz, Boulder, CO	Movement, dance, and climate change	Organized a dance workshop for scientists interpreting climate change data; hosted a public workshop showcasing choreography
Krystal Mack, Baltimore, MD	<i>i'm Black, But i'm Blue When i'm Not Green</i> —common ties between urban forest patches and residents as living vessels of joy, community, and reparation	Participated in a Urban Waters artist panel; presented at World Forum on Urban Forests side event at MLK Library, October 2023
Ania Upstill, New York City, NY	Applying a theater-informed, creative approach to stewardship	Hosted three sessions of the project: NYC Parks Stewardship Team training; Stewardship Salon at Socrates Sculpture Park; Pratt Institute student workshop
Richard Johnson, Springfield, MA	Community events on belonging and place	Hosted “Be the Change” art and muraling workshops for local youth
2024–2025		
Cesar Almeida, Chicago, IL	Merging hip-hop and the natural world through a cohesive collection of poetry, sound recordings, and beats	Attended and DJ'd at the Nature of Cities Festival (Berlin, Germany); hosted Beats in the Forest workshop series Summer 2024
Xavier Cortada, Hubbard Brook, NH	Art-science engagement around climate equity https://cortada.com/events-2024/ufs-arts-climate-justice-residency-at-hubbard-brook/	Presented an “Arts for Climate Equity” talk to researchers at Hubbard Brook; led natural resource technicians and scientist through the “DO NOT OPEN” letter writing, performance piece
James Everest, Saint Paul, MN	Sound-gardens https://jgeverest.com/	Participated in <i>Park After Dark</i> —soundgarden along the Mississippi River in Saint Paul to explore the forest, river, and park
Takuma Itoh, Honolulu, HI	<i>Symphony of the Hawai'i Forests</i> —collaboration including the DLNR Division of Forestry and Wildlife (DOFAW), the University of Hawai'i at Mānoa, Hālau 'Ōhi'a, and others	Feb 2024 presented a public performance of the Symphony of the Hawai'i Forests, which was a six-movement symphony with animation and hula https://symphonyofthehawaiiforests.com/
Dirk Joseph, Baltimore, MD	Soils and forest patches	Started an Open Workshop Series, for self-guided art and craft making, including the use of natural materials
Carolyn Lambert, Hubbard Brook, NH	Film about the technicians and students working at Hubbard Brook in this era of climate change	Scheduled to present at July 2024 Collaborators' meeting in Hubbard Brook (cancelled due to COVID-19)
William Langford, Detroit, MI	Spoken word poems dedicated to sites of natural beauty	Performed spoken word poetry at the <i>Rhythm and Rouge</i> event

Laura Nova, New York City, NY	Exploring care, tree stewardship interactions to amplify the power of relationships https://www.lauranova.com/	Volunteered with NYC Parks Street Tree Care teams; <i>Tree Hotel</i> workshops foster exploration of tree environments; <i>Tree Loving Care</i> performance in the 2024 Art in Odd Places
Roxane Revon, New York City, NY	<i>Routes</i> —root systems in urban landscapes	Participated in beach grass planting in Coney Island, developed prototypes of beach grass root structure-inspired artistic installations
Kate Schaffer, Milwaukee, WI	<i>Mino-akking</i> : stories of Milwaukee, those of past and present, human and nonhuman residents	Drafted an essay about relationships on the landscape, contributed to an event at the Urban Ecology Center through a story-telling activity for attendees

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