



Material and social relations in a coastal community garden assemblage

Lindsay K. Campbell ^a, Erika S. Svendsen^a, Renae Reynolds^b and Victoria Marshall^c

^aUSDA Forest Service, New York City Urban Field Station, New York, USA; ^bNew York City Urban Field Station, New York, USA; ^cTill Design, Newark, USA

ABSTRACT

This paper draws upon Actor Network Theory (ANT) to explore material and social dynamics of a coastal community garden site on public housing grounds in Rockaway, NY after Hurricane Sandy. Through a participatory design-research project, we examine shifting associations between humans and non-humans as a way of interrogating agency, power dynamics, and governance. Acknowledging our own outsider status, we draw upon the frame of ‘contact zones’ for thinking through encounters in conditions of power differentials. In describing our encounter with the Beach 41st Street Community Garden as a contact zone, we identify three assemblages with different governance arrangements – tidal shore, garden plots, and treed lawn. These assemblages are networked through material flows and include nonhuman actants such as freshwater, soil, plants, and wood. Unruly actors and actants – people, saltwater, poison ivy, dogs, and trash – can spark controversy and resist governing. We reflect upon the role of design, research, and community organizing as interventions that can cause rearrangements of the assemblages, shedding new light on power dynamics and potential apertures for change in a dynamic site. In so doing, we mobilize contact zones and ANT to better understand and act within shifting associations between humans and non-humans.

Relaciones sociales y materiales en el ensamblaje de un jardín comunitario costero

RESUMEN

Este artículo se basa en la teoría del actor-red (ANT, por sus siglas en inglés) para explorar la dinámica material y social de un jardín comunitario costero en el terreno de viviendas públicas en Rockaway, Nueva York, después del huracán Sandy. Mediante un proyecto de investigación-acción participativa, examinamos las asociaciones cambiantes entre humanos y no humanos como una forma de interrogar la agencia, las dinámicas de poder y la

ARTICLE HISTORY

Received 8 January 2018
Accepted 10 July 2019

KEYWORDS

Actor network theory; contact zone; design; participatory research; power; stewardship

PALABRAS CLAVE


teoría del actor – red; zona de contacto; diseño investigación participativa; poder; administración

MOTS-CLEFS

théorie de l'acteur-réseau; zone de contact; conception; recherche participative; pouvoir; gérance

CONTACT Lindsay K. Campbell  lindsay.campbell@usda.gov  USDA Forest Service, New York City Urban Field Station, New York, USA

Renae Reynolds' current affiliation is the New York City Environmental Justice Alliance, New York, NY. Victoria Marshall's current affiliation is the National University of Singapore, Department of Geography and ETH Future Cities Lab, Singapore.

 Supplemental data for this article can be accessed [here](#).

© 2019 Informa UK Limited, trading as Taylor & Francis Group

gobernanza. Reconociendo nuestro propio estatus como agentes externos, recurrimos al marco de ‘zonas de contacto’ para pensar a través de encuentros en condiciones diferenciales de poder. Al describir nuestro encuentro con el Jardín Comunitario de Beach 41st Street como una zona de contacto, identificamos tres ensamblajes con diferentes acuerdos de gobierno: la orilla, las parcelas de jardines y el césped arbolado. Estos ensamblajes están conectados en red a través de flujos de materiales e incluyen agentes no humanos como el agua dulce, el suelo, las plantas y la madera. Los actores indisciplinaos y los actantes (gente, agua salada, hiedra venenosa, perros y basura) pueden provocar controversia y resistirse al gobierno. Reflexionamos sobre el papel del diseño, la investigación y la organización de la comunidad como intervenciones que pueden causar reordenamientos de estos ensamblajes, arrojando nueva luz sobre la dinámica de poder y posibles aperturas para el cambio en un sitio dinámico. Al hacerlo, empleamos las zonas de contacto y ANT para comprender mejor y actuar dentro de asociaciones cambiantes entre humanos y no humanos.

Les relations matérielles et sociales dans un jardin communautaire littoral en tant qu’assemblage

RÉSUMÉ

Cet article puise dans la théorie de l’acteur-réseau pour explorer les dynamiques matérielles et sociales d’un jardin communautaire littoral situé sur un terrain de logements sociaux dans la péninsule de Rockaway, à New York, après l’ouragan Sandy. À partir d’un projet participatif de conception-recherche, nous examinons les associations changeantes entre les humains et non-humains afin d’interroger actions, dynamiques de pouvoirs et gouvernance. Reconnaisant notre propre statut d’étranger, nous empruntons le concept de « zones de contact » afin de penser les rencontres à travers les déséquilibres de pouvoir. En décrivant notre rencontre avec le jardin communautaire Beach 41st Street comme une zone de contact, nous identifions trois assemblages aux modalités de gouvernance diverses – rivage à marée, parcelles de jardin et pelouses boisées. Ces assemblages sont organisés en réseau par des flux matériels qui contiennent aussi des non-humains tels que de l’eau douce, de la terre, des plantes et du bois. Des acteurs et actants indisciplinaos – individus, eau de mer, sumac grimpant, chiens et déchets – peuvent créer des controverses et résister au pouvoir. Nous réfléchissons au rôle de la conception, de la recherche et du *community organising* comme interventions qui provoquent le réarrangement de ces assemblages, éclairant ainsi d’une lumière nouvelle les dynamiques de pouvoir et les possibilités de changement dans un site dynamique. Ce faisant, nous mobilisons les zones de contact et la théorie de l’acteur-réseau pour mieux agir et mieux comprendre les associations changeantes entre les humains et non-humains.

Introduction

This paper draws upon Actor Network Theory (ANT) as an assemblage approach that reworks our understanding of human and non-human relations to explore the material and social dynamics of a coastal community garden site after a storm (Latour, 2005; Power, 2005). These

material and social dynamics can be considered power dynamics from an ANT perspective. As Stone-Jovicich (2015, p. 25) summarizes, ‘actor-network theory looks at power from a different angle: how it emerges as a result of processes of networking among human and nonhuman actors. Rather than looking at capitalist structures and knowledge systems as ways to explain power, social injustices and inequities, and environmental degradation, ANT investigates how these structures and systems “come into being.” In other words, for ANT, power is the phenomenon to be explained, rather than the explanation (Alcadipani & Hassard, 2010). Thus, we examine the everyday and shifting associations between people and things as a way of interrogating the agency, power, and governance of the site. ANT provides a framework for describing how this dynamic system came together and continues to be reassembled around a changing set of concerns, including coastal flooding, community stewardship, public safety, and maintenance. As part of a coupled, participatory research-design project from 2013–2017, we worked with the residents of the Beach 41st Street Community Garden (B41 Garden), a coastal community garden on public housing grounds on the Rockaway Peninsula in Queens, NY that was heavily impacted by Hurricane Sandy. The case study focuses on a period of major reorganization of the use of space and changes in material flows throughout the network; providing an opportunity to understand both dynamism – the ways in which assemblages are rearranged – and obduracy – the things that are resistant to change within the system (Gunderson & Holling, 2002; Hommels, 2005).

Recognizing our own status as outsiders engaged with a historically marginalized community, we draw upon the notion of the ‘contact zone’ (Pratt, 1992) – as filled with encounters of both friction and exchange between actors (and actants) with differential access to power and resources. While ANT’s flat ontology has been critiqued for not dealing well with structural power and social inequality (Rudy, 2005), it has also been celebrated for opening up new spaces for critical environmental justice research (Holifield, 2009). Participatory research and contact zone theory provide an approach to thinking through the limits of ANT. That is, they offer a way to think through the politics of entanglements between groups with multiple forms of difference. Thus, in this article, we join up assemblage theory with the frame of the contact zone. These two strands of theory are rarely used in tandem (but see Harrison, 2013). By combining these perspectives, we think of contact zones anew. We see them as power-laden moments and spaces of encounter between humans and non-humans and as relational actor-networks that touch down in particular sites, but are not bound by Cartesian space. Accordingly, we propose a diminishing of the theoretical distance between contact zones and ANT and argue that this case offers empirical evidence of that convergence. We identify three assemblages at B41 Garden with different governance arrangements and material configurations: *tidal shore*, *garden plots*, and *treed lawn*. Throughout this paper, we reflect upon the role of design, research, and community organizing as active interventions – in which we participate – that can rearrange assemblages, while also attending to the limits, failures, and inabilities to create or perpetuate those changes. Finally, we conclude with a discussion of what we learnt through our design-research encounter in three assemblages that shape and are shaped by power, which is something both structural and emergent.

Tracing assemblages of humans and non-humans

ANT is a theoretical approach with a non-dual, flat ontology that radically departs from other modes of analysis. In this approach, non-humans are considered ‘actants’ or active agents,

rather than being solely the material substrate upon which humans actors work (Latour, 2005). Assemblage thinking has been applied to a wide range of sites and materials as a way to tease out human and non-human relations in different social-ecological systems, including urban environments (see, e.g. Braun, 2005). From a relational ontology perspective, no two assemblages are ever comparable. Instead, it is important to offer a 'micro-level focus on ... the relations between them that constitute our world' (Castree, 2005, p. 229). For example, water has been particularly well studied because the infrastructure can be traced from tap to watershed as a social-biophysical-technological network (Linton, 2010). In so doing, we see the way that different technologies and ways of thinking about both water and the city manifest in diverse spatial forms and institutional arrangements over time (Kaika, 2005). Turning to a coastal example from Sri Lanka, Lehman (2014) analyses the ocean as an actor that plays a role in shaping daily practices of fisher folk, armed conflicts in the region, and tsunamis.

Vegetation – such as trees, grass, and wetland plants – can also be considered as actants with which humans interact in forming assemblages that vary in their physical form and management approaches, including gardens (Power, 2005; Taylor & Lovell, 2014), lawns (Robbins, 2007), and tree-lined streets (Perkins, 2007). In all of these cases, the authors draw attention to the way in which non-human actants have inherent capacities and needs, with Perkins (2007) arguing that trees actively 'labour' while Robbins (2007) shows that the lawn 'enrols' humans in its care. Similarly, Power (2005) demonstrates how planted species, pests, and weeds operate as subjects, 'drawing people and plants into a relation of care' (p48). However, these vegetative actants are not always compliant with our human desires; they can be 'unruly' (Dean, 2015). We see this particularly in the case of species categorized as 'weeds' that managers often seek to remove, such as Dog Strangling Vine (Sandilands, 2013) and the Ailanthus tree (Patrick, 2015).

We can consider environmental governance as power-laden acts of negotiation or transformation, not only between various sectors (state, civil society, business), but also between humans and non-humans. Few (2002, p. 31) describes how, using ANT, '... power is composed by enrolling others actors in political and social schemes, and the ability to generate such associations hinges on both material and non-material resources (Latour, 1986).' Braverman (2015) describes urban forest governance via a Latourian lens, honing in on 'spatial technologies' – the grid, the grate, and the Dig-Safe Procedure – that influence governance dynamics and operate on different strata—aboveground, underground, and ground level. McCrea (2016, p. 307), drawing upon assemblage approaches and Foucault's *dispositif*, finds a wetland to be a site of co-governance and co-production between beavers and humans – with the former influencing 'the parameters, implementation, and management of the wetland restoration project.' Yates, Harris, and Wilson (2017) explore the governance implications of recognizing multiple water ontologies – acknowledging that there are multiple ways of being-with-water, not just of perceiving it, which can open up possibilities for challenging hegemonic views. Overall, assemblage thinking shares an interest in distributed, relational, and networked agency as well as an openness to processes of emergence and becoming (Marcus & Saka, 2006).

The literature presents a lively debate over ANT's approach to theorizing power and whether and how it is compatible with other critical theories (Castree, 2002; Holifield, 2009; Lave, 2015). ANT has been critiqued as insufficiently attuned to issues of social and

political inequality (Lave, 2015), including a particular lack of attention to issues of gender, race, class, and colonialism (Haraway, 1992). However, Holifield (2009) contends that ANT provides an alternative, and potentially more productive, approach to advancing environmental justice than Marxism – because it ‘opens up space’ for alternative explanations of processes. It also brings attention to ‘controversies and uncertainties about how agency is distributed’ as well as the ways in which those controversies become stabilized, thereby ‘structuring unequal and potentially unjust configurations of society and nature’ (Holifield, 2009, p. 645, 647). More recent scholarship has worked to address prior critiques – calling for ‘extra-sectionality’ that takes into account both intersectional, structural (raced, classed, gendered) inequalities *and* the embodied, socio-material experiences that co-constitute them (Horton & Kraftl, 2018). Finally, while ANT may miss some of the power inequalities that shape the ‘contours of networks associations,’ Routledge (2008, p. 201) calls for acts of critical engagement or ‘acting in the network’. In taking up this call, we argue that bringing the concept of contact zones into the analytical approach can work to address some of these concerns about ANT.

Contact zones and spaces of encounter

Considering acts of critical engagement in contexts of power inequality, contact zones, contact theory, and spaces of encounter provide lenses for understanding spaces and moments in which diverse groups interact, exchange, and reciprocally reshape each other. Contact theory originated in post-World War II social psychology, advanced by Gordon Allport’s (1954) contact hypothesis. This work explored ways in which more frequent intercultural contact could potentially help improve conditions of inequality, prejudice, and discrimination (Allport, 1954). In particular, that contact needed to be mutually meaningful, engaged, and participatory in order to be transformative. As such, this early theory has been taken up by scholars who are interested in engaged research methods (Torre, 2010).

More recent scholarship, including postcolonial and borderland theory, has focused on power asymmetries, inequalities, and hybrid identities in contact zones. Coming from a focus on comparative languages in intercultural settings, Pratt (1992, p.4) coined the term *contact zones* to mean ‘social spaces where cultures meet, clash, and grapple with each other, often in contexts of highly asymmetrical relations of power, such as colonialism, slavery, or their aftermaths as they are lived out in many parts of the world today.’ Pratt’s framing has been applied in a wide range of settings, including examining the classroom as a contact zone between ‘various competing languages and perspectives,’ but also a space for intercultural learning (Harris, 1995, p. 31). Anzaldúa (1999) theorized the notion of *nos-otras*, which are mixed identities of self (colonized) and other (colonizer) that begin to blur and dissolve in border spaces. Torre (2010, p. 6) notes that these ‘hybridized’ selves [are] selves with contrasting, conflicting roots, selves from communities, people, now responsible for one another.’ Building on Clifford’s (1997) notion of the ethnographic museum as a contact zone, Harrison (2013) theorizes these places as ‘meshwork’ assemblages that are full of friction, encounter, and distributed agency.

Socio-natural dynamics and multispecies encounters are also theorized through the lens of contact zones; not as two interacting sets of wholes, but as a relational meshwork. In these dynamic moments and sites of exchange, multiple sets of actors and

actants come together and are altered through the process. Tsing (2005) theorizes these as 'interspecies interdependence' – in which human nature and culture is bound up and constantly changing. Haraway (2008) considers these entangled relationships of 'reciprocal induction, through which organisms are structured by the mutual coshaping of the fates of cells. The point is that contact zones are where the action is, and current interactions change interactions to follow.' (219). Following this line of scholarship, the concept of contact zones is compatible with assemblage thinking. Indeed, scholars have advanced both Haraway and Latour, calling for 'common worlding' through multi-species ethnographies and other post-human research approaches that de-centre humans from our accounts (Pacini-Ketchabaw, Taylor, & Blaise, 2016).

Contact zones and spaces of encounter are manifold in the conduct of research. Turning her eye reflexively toward the process of conservation field research in Bolivia as an American academic, Toomey (2016) identifies multiple 'spaces of encounter and misencounter' over the course of the research process. Toomey surfaces the potential for (and obstacles against) greater power-sharing and inclusion in scientific processes throughout spaces of arriving and gaining permission; spaces in the field; spaces of relevance; spaces of knowledge exchange; spaces of friendship; and spaces of analysis and acknowledgement. The notion is not limited to foreign, rural research sites; Amin (2002) has examined the spatiality of inter-ethnic urban encounter. Building upon these traditions, Askins and Pain (2011) argue that contact zones can be used as theory and method, and can productively be combined with Participatory Action Research in order to better understand what fosters transformative spaces. Overall, these contributions encourage a sensitization to (and potential transformation of) power dynamics at play in knowledge production and community engagement—lessons that we attempted to take forth in our coupled, participatory research-design project described herein.

Context, methods, and approach

The Beach 41st Street Houses is a New York City Housing Authority (NYCHA) public housing development consisting of four mid-rise apartment buildings that house approximately 1,700 residents, situated on the shoreline of Jamaica Bay in the Edgemere neighbourhood of the Rockaways (see Figure 1). In thinking about our encounter with this area as a contact zone, it is important to understand that NYCHA is the largest administrator of public housing in the United States – providing shelter and services to residents who are low income and predominantly people of colour. There are 334 NYCHA developments across New York City, covering more than 1,100 hectares, housing officially half a million people and unofficially many more. Many of these developments were built in the middle of the 20th century and have decades of deferred capital maintenance. As of 2014, NYCHA's capital shortfall was projected to reach \$14 billion over the next five years (Center for an Urban Future, 2014). The Beach 41st Street Houses also face physical vulnerabilities due to their location on the Rockaway Peninsula, which is a narrow, sandy land mass abutting the Atlantic Ocean. During Hurricane Sandy, the entire peninsula was inundated with floodwater, and was one of the most heavily impacted areas in New York City.

B41 Garden is a linear community garden comprised of 30 individually-managed plots (roughly 10 × 15 feet each) located on the grounds of Beach 41st Street Houses and adjacent to Jamaica Bay. The gardens were developed in the 1990s through the

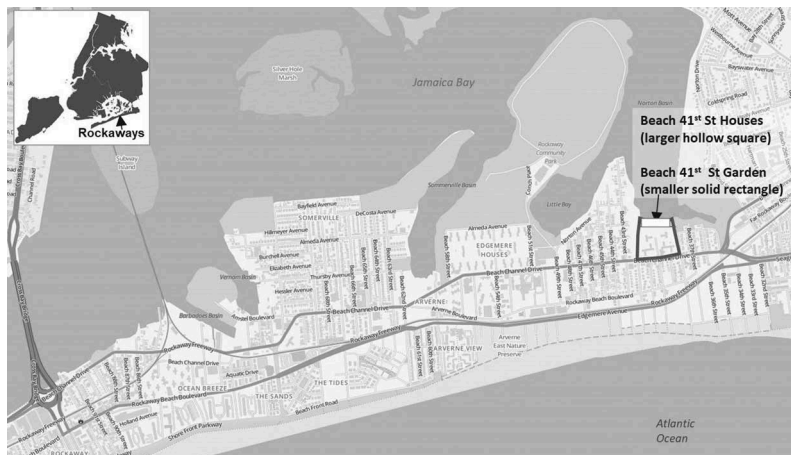


Figure 1. Map of beach 41st street garden and houses located on the rockaway Peninsula in Queens, NY. Map created by Michelle Johnson, USDA Forest Service.

NYCHA Garden and Greening Program, which supports public housing residents' involvement in green space stewardship (see also Bennaton, 2009). In October 2012, Hurricane Sandy flooded the grounds and NYCHA closed B41 Garden for a year. Starting in 2013, the site became part of a coupled, participatory research-design project supported in part by the TKF NatureSacred program, entitled 'Landscapes of Resilience.'¹ At the invitation of the NYCHA Garden and Greening Program, this project supported the process of returning to gardening after the hurricane and examined how people's participation in greening activities can support resilience to future threats (see also McMillen, Campbell, Svendsen, & Reynolds, 2016). Social science researchers (LC and ES) and a landscape architect/urban design professor (VM) served as co-leads of the project. We intentionally worked to diversify our team by hiring two Rockaway residents – one community organizer who provided horticultural assistance to gardeners and one participatory research practitioner (RR) who led the ethnographic research. While one of these women was a person of colour, neither was a public housing resident and we recognize that many intersectional sources of difference (such as race, class, educational status, employment status) divide our team from the NYCHA residents. Acknowledging these differences, we worked in collaboration with NYCHA gardeners, staff, and residents throughout the process to share resources and knowledge and to support residents' desires for using and re-envisioning the space.

We documented B41 Garden from 2013–2017 through ethnographic methods including participant observation, photographs, and unstructured and semi-structured interviews. Our approach included weekly and sometimes daily visits to the garden to participate in project development, socialize with gardeners, talk with staff, and be a consistent, embedded presence on site. We wrote field notes after each visit (187 pages) and participated in weekly research team debriefs to discuss observations, processes, and patterns. Following procedures of informed consent, 22 interviews lasting one to two hours in duration were conducted with community gardeners and local community greening organization representatives. Because

our research question did not focus on differences in stewardship practices among gardeners at the individual plot level, we did not collect detailed demographic data of our interviewees. Overall, we observed that the composition of the garden group was entirely public housing residents and people of colour, predominantly women, and predominantly seniors. We organized a series of community workshops as opportunities for reciprocal learning and exchange – with researchers learning about garden practices and gardeners exploring how their NYCHA grounds might be transformed in novel ways. We worked with illustrative and technical drawing sets that communicated proposed design elements. We engaged with the material construction of designed garden elements as an ongoing process of negotiation. Photographs and short vignettes were shared via a public website to share progress and solicit feedback and reflections (see <https://b41communitygarden.tumblr.com/>).

We strengthened the rigor of the research by using four types of triangulation: ‘multiple sources, methods, investigators, and theories’ (Bradshaw & Stratford, 2005, p. 74). Interviews were recorded, transcribed, and analysed for their themes, using an inductive approach guided by assemblage theory. We iteratively wrote narratives, verifying these against field notes, and seeking consensus among team members. As a qualitative case study, these findings cannot be generalized to any broader population. However, our aim is not to generate predictive theory or to claim that these assemblages resemble any others; but rather, to show as Timothy Mitchell (2002, p. 8) notes that ‘theory lies in the complexity of the cases.’ Toward that end, next we present three narratives of the assemblages that we identified and worked with, moving from the bay inland: *tidal shore*, *garden plots*, and *treed lawn* (Figure 2). We did not approach the contact zone as three distinct assemblages at the outset – but rather came to observe the ways in which relations were arranged and governed very differently across space over the course of working with the site and the residents. We also acknowledge that boundaries are not rigid, and we explore the many ways in which border-crossings occurred on their own and were encouraged by the design-research team, the landscape contractor team, and the gardeners. To see detailed images of the assemblages, see supplemental online materials.

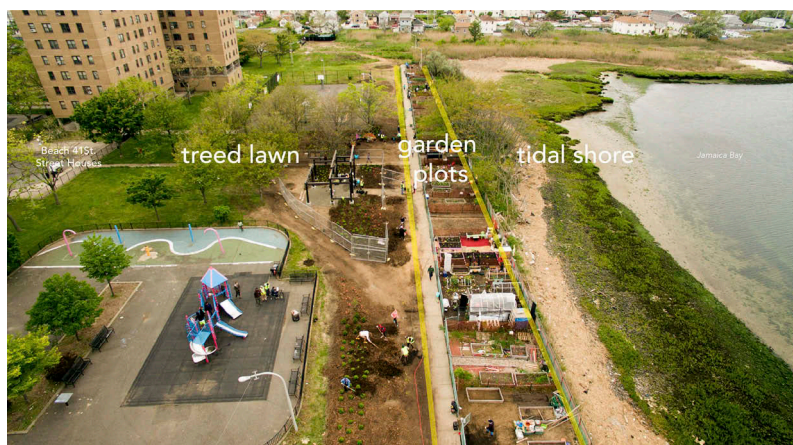


Figure 2. Photo of Beach 41st Street Houses with tidal shore, garden plots, and treed lawn identified. Photo by Mehdi Salehi, New School Tishman Environment and Design Center.

Tidal shore

Because the Rockaways were historically a barrier island, flood events are common and becoming increasingly so with the changing sediment balance in the bay, the rise of sea levels, and the increase in intense storm events in a context of climate change. Situated adjacent to the Norton Basin of Jamaica Bay, the shore, the plots, and the lawn of Beach 41st Street Houses all regularly flood at high tide and in storms, and flooded with particular severity after Hurricane Sandy. Water is a powerful, boundary-crossing actant, with waves lapping into garden plots and soggy lawn patches hydraulically connected to the bay. Additionally, other non-human actants, including avian and aquatic life, are a visible presence at the shoreline. New York City is located on the East Coast flyway, which is a transcontinental corridor for bird migration; and Jamaica Bay is an important site for Atlantic Ocean fish breeding.

Our team worked with NYCHA to identify B41 Garden as a site for adaptation through design and research. Following Hurricane Sandy, NYCHA told gardeners at B41 to stop gardening, because the plots had flooded and they were not sure of the safety of the soil. NYCHA staff suggested to our team that perhaps the garden should be re-located away from the water's edge, and we began by assessing alternate sites. But, in talking with the gardeners, many had a strong attachment to their coastal site – despite its vulnerabilities. Only one intrepid family continued to garden in the year after Sandy, in spite of the gardening ban. But others were eager to return. The waterfront views, breezes, and birds exerted a powerful influence on the gardeners, who told us they connected deeply to these aspects of the site as part of their attachment to that place.

At the same time, among residents and staff, there was some confusion over who 'owns' the shoreline, with numerous interviewees telling us that it 'belonged to the NYC Parks Department' rather than NYCHA. In the eyes of residents, the wetland exists as a liminal, 'wilder' space that is perceived quite differently from the regularly maintained lawns, playgrounds, and pathways that are operated by NYCHA staff. The ownership was not initially clear to us either, but our inquiries with NYC Parks and the Mayor's Office revealed that the land is part of NYCHA's holdings. It is possible the shoreline may be reshaped in the future, as the NYC Office of Recovery and Resiliency has examined the Edgemere neighbourhood for potential construction of 'Raised Shorelines' (slightly elevated edges). Paralleling the ambiguity over who owns the shoreline in the eyes of the residents, the garden does not appear on any municipal map. City officials conducted site visits to assess the potential for raised shorelines and some were surprised to find an active community garden at the site. At the same time, NYC Department of Housing Preservation and Development (HPD) is implementing selected waterfront home relocation to parcels further inland. HPD initiated a neighbourhood-scale planning process entitled the Resilient Edgemere Community Planning Initiative (NYC HPD, 2017). Our embedded researcher attended public meetings in the neighbourhood, drawing attention to the presence of the B41 Garden and its constituents. While various government agencies consider how to manage the shoreline in the future, large-scale forces of the bay's bathymetry, the size and frequency of the tides, storm events, and climate change continue to exert their own pressures.

Through our process of examining the jurisdiction of the site, we learned that any transformation of the Beach 41st St shoreline triggers a host of regulatory frameworks.

Any disposition, demolition, or under-utilization of NYCHA property triggers a Section 18 easement of the 1937 Federal Housing Law (HUD, 2017). Any earth moving or construction beneath the 3 meter elevation line next to tidal wetland is subject to state tidal regulation laws, according to Article 25, Environmental Conservation Law 6NYCRR part 66 (New York State Department of Environmental Conservation [NYSDEC], 2017). Finally, the entire Rockaway Peninsula and Jamaica Bay region is under study by the US Army Corps of Engineers and New York State Department of Environmental Conservation for potential coastal protection measures (U.S. Army Corps of Engineers, 2017). At one point we made design proposals for moveable planter boxes or plantable berms along the waterfront. But given this regulatory context, the ongoing challenges of both bureaucratic control as well as flooding, and the size of our design budget, we did not do any construction in the tidal shore. Instead, we followed the lead of gardeners, stewards, and fisherman who engage with the shore in its current state (described below) – and organized shorefront clean-up and native plant identification workshops – to reinforce and shape further attachments.

Despite the jurisdictional complexity and ambiguous future, the coast offers numerous human-nonhuman encounters in its present state, particularly because of unruly actants that penetrate the different areas – often in response to the currents and tides as actants. Some of the gardeners engage in shorefront clean-up – removing plastic debris that washes up in the reedy wetland area, or paying neighbours to cut back poison ivy that persistently returns along the fence line. A robust saltwater marsh forms the narrow, curved shoreline. On the western side of the site, these marsh grasses demonstrate their capacity to move inland toward the garden plots and the lawn, forming a meadow. We took cues from these fast-growing marsh grasses in developing our design approach for the lawn space, described below. One group of gardeners purchased a lawnmower, cutting back the grasses when they perceive them as getting ‘too high’ or coming ‘too close’ to the garden plots.

Other local residents have embraced the shoreline as a place to interact with bay, fish, plants, and sky. A group of men who call themselves the ‘Bay Rats’ fish, barbeque, and socialize in a makeshift structure at the end of a dead-end street, just past the bulk trash dumpster and parking area, adjacent to the garden. The tidal beach next to the clubhouse is largely comprised of rocks and broken glass – evidence of years of accumulated detritus from human use. Despite being in close proximity and having convivial relations with the gardeners, there is little material exchange between the gardeners and the Bay Rats. The Bay Rats discussed the idea of using fish gut as compost and soil amendment for the garden, but to our knowledge this remains a proposal. However, at least one of the Bay Rats was a former gardener. Other residents consider themselves stewards of the wetlands, including a nearby neighbour who founded the Norton Basin Edgemere Stewardship Group. A self-reported ‘guardian of the bay,’ she described removing 35 bags of garbage per week since moving to the area in 2002 as well as removing invasive plants like mugwort and phragmites. Our initial design impetus was to create more boundary-crossings between shore and plots; we proposed a small pier with floating gardens that was anchored to a concrete pad, coupled with access to the shoreline via a lockable gate between one garden plot and the bay. This steward claimed that the fragile saltmarsh would be damaged by foot traffic, and noted that the existing fence was an important protective barrier to keep humans away from the shoreline; some

gardeners were concerned about loss of a plot to create access to the bay; and NYCHA staff raised safety concerns about accessing the shore. All of this feedback led to us eliminating these features from our design.

Finally, stretching beyond B41 Houses and the Bay Rats' clubhouse lies a network of desire lines and informal trails that wrap around the edge of Norton Basin. NYC Parks has a proposal in the planning stage for a Jamaica Bayfront Trail that would connect existing public greenspaces along this shoreline. We sent emails and had phone calls with agency representatives to let them know about the garden and to suggest potential connections with Beach 41st Street Houses. One proposed trail route goes inland, around the NYCHA grounds, losing contact with the shoreline and missing these spaces of coastal encounter, whereas another proposed route shows a dotted line that traverses the NYCHA grounds. We appreciate the power of this dotted line in acknowledging the potential connections to a community that is often ignored in planning processes. Given the shifting nature of the coastline due to climactic, biophysical, and political pressures – the location and physical form of these trails and connections remains to be determined at the time of this writing.

Garden plots

Although we use the term 'community garden' as a shorthand to refer to B41 Garden, it is important to note that these 30 individual plots more closely resemble an allotment garden governance structure. An individual or family gets their own dedicated, fenced area to manage; the overall space is not managed collectively as a commons. These plots are assigned via a request system that is managed by NYCHA and gardeners must reapply every year, which can generate uncertainty mixed with territoriality. Our designer and community organizer attempted to work with gardeners to subdivide plots that were too large to be maintained by an individual with temporary snow fencing. But the memory of plots as individual spaces was persistent and difficult to shift. Even when plots lay fallow, they were considered 'claimed,' which can create tension with more productive growers who would like additional space. Reassigning or subdividing plots remains a highly delicate act. Recognizing that many of the gardeners were senior citizens, our community organizer aimed to recruit more youth to work with the garden. Despite a community centre with youth programming being just one block away, that centre was not engaged with the garden. The organizer recruited youth from the centre to participate in a demonstration garden. During the course of the design-research project, the gardeners also created a NYCHA Resident Green Committee to strengthen their organizational capacity. They have a president and secretary, keep meeting notes, and apply for grants to support programming on the site. This Resident Green Committee is an attempt by local residents to align with the organizational structure at NYCHA in order to build more lasting group institutional knowledge and continuity, given that plots are reallocated every year.

Gardeners are the primary land managers of their plots – so they largely determine the material inputs and structural configurations within their space – but they do so in the context of a broader assemblage that shapes their actions, including NYCHA rules, unruly actants, and access to material resources. In the past, NYCHA rules required residents to plant only annuals, so that grounds staff could consider gardens as

'temporary' uses on the land; but these rules were renegotiated in 2002 to allow the planting of perennials and shrubs (Bennaton, 2009). B41 Garden was established in the 1990s; the perennial plants at the site form multi-year attachments with the gardeners as they return anew each spring, grow throughout summer, are cut back in fall, and go dormant in winter. So, while gardeners must re-apply for plots each year, both plant structures and human memories demonstrate abiding relations. Many gardeners save seeds, share plants, and select plants that have edible or medicinal uses, cultural, or personal significance. Planting practices range from agricultural-style row cropping (e.g. beans, garlic, peppers, collards), to raised beds (e.g. tomatoes, basil, other herbs), to decorative borders of flowers (e.g. daffodils, lilies, marigolds). Gardeners adaptively source and reuse materials (such as used furniture or pallets from the nearby bulk trash area) in creating benches, shade structures, and trellises. One novice gardener created, entirely from found objects, a self-designed greenhouse. Although enclosed structures are technically against NYCHA rules, this gardener's creativity was honoured with an award at the 2016 NYCHA Garden and Greening Awards Ceremony.

Some actants can be unruly and unwanted. The ongoing human labour required to keep plots from becoming overrun with weeds presents a substantial and strongly voiced challenge to gardeners – especially those who may be elderly, ill, or disabled. Particularly troublesome to the gardeners is the poison ivy that grows on the fence. Some gardeners put down fabric or carpet as a weed barrier; others pay a group of men to remove plants on the fence. The porous boundary between the tidal shore and the garden plots is penetrated by the unruly actant of brackish water. Several gardeners have developed adaptations for 'living with water,' including building raised beds and creating trenches between beds. Many gardeners store their tools in lightweight boxes and shopping carts so that they can be brought up to their apartments before storms. We used low-cost strategies to support gardeners, while also recognizing that plots and lawn will continue to flood. These design strategies included: working with NYCHA to secure lumber for raised beds, developing new systems to access soil on an ongoing basis, and offering free sandbags for gardeners to shore up their plots in a temporary way.

Fresh water is a crucial material input required for creating a successful garden. In the past, NYCHA provided one spigot for freshwater access near the centre of the plots on the sidewalk. Over time, this system had broken. It took the work of the community organizer and B41 residents to draw attention to the need to repair this system. NYCHA made repairs to the central spigot and redesigned the system to run hoses along the 30 plots with individual spigots for each gardener. This system was highly successful in the 2015 growing season. In the spring of 2016, however, the water was not turned on for several hot weeks. We learned that only one worker on staff had the knowhow and correct tool to turn the water system on – and he was on vacation in Puerto Rico. This one key node in the water assemblage could enable or constrain the ability for the system to function. Gardeners made do, bringing water in buckets from their homes until the system was reinstated. To build more redundancy, our designer created a free-standing, individual drip-irrigation system that uses contractor buckets, suspended from bamboo tripod poles. If the water system breaks again, buckets can be filled off-site and installed to slowly drip water on the plots.

Receiving sufficient, clean organic soil is another consistent challenge for urban gardeners, particularly for gardeners on public housing grounds that are not able to

easily access or direct the material flows of such a resource. Concerns over potential soil contaminants after Sandy led NYCHA to enact the gardening ban at B41 Garden for over a year. Once the soil was tested and deemed safe for gardening, and funding was secured to support a community organizer and material resources, the gardeners were able to begin again. Our team helped support the gardeners' 2014–2017 growing seasons with a mix of privately-funded soils purchased from a regional nursery, publicly-offered compost sourced via NYCHA, wood for raised bed box-building sourced via NYCHA, and plants sourced from private funds and NYCHA supplies. The approximately 650 community gardens in New York City that are part of the NYC Parks GreenThumb program can register to receive free soil, compost, clean fill, or mulch by attending a workshop and filling out a simple, one page online form. However, gardens on NYCHA grounds are not part of the GreenThumb system. The NYCHA Garden and Greening Program aims to provide shipments of soil, compost, lumber, and plants to these numerous sites (Bennaton, 2009), however the support staff for this program is significantly smaller than that which is available for GreenThumb gardeners. Over the last decade and due to budget constraints, the NYCHA program went from having two citywide coordinators, to one single coordinator, to no coordinator. These coordinators' work had been supplemented by paid seasonal consultants (like our community organizer), but those consultancies ended in 2015. The Gardening and Greening Program is mentioned in the Next Generation NYCHA 10-year plan as the sort of 'direct service' provision that does not have sufficient funding and requires a partnership model, although the specific model for that program area is not named (New York City Housing Authority [NYCHA], 2015, pp. 93–96). Thus, we are mindful that beyond the duration of our project, there will be a substantial need to identify a consistent source of soil to support the ongoing needs of the gardeners.

Ultimately, our design and organizing approach consisted of supporting gardeners to remain *in situ*, while helping to strengthen and re-shape their attachment to this site and to each other. In so doing, we hoped that these social ties would sustain gardeners through the next wet event. Going beyond the traditional design charrette, we held interactive workshops with gardeners – focusing on creating custom signage and lighting for the garden. By encouraging gardeners to adorn their plots with expressions of identity and love, we sought to reinforce place attachment, to communicate the intent of the garden to all residents of B41st Street Houses, and to collect statements to put on flags that are the signage in the lawn. We also worked to strengthen social and material networks that extend beyond the site. Our embedded researcher was instrumental in catalysing the East Rockaway Growing Coalition that brought together members from B41 Garden with other greening groups on the peninsula, including Rockaway Waterfront Alliance, Rockaway Youth Task Force, and Edgemere Farm. The coalition applied for and received a grant to hire two urban agriculture summer interns to work across sites, sharing knowledge and labour in tending land at multiple locations. These sorts of organizational and material ties are crucial to sustaining B41 Garden in the long term, particularly in the context of ongoing resource constraints and changes to the NYCHA Garden and Greening program and the only temporary presence of our team at the site.

Treed lawn

While considering the Beach 41st Street site, it is important to briefly situate these grounds in the context of public housing landscape design, which has evolved over time. In the mid-20th century, public housing often took the form of modernist, Le Corbusier-style 'Tower in the Park' – i.e. high-rise buildings surrounded by lawns – as this was believed to maximize open space and exposure to sunlight and fresh air (NYCHA, 2015). However, the late 20th century saw a return to a desire for low- to mid-rise housing integrated with the streetscape. From the 1970s to the 1990s, there was a turn toward the creation of 'defensible space' in public housing, which focuses on the need to create a sense of territory and ownership in a shared public space in order to deter negligence and crime. This approach to landscape management intersected with concepts from criminology in the creation of the subfield 'Crime Prevention through Environmental Design' or CPTED (Newman, 1972, 1996). In 2015 the NextGeneration NYCHA plan recommitted to integrating CPTED principles into all capital projects, shaping 'everything from the small-scale, such as the use of shrubbery and vegetation, to the large scale, promoting an increased use of public space and presence' (NYCHA, 2015, p. 78). The Beach 41st Street Houses was constructed in 1973, consisting of four mid-rise buildings containing 712 apartment units and one community centre situated on 5.39 hectares of land. Institutional rules and aesthetics inform the form, function, and plant selection in the NYCHA grounds. The Beach 41st Street grounds contain mown lawns with large, landscape trees, occasional planting beds, and separate functional areas for walking (sidewalks), children (playground), and sitting (benches), often divided by low fences.

The physical design, rules, and maintenance routines of Beach 41st Street Houses emphasize cleanliness and security of the space. The lawn is a regulated space that is demarcated with posted signs and rules, including 'No BBQs or Picnics on NYCHA Property' and 'Keep Dogs off Grass – It's the Law; Minimum Fine \$100-\$250.' Certain lawn areas include generator-powered flood lights, installed through the New York City Police Department Omnipresence program, meant to enhance night-time visibility and deter crime. The primary management activities that we observed occurring in the lawn were ongoing trash removal by maintenance workers and regular mowing of the grass with ride-along mowers. NYCHA regulates the presence of pets in apartments as well as on the grounds. For example, residents told us that there are certain size and breed restrictions written into their apartment leases. There is no official dog run or off-leash area on the grounds for dogs to use; though some residents unofficially allow their dogs on the lawn, in spite of the posted rules.

The process of gaining permission to intervene in the NYCHA lawn was lengthy due to the need to build trust and shared understanding about project scope, while also addressing concerns over risk and liability in a capital project. A license agreement was secured for Till Design, the landscape architecture practice, and our contractor, Natural Garden Landscapes (NGL), that allowed our team to work within a designated project area for a specified period of time. In order for NGL to work in that area, they had to demonstrate having sufficient insurance and ensure the health and safety of all workers on site. Unlike many private construction contractors, NGL sought to work with paid apprentices in order to provide training in woodworking and to work with residents in the implementation of the landscape design. This different approach to labour was

challenging within the safety and training protocols, and so the apprenticeship program was adjusted to meet these requirements. In addition to NGL, our team partnered with Green City Force, a non-profit youth development and greening organization with prior experience working on NYCHA grounds.

With permission to work on the grounds secured, we sought to be responsive to gardener interests and needs, including concerns around dog faeces and unleashed dogs. In one of our design workshops a gardener sat in a chair along the concrete path, rather than sit on the picnic blanket we had laid out. 'She had a phobia of the grass,' another garden explained, due to the fear of stepping into dog waste. In response, our community organizer purchased a dog waste system, consisting of a bag dispenser and waste basket that was installed at the entry of the lawn area. At the same time, residents' fears have been realized as, on various occasions, both people and smaller animals have been attacked by unleashed dogs. Yet, fear of reprisal for reporting dog owners responsible for these encounters, coupled with persistent frustration that nothing will ever change, leads to inaction. An earlier design proposal to create a dog run that was initially met with great enthusiasm did not develop due to lack of sufficient budget and lack of precedent for this type of intervention on NYCHA grounds.

Our design strategy worked with the lawn assemblage, recognizing the entrenched routines around maintenance and aesthetics – but searching for apertures for change. The design balanced permanent elements, such as a pergola; with other elements that are easier to rebuild, such as bamboo fences that enclose garden plots; with temporary gestures that were meant to claim space, but not necessarily meant to last. Our first landscape intervention was directed by our community organizer and supported by NYCHA Garden and Greening – the fall planting of annual, ornamental chrysanthemums and cabbages at key entry points to buildings. Albeit ephemeral, the act of stewardship was a symbol of our shared commitment to the site. Our approach to lighting similarly made claims on the space – with gardeners deciding to spell out 'Beach 41st Street' in flexible lighting arrayed on the garden fence. Over many periods of iterative design, community input, approval from NYCHA and our funder, we proposed creating a gathering space that would be a focal point for the grounds. We heard from gardeners that they wanted a multi-use space for meetings, birthday parties, church group gatherings, and socializing in the shade. Our new design consisted of a hand-built pergola – a shade structure made of a wooden frame and slate roof assembled by NGL and their apprentices; planting beds with salt-tolerant ornamental plants planted with and for community residents and volunteers; and newly seeded lawns areas with two wooden benches and several tripods adorned with messages of love crafted through our workshops.

The particular arrangement of the design elements was finalized through an iterative process working with NYCHA residents and staff. Over time, we became attuned to the capacities and needs of the actors and actants through our ongoing physical presence at the site. The salt-water floodplain forms a part of this assemblage that affects and is affected by the people, plants, and built features that we worked with on the site. In response to the frequent flooding issues on low lying areas in the lawn, the design proposal included new planting beds with species that can tolerate inundation. These planting beds are meant to hold extra water and allow it to be slowly absorbed by the soil. To prepare the grounds for successful planting, massive inputs of human labour and

soil were required. Fifteen members of Green City Force provided labour, hand tools, and use of a backhoe. They spent two weeks excavating the ground – a low-quality fill – and amending it with soil, compost, and sand. Following this bed preparation stage, as well as weeks of community outreach, we engaged more than 100 residents, neighbours, and friends on a large-scale volunteer planting day on 21 May 2016 in which more than 700 plants were installed, mulched, and watered.

Through both the landscape design elements and the volunteer planting day we sought to amplify boundary-crossings between the garden plots and the lawn. Without direction from our team, the gardeners planted a row of daffodil bulbs along the central sidewalk, helping to beautify that pathway as a key axis. Daffodils were selected because they are planted in the fall, but emerge as an early sign of spring with a burst of yellow colour that signifies that someone is tending the site. During one site visit, we observed that resident gardeners were ‘jumping the fence’ to plant hostas and other ornamental plants on the other side of the sidewalk in the lawn. Responsive to this impulse, our design proposed 6 new hexagonal garden plots inside the lawn surrounded by handmade bamboo fences created by NGL and Green City Force. During the community planting day, volunteers also ‘jumped the fence’ to work with some of the resident gardeners on maintenance of their plots. At a summer potluck, we observed that one gardener had created a new vegetable garden across the path, and another had rigged up a shade structure next to their garden. We take these boundary crossings as subtle, ephemeral signs of transformation in the interaction with the lawn space.

Discussion

We have interrogated and traced the structural and emergent power relations in the actor-network/contact zone of the B41st Street Houses across three assemblages. While we acknowledge that the areas are not neat and distinct, but blurry and porous, we can nonetheless detect that the assemblages are arranged differently in the shore, the garden, and the lawn. Each assemblage area has a different governance arrangement and set of stewardship practices and is discussed in turn.

The tidal shore, with its multiple, overlapping jurisdictions, appears as an *ambiguous or liminal space*. In alignment with Lehman (2014)’s findings that coastal networks are permeated with uncertainty, we found ourselves with limited ability to create changes in the shoreline assemblage. The shore’s ownership was unclear; its boundary at the edge of the bay is shifting in the face of storms and climate change, and its future remains indeterminate as various capital-intensive proposals for shoreline retrofits and bayfront trails circulate through policy arenas. Nonhuman actants include tides that vary in rhythmic, but sometimes extreme ways; birds, fish, and breezes that invite curious humans to the shore; and coastal debris that returns recalcitrantly along the edge. We experimented with (and abandoned) creating more access points between the garden plots and the tidal shore in the form of a lockable gate–until we realized concerns about coastal fragility, public safety, and garden territory. Meanwhile, some human users – particularly fisherman, ecological stewards, and trail explorers – already seek out engagement with the shore. We took our cues from these entanglements, documenting the informal trails, engaging in temporary acts of debris removal, and drawing attention to the potential linkages between Beach 41st Street Houses and other bayfront open spaces. By creating visibility through social media, meetings, and field tours, we hope that the stake of Beach 41st residents is made more prominent in these ongoing negotiations.

The garden plots are *community-managed spaces*, where – given certain rules and procedures created by NYCHA – gardeners can make choices about how to steward their spaces. Following Power (2005), we find that these choices are never a total mastery of space, but rather are sets of relationships with human neighbours and nonhuman actants – the salt water, freshwater, cultivated plants, weeds, soil, lumber, found objects, trash, and animals that co-constitute these spaces. Some beloved, but fragile species require ongoing care in order to thrive (such as the flowers and vegetables gardeners intentionally grow), whereas other hardy species that are not desired resist efforts to restrain them (such as poison ivy and mugwort). We found the most room to manoeuvre as organizers within the community-managed spaces of the garden plots, where we worked to support and mediate relationships among gardeners and with their plots. Our collaboration with NYCHA helped to repair key infrastructure systems (e.g. the freshwater line), but it requires ongoing maintenance in order to function. Our participatory workshops encouraged acts of turf-marking, place naming, and assertions of identity. Our community organizer and researcher worked to reknit networks through offering feedback, connecting gardeners to resources (including soil), holding planning meetings, and building neighbourhood coalitions.

Finally, the treed lawn is the *negotiated regulatory space* – reflecting NYCHA's institutional decisions around maintenance, cleanliness, and safety. Posted rules prohibit certain uses of the spaces, and management routines emphasize the need for mowing and trash removal – while the grasses themselves enrol the NYCHA managers as 'lawn subjects' (Robbins, 2007). The physical forms, rules, and maintenance routines have evolved over the history of public housing landscape design (see, e.g. Newman, 1996). But still, both human actors (gardeners, dog owners, picnickers, designers) and non-human actants (marsh grasses, dogs and their faeces, salt-tolerant planting beds) work with, reshape, and even resist these rules as the lawn gets assembled and reassembled. We observed gardeners who encouraged their plants to 'hop the fence' into the lawn and others who mowed back weeds in the meadow area of the lawn. Following their lead, we helped enable the expansion of the community-managed space into the lawn through the creation of hexagonal garden plots. The creation of the planting beds and pergola in the lawn space invited acts of stewardship and care of the plants, and social connection in the shade of the new structure. The lawn started to look and feel, at least momentarily, a little more like a garden.

Our team of designers, community organizers, and researchers engaged with the Beach 41st Street assemblage and attempted – for a particular window of time – to creatively alter some of the relations. According to Holifield (2009), 'The aim of an actor-network analysis should not be to stand back from the political fray and generate neutral descriptions featuring gratuitous hordes of nonhumans. On the contrary, it should be to participate in a modest way in the re-composition of the common world' (p. 655). Aligned with this approach, our goal was to support the aims of public housing resident gardeners to resume gardening after Hurricane Sandy, to remain *in situ* while living with water, and to create new opportunities for sociability and encounter in the lawn space. While our scope was necessarily limited by our budget and our focus on the landscape – not the buildings, it provided us an opportunity to 'dance with systems' (Meadows, 2008). If we had a different design approach with greater human resources or financial capital, this subtle dance would not be so palpable. A more heavily resourced approach might reshape the ground plane, build the

levees, relocate the garden, and re-engineer the infrastructure systems. This is the scale of many projects that we see pursued via the post-Sandy disaster recovery funding, such as the redesign of NYCHA's Red Hook Houses in Brooklyn (NYCHA, 2017). In contrast, we intervened in the assemblage through subtle changes to the physical grounds and the routines required to care for them, in order to encourage new forms of attachment. So, too, have the resident gardeners danced with systems for several decades – from sourcing pallets as building materials, to self-organizing as a Resident Green Committee, to applying for grants. We know that all of these re-arrangements are fragile and could revert to another state – often in response to the agency of the nonhuman elements of the assemblage – without ongoing infusion of resources and strong networks.

Conclusion

On its face, contact zone approaches and ANT have very different conceptualizations of power that might appear to be incompatible. Contact zones have been described in places of inequality along axes of race, class, and other forms of identity, where access to power and resources are unequal. In contrast, ANT takes power as the phenomenon to be explained – drawing attention to how power emerges and operates in a particular assemblage. We argue that *both* of these understandings of power are needed to analyse Beach 41st Street Houses. In addition to structural inequalities, there are more subtle, even momentary, shifts in the operation and mobilization of power that might otherwise be missed if we did not adopt an attention to the assemblage. Moreover, if we think of contact zones as relational moments in space-time, then they are not external, already-existing sites, but rather are encounters brought into being through the friction and interaction of people/animals/plants across multiple forms of difference.

Over the course of our encounter with Beach 41st Street, we observed and participated in five forms of power at work. First, there is, indeed, inequality that has occurred over years and decades through the path-dependent accumulation of structural racism, unequal access to resources, land use legacies, and physical and hydrologic coastal vulnerability. This inequality is both structural and emergent. Flows of materials and resources – most notably money, soil, and freshwater – are affected by these inequalities. The challenge of inconsistent resource flows and persistent unmet needs is apparent in this public housing site. Inequality shapes – and is reciprocally shaped by – *powerfully recalcitrant routines* and patterns of use. In short, we found that inequality, here, bounds the scope for action, and limits the ability to make changes in the assemblage.

Second, we observed the need for and the *power of recognition* of groups, which Young (2000) argues is a necessary first step toward social justice and inclusion. Too often, marginalized social groups can be ignored or are less visible in policymaking. Networked relationships, such as federal disaster response funding streams, municipal resiliency planning efforts, and public housing strategic planning and administrative procedures are all working to reshape the site. Amidst this context, we attempted through our design-research project to amplify the visibility of the gardeners and the grounds in local decision-making arenas. We take the dotted line traversing NYCHA grounds on the bayfront trail map as a small piece of evidence that this place and people are recognized as important to the Jamaica Bay community.

Third, *'thing power'* has been identified by Bennett (2010) and others to describe the ways in which nonhuman actants exert agency. The power of these actants is more easily detectable when they are unruly, undesired, or when they resist our intentions. We had to negotiate strongly with saltwater in garden plots, poison ivy on the fence, the missing tool that turns on the water system, dogs and their faeces in the lawn, trash throughout the site, and reed grasses in the lawn – as we work to steer these actants to behave in different ways. Brackish water is perhaps the most unruly actant on the site – the one that brought us to B41 Garden in the first place after the flooding of Hurricane Sandy. The gardeners continue to navigate living with brackish water and its changing reach with the tides and the moon on daily, weekly, and monthly cycles. This brackish water is also a part of a network; responding to changing precipitation patterns in the face of extreme weather and climate change. At the same time, we attended to the *relational power that exists between humans* – particularly the power of casual chit chat, friendship, and mutual support. We saw this when gardeners exchanged ideas, offered comfort when plots were trampled, checked in on each other when ill, or celebrated life's events together (see also McMillen et al., 2016). Finally, though our participatory approach, we aimed to foster the *power of coproduction* – working together and workshopping to solve a shared problem (Marshall & Reynolds, 2019). In so doing, we engaged in, following Latour (2005), *'common worlding'* with the bay, the grass, the plants, the soil, and each other.

Contact zones are theorized as spaces of exchange and by engaging in this encounter, we changed. Although the theory of contact zones developed out of post-colonial and global south contexts, we found that it has salience to situations like ours – where outside researchers and designers are working with a historically marginalized and vulnerable community. Through stewardship, design, and research – we came to understand (in quite embodied ways) the site as a complex assemblage of people, plants, animals, and other material agents – with some ability to be rearranged, but also with incredibly persistent patterns of rules, use, and maintenance. Given the participatory nature of the work, we sought to be reflexive about these encounters and the ways in which we, too, were altered through this process to refine future approaches to design and research going forward.

In dancing with the system, we learned to be humble – to acknowledge the limits of our own agency. We are not the land managers, we lack jurisdiction over the place, and we were invited in for a temporary window of time with some modest funding for a garden project. Despite many residents' desires for flood protection, we have no authority, resources, or expertise to alter the coastline. From envisioning radical ideas about moveable planters, to hoping for a compromise of a lockable gate, to simply removing litter and cutting back poison ivy – we felt our ambitions on the shoreline diminish. We learned from the residents, the brackish water, and the plants about the limits of our existing resources to make an impactful change in the relationship with the powerful bay. In contrast, for a small moment of time – we found some traction. We found a window into rearranging the lawn assemblage, a step toward supporting residents' voice and agency, in a population that is often constrained by bureaucracy, stigma, and social hierarchy. Over months of iterative work, learning, frustration, and compromise, we were able to comply with NYCHA rules and regulations related to capital construction while holding collaborative workshops and a volunteer planting day – outside the boundaries of the previously recognized community-managed space (garden plots). We

enabled the creation of a hand-built wooden structure by apprentices and green job trainees that provides shade for gatherings; there is no other pergola like this one on NYCHA grounds. In the garden plots, we felt welcomed by the gardeners to work with them, to source materials, to offer our labour, and to exchange horticultural knowledge. At the same time, we felt overwhelmed by the size of these generous plots that can easily become overrun with grasses, frustrated in the hot summer days when the freshwater was not flowing, empathetic when prized vegetables were stolen, and horrified when a dog attacked a member of the group. Finally, there are some impacts can only be seen by examining the multi-scalar relationships beyond the Cartesian bounds of the site. We are proud of how we worked to connect local residents with social and material networks in their neighbourhood, city, and country throughout the entire process. We led workshops, helped catalyse local coalitions, coordinated national seminars, and wrote publications to promote learning from the site (Campbell, Svendsen, Sonti, Hines, & Maddox, 2019; Marshall & Reynolds, 2019; McMillen et al., 2016).

Throughout our years on the project, the physical presence of members of our team on the site became a focal point for resident engagement. Every time we finished an event, workshop, or workday, residents asked when we would be back – the need for ongoing, sustained engagement with this community was evident. Given that some of our design elements were meant to be flexible, moveable, or rebuilt over time, as well as the ongoing need to tend planting beds, what responsibility of care do we have to this place and these people? Officially our grant, design, and research have ended, but a gardener knows that the work of tending is never finished. So as our role shifts away from the site, we can also ask: what has been transformed in the process? Our fear is that we can never fully know the impact of this work for the residents themselves. For *our* part we entered the system with a sense of reciprocity: to learn as much as to give. We were grateful for the tacit and temporary acceptance into a community that was not our own. We now have a heightened awareness of structural and emergent power and how it is expressed across a range of differentiated assemblages – and we have become more critically alert to these dynamics in our own work going forward.

Notes

1. The other paired site not discussed in this paper is Cunningham Park in Joplin, MO after the 2011 tornado. For more information on the Landscapes of Resilience project, see: http://www.nrs.fs.fed.us/nyc/focus/resilience_health_well_being/landscapes_resilience/.

Acknowledgments

This work was supported by the TKF Foundation, NatureSacred Program and the USDA Forest Service, Northern Research Station. The authors would like to thank the entire Beach 41 Garden team: The Till Design team including Kira Applehans, Carmen Bouyer, and Colin Macfadyen as well as Craig Desmond and the Natural Garden Landscapes team. In addition, we thank Elizabeth Gilchrist, Craig Shaw, Green City Force members, Lee Trotman and the NYCHA Garden and Greening Program, and NYCHA Beach 41st Street Houses gardeners, Resident Green Committee, and staff. We also acknowledge our Landscapes of Resilience team members, including Keith Tidball and everyone working on the Joplin, MO site, particularly Traci Sooter and Nancy Chikaraishi of Drury University. Thanks also to the TKF Foundation and Mary Wyatt and Kathy Wolf. Finally, thanks to Gwendolin McCrea, who provided helpful feedback on an earlier draft, Laura Landau for providing proofreading, and to three anonymous reviewers for their constructive comments on the manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the TKF Foundation [NatureSacred Program]; USDA Forest Service - Northern Research Station.

ORCID

Lindsay K. Campbell  <http://orcid.org/0000-0002-7065-8997>

Geolocation information

Rockaway, NY, USA.

References

- Alcadipani, R., & Hassard, J. (2010). Actor-network theory, organizations and critique: towards a politics of organizing. *Organization*, 17(4), 419–435.
- Allport, G. W. (1954). *The nature of prejudice*. New York, NY: Addison-Wesley.
- Amin, A. (2002). Ethnicity and the multicultural city: living with diversity. *Environment and Planning A*, 34, 959–980.
- Anzaldúa, G. (1999). *Borderlands/la frontera: The new Meztiza*. San Francisco, CA: Auntie Lute Press.
- Askins, K., & Pain, R. (2011). Contact zones: Participation, materiality, and the messiness of interaction. *Environment and Planning D*, 29(5), 803–821.
- Bennaton, R. (2009). The re-greening of public housing: New York city housing authority garden and greening program, New York, NY. In L. Campbell & A. Wiesen (Eds.), *Restorative commons: Creating health and well-being through urban landscapes* (pp. 233–247). Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.
- Bennett, J. (2010). *Vibrant matter: A political ecology of things*. Durham, NC: Duke University Press.
- Bradshaw, M., & Stratford, E. (2005). Qualitative research design and rigour. In I. Hay (Ed.), *Qualitative methods in human geography* (2nd ed., pp. 67–76). Oxford: Oxford University Press.
- Braun, B. (2005). Environmental issues: writing a more-than-human urban geography. *Progress in Human Geography*, 29, 635–650.
- Braverman, I. (2015). Order and disorder in the urban forest: A foucauldian-latourian perspective. In L. A. Sandberg, A. Bardekjian, & S. Butt (Eds.), *Urban forests, trees, and green space: A political ecology* (pp. 132–146). New York, NY: Routledge Press.
- Campbell, L. K., Svendsen, E., Sonti, N. F., Hines, S. J., & Maddox, D., Eds. (2019). *Green readiness, response, and recovery: A collaborative synthesis* (Gen. Tech. Rep. NRS-P-185). Newtown Square, PA: U.S.: Department of Agriculture, Forest Service.
- Castree, N. (2002). False antitheses? Marxism, nature and actor-networks. *Antipode*, 34(1), 111–146.
- Castree, N. (2005). *Nature*. New York, NY: Routledge.
- Center for an Urban Future. (2014, March). Caution ahead: Overdue investments for New York's aging infrastructure [Center for an Urban Future]. Retrieved from <https://nycfuture.org/pdf/Caution-Ahead.pdf>
- City of New York, Department of Housing Preservation and Development. (2017, March). *Resilient edgemere community plan*. City of New York. Retrieved from <http://www1.nyc.gov/assets/hpd/downloads/pdf/community/resilient-edgemere-report.pdf>

- Clifford, J. (1997). *Routes: Travel and translation in the late twentieth century*. Cambridge: MA& London: Harvard University Press.
- Dean, J. (2015). The unruly tree: Stories from the archives. In L. A. Sandberg, A. Bardekjian, & S. Butt (Eds.), *Urban forests, trees, and green space: A political ecology* (pp. 162–175). New York, NY: Routledge Press.
- Few, R. (2002). Researching actor power: analyzing mechanisms of interaction in negotiations over space. *Area*, 34(1), 29–38.
- Gunderson, L. H., & Holling, C. S. (Eds.). (2002). *Panarchy: Understanding transformations in human and natural systems*. Washington, DC: Island Press.
- Haraway, D. (1992). The promise of monsters: a regenerative politics for inappropriate/d others. In L. Grossberg, C. Nelson, & P. Treichler (Eds.), *Cultural studies* (pp. 295–337). New York: Routledge.
- Haraway, D. (2008). *When species meet*. Minneapolis, MN: University of Minnesota Press.
- Harris, J. (1995). Negotiating the contact zone. *Journal of Basic Writing*, 41(1), 27–42.
- Harrison, R. (2013). Reassembling ethnographic museum collections. In R. Harrison, S. Byrne, & A. Clarke (Eds.), *Reassembling the collection: Ethnographic museums and indigenous agency* (pp. 3–35). Santa Fe, NM: SAR Press.
- Holifield, R. (2009). Actor-network theory as a critical approach to environmental justice: A case against synthesis with urban political ecology. *Antipode*, 41(4), 637–658.
- Hommels, A. (2005). Studying obduracy in the city: Toward a productive fusion between technology studies and urban studies. *Science, Technology & Human Values*, 30(3), 323–351.
- Horton, J., & Krafft, P. (2018). Rats, assorted shit and 'racist groundwater': Towards extra-sectional understandings of childhoods and social-material processes. *Environment and Planning D*, 36(5), 926–948.
- Kaika, M. (2005). *City of flows: Modernity, nature and the city*. London and New York, NY: Routledge.
- Latour, B. J., & (1986). The power of association. In J. Law (Ed), Power. 264–80: action belief: A new sociology of knowledge? London: Routledge and Kegan Paul
- Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford: Oxford University Press.
- Lave, R. (2015). Reassembling the structural: political ecology and actor-network theory. In T. Perreault, G. Bridge, & J. McCarthy (Eds.), *The routledge handbook of political ecology* (pp. 215–223). London, UK: Routledge.
- Lehman, J. (2014). Expecting the sea: The nature of uncertainty on Sri Lanka's East coast. *Geoforum*, 52, 245–256.
- Linton, J. (2010). *What is water? The history of a modern abstraction*. Vancouver, BC: UBC Press.
- Marcus, G. E., & Saka, E. (2006). Assemblage. *Theory, Culture & Society*, 23(2–3), 101–106.
- Marshall, V., & Reynolds, R. (2019). Codesigning a workshop garden. In L. K. Campbell, E. Svendsen, N. Sonti, S. J. Hines, & D. Maddox (Eds.), *Green readiness, response, and recovery: A collaborative Synthesis* (pp. 58–73). Newtown Square, PA: U.S.: Department of Agriculture, Forest Service. Gen. Tech. Rep. NRS-P-185.
- McCrea, G. (2016). Castor canadensis and urban wetland governance – Fairfax County, VA case study. *Urban Forestry and Urban Greening*, 19, 306–314.
- McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing stewardship practices as indicators of social resilience: In living memorials and in a community garden. *Sustainability*, 775(8), 26.
- Meadows, D. (2008). *Thinking in systems: A primer*. London: Earthscan.
- Mitchell, T. (2002). *Rule of experts: Egypt, techno-politics, modernity*. Berkeley, CA: University of California Press.
- New York City Housing Authority (NYCHA). (2015, May). NextGeneration NYCHA [NYCHA]. Retrieved from <http://on.nyc.gov/nextgeneration>
- New York City Housing Authority (NYCHA) (2017, December 14). Red hook houses, Brooklyn, NY capital projects division - recovery and resiliency [Interactive Sandy Recovery Map]. Retrieved from <http://www1.nyc.gov/assets/nycha/downloads/pdf/RTR-Red%20Hook%20E%26W.pdf>

- New York State Department of Environmental Conservation (NYSDEC). (2017, December 14). Tidal wetlands permit program: introduction [NYSDEC]. Retrieved from <http://www.dec.ny.gov/permits/6039.html>
- Newman, O. (1972). *Defensible space: Crime prevention through urban design*. New York, NY: Macmillan.
- Newman, O. (1996). *Creating defensible space*. U.S. Department of Housing and Urban Development (HUD) Office of Policy Development and Research HUD. Retrieved from <https://www.huduser.gov/publications/pdf/def.pdf>
- Pacini-Ketchabaw, V., Taylor, A., & Blaise, M. (2016). De-centring the human in multispecies ethnographies. In C. Taylor & C. Hughes (Eds.), *Posthuman research practices in education*. Hampshire: Palgrave Macmillan. 149–167.
- Patrick, D. (2015). Queering the urban forest: Invasions, mutualisms, and eco-political creativity with the tree of heaven (*Ailanthus altissima*). In L. A. Sandberg, A. Bardekjian, & S. Butt (Eds.), *Urban forests, trees, and green space: A political ecology* (pp. 191–206). New York, NY: Routledge Press.
- Perkins, H. A. (2007). Ecologies of actor-networks and (non)social labour within the urban political economies of nature. *Geoforum*, 38, 1152–1162.
- Power, E. R. (2005). Human–nature relations in suburban gardens. *Australian Geographer*, 36(1), 39–53.
- Pratt, M. L. (1992). *Imperial eyes: travel writing and transculturation*. London: Routledge.
- Robbins, P. (2007). *Lawn people: How grasses, weeds, and chemicals make us who we are*. Philadelphia, PA: Temple University Press.
- Routledge, P. (2008). Acting in the network: ANT and the politics of generating associations. *Environment and Planning D*, 26(2), 199–217.
- Rudy, A. P. (2005). On ANT and relational materialism. *Capitalism Nature Socialism*, 16, 109–125.
- Sandilands, C. (2013). Dog stranglers in the park?: National and vegetal politics in Ontario's rouge valley. *Journal of Canadian Studies*, 47(3), 93–122.
- Stone-Jovicich, S. (2015). Probing the interfaces between the social sciences and social-ecological resilience: insights from integrative and hybrid perspectives in the social sciences. *Ecology and Society*, 20(2), 25.
- Taylor, J. R., & Lovell, S. T. (2014). Urban home food gardens in the Global North: Research traditions and future directions. *Agriculture and Human Values*, 31(2), 285–305.
- Toomey, A. H. (2016). What happens at the gap between knowledge and practice? Spaces of encounter and misencounter between environmental scientists and local people. *Ecology and Society*, 21, 2.
- Torre, M. E. (2010). *The History and Enactments of Contact in Social Psychology*. (Doctoral Dissertation). City University of New York, New York, NY.
- Tsing, A. (2005). *Friction: An ethnography of global connection*. Princeton, NJ: Princeton University Press.
- U.S. Army Corps of Engineers. (2017, December 14). East rockaway inlet to rockaway inlet (Rockaway Beach) [USACE]. Retrieved from <http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/East-Rockaway-Inlet-to-Rockaway-inlet-Rockaway-Beach/>
- U.S. Department of Housing and Urban Development (HUD). (2017, December 14). Demolition and disposition [HUD]. Retrieved from https://www.hud.gov/program_offices/public_indian_housing/centers/sac/demo_dispo
- Yates, J. S., Harris, L. M., & Wilson, N. J. (2017). Multiple ontologies of water: Politics, conflict and implications for governance. *Environment and Planning D*, 35(5), 797–815.
- Young, I. S. (2000). *Inclusion and democracy*. New York: Oxford University Press.