

1 **Policy Mobilities, Infrastructures, and Nonhuman Political Agency**

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Abstract

Policy mobilities research has explored how policies—particularly urban development policies—spread among sites around the world, mutate along the way, and take hold in distinct contexts. Within the policy mobilities literature, there is particular attention to circulatory infrastructures, which facilitate encounters, learning, and exchange of knowledge that support the (re)production and movement of policies and “best practices.” Policy mobilities scholarship thus understands policy implementation as emerging from relational assemblages of myriad actors and social processes. Drawing on assemblage theory, this work has been attentive to nonhuman objects and infrastructures, nonetheless it has given little attention to nonhuman life. This article draws on more-than-human geographies, particularly emerging work on nonhuman life and infrastructures, to incorporate nonhuman actors into an understanding of policy mobilization. We present a case study of suburban wildlife management programs in Massachusetts and discuss how human-nonhuman relationships undergird policy development, transfer, and change. Drawing insights from municipal surveys, in-depth interviews, and document analysis, we argue that nonhumans are active in the production of policy assemblages and the mobility of environmental policies. Deer, in particular, are lively actors entangled in the circulation of policies designed to manage social-ecological dynamics and processes that also include ticks, forests, bacteria, and many other nonhuman agents. Through this intervention to situate nonhuman life in policy mobilities, we highlight the political agency of nonhuman actors, the materialities of policy mobilization, and the role of nonhumans in shaping relational networks.

Introduction

A large body of scholarship in geography has now explored nonhumans as political actors (Argüelles & March, 2022; Hobson, 2007). This research advances an understanding of nonhumans - particularly animals (Margulies & Karanth, 2018; Srinivasan, 2016) and plants (Lawrence, 2022), but also other objects (Bennett, 2010) – as more than objects of political struggle, and instead as active subjects in the constitution of policy (Hobson 2007). Such scholarship has demonstrated the role of nonhumans in shaping policies, from ocelots shaping policing on the border (Sundberg, 2011), to plants transforming biosecurity policies (Argüelles & March, 2022), to elephants influencing conservation imaginaries (Barua, 2014). Here, we expand upon this growing body of scholarship and explore its implications for policy mobilities (McCann, 2011; Temenos & McCann, 2013). We argue that attention to nonhumans in policy mobilities contributes to a theorization of nonhumans as political actors and offers important insights into the mobilization of policies across sites. We link scholarship on nonhuman agency, policy mobilities, and infrastructures to understand nonhuman mobilities as co-constitutive with policy mobilities. Through this lens, we demonstrate the ways that nonhumans actively (re)shape relationships within policy networks and informational infrastructures.

In the following sections, we review and link the literatures on policy mobilities and nonhumans as political actors. We then draw on our research on the mobilization of deer management programs in Massachusetts to show how deer are active in the mobilization of environmental policies. We discuss the ways that deer mobilities have reshaped broader social-ecological assemblages and affective relations to humans. Turning to concepts of nonhuman life as infrastructure (Barua 2021; Enns and Sneyd 2020), we consider how nonhumans constitute infrastructures that facilitate (or obstruct) flows of materials, information, and policies. In this

manner, we seek to situate nonhuman life in understandings of policy mobilities and to draw upon approaches in policy mobilities to examine nonhuman political agency.

Toward More than Human Policy Mobilities

The policy mobilities approach explores the relationships between distant processes and sites and the diffusion of policies, particularly among cities (Baker & Temenos, 2015; McCann & Ward, 2015). Policy mobilities scholarship has largely focused on the movement of specific policy strategies – e.g., business districts (Ward, 2006), drug policies (McCann, 2008), and creative class clusters (Peck, 2011) – and processes of replication, transplantation, and mutation of policies (Andersson & Cook, 2019). Drawing from diverse strands of critical policy research, urban geography, and political economy, this scholarship challenges the prevailing notion of “best practices” as simply proliferating and mobilizing naturally. Instead, this approach is attentive to the actors and socio-political processes involved in producing, transporting, and adopting policies, policy models, and knowledges (McCann 2011, Temenos and McCann, 2013).

This work thus extends urban political economy scholarship that has emphasized relational approaches to examining spatial differentiation (Marston et al., 2005; Massey, 2012; Smith, 2001). Noting the tensions between the mobility and fixity of capital, policy mobilities research conceptualizes cities as relational nodes connected to other, sometimes distant, places. In many cases, such research takes a ‘follow the policy’ approach to trace movements of ideas or practices across actors and sites (Peck & Theodore, 2012); in others, it has focused on understanding how policies coalesce at a specific single site (Croese, 2018; Leducq & Scarwell, 2020). Policy mobilities research has been particularly attentive to the spread of ‘green policies’ (Andersson & James, 2018; Leducq & Scarwell, 2020; McCann, 2017), revealing how best

practices rely upon simplification of complex environmental issues to increase legibility (Andersson & Grundel, 2021; Rosol et al., 2017; Temenos & McCann, 2013).

In this manner, the policy mobilities literature builds upon assemblage thinking to understand policy as ‘constructed out of various circulating discourses and materials’ (Prince 2017:339). Such approaches to understanding the assemblages of sites, actors, practices, and representations, can transcend hierarchical and cartesian conceptualizations of space to instead emphasize topological relations (Allen & Cochrane, 2010; Prince, 2017, p. 20; Robinson, 2011). Drawing upon assemblage thinking, policy mobilities research illustrates the role of nonhuman objects, such as documents, web sites, and manuals in crafting policy concerns. Policy networks are thus shaped by “informational infrastructures,” such as conferences, trade fairs and online forums, and related physical infrastructure through which knowledge and “expertise” is circulated and legitimized (Cook & Ward, 2012; McCann 2011; Ward, 2007).

Despite this attention to socio-material assemblages, policy mobilities scholarship has given little attention to nonhuman life. In contrast, extensive scholarship in political ecology has examined how nonhumans organisms are entangled in political processes, as they are organized into spaces of human-imposed order and control (Buller, 2014; REDACTED; Head & Muir, 2006; Robbins, 2004) and discursively leveraged in processes of territorialization (Duffy, 2016; Sylvander, 2021). A growing body of work in political ecology also considers nonhuman organisms as active in forming political and legal configurations (Braun, 2005; Fleming, 2017; Gillespie & Collard, 2015; Hobson, 2007). This literature has drawn on assemblage thinking and actor network theory to theorize agency as the efficacy of components of an assemblage rather than the intentionality of those components (Dittmer, 2015; Kuus, 2019). As such, political

agency arises from relational configurations of elements within an assemblage, which shape the capacity to act politically (Kuus, 2019).

Although literature on nonhuman agency often entails an understanding of agency without “conscious intentionality” (Philo & Wilbert, 2004:15), some have emphasized the reflexive, intentional decisions of animals even if these actions do not demonstrate collective organization (Carter & Charles, 2013). Attentive to the cognitive and emotional capacities of animals, some animal studies scholarship engages with ethology and multispecies ethnography to explore the behavior and performativity of animals (Barua & Sinha, 2022; Kirksey & Helmreich, 2010), and implications for relationships to humans (Haraway, 2008). Hodgetts and Lorimer (2020) note the potential for cross-fertilization between mobilities studies (broadly, not just policy mobilities) and animal studies to understand the movements and experiences of animals. They note that an attention to mobilities offers insights into the ethics and politics of animal management, and the technologies of governing life.

Through our discussion of white-tailed deer management that follows, we argue that the mobilities of nonhuman organisms shape policy mobilities as well. Policy mobilities literature has emphasized the role of “informational infrastructures” (Ward 2007) and has more recently noted the importance of people as infrastructure (Ward, 2018). AbdouMaliq Simone (2004) emphasizes a relational understanding of infrastructure, whereby people’s daily activities form coalitions among people, spaces, and objects. In order to understand the ways that nonhumans structure relationships among sites, we draw on emerging scholarship that extends Simone’s work to consider nonhuman life as infrastructure (Barua 2021). This research is attentive to how nonhuman life and ecological processes craft the relations and coalitions that reproduce life, economic activities, and flows of capital. This work, thus, moves beyond an understanding of

nature as an inert background to infrastructure (Carse, 2014; Enns & Sneyd, 2021; Pritchard, 2011), and instead addresses the variable ways that nature becomes infrastructural (Carse, 2012). Barua (2021) offers an ontology of infrastructure that is inclusive of the nonhuman, examining “the effects infrastructures have on the distribution and mobility of life” as well as “infrastructures as a medium of life and... how non-human life itself is rendered infrastructural” (p. 1469). For example, many ecosystem services programs actively enroll nonhuman life in service of human desires, such as constructing forests for carbon sequestration or leveraging beavers to expand water storage. Many nonhuman organisms, however, also continuously produce and alter infrastructures without consideration for human needs.

We use the concept of nonhuman life as infrastructures to expand existing understandings of infrastructure in policy mobilities and to examine how animals “are co-constitutive of political spatialities” (Hobson 2007: 251). We argue here that policy mobilities provides a useful frame to understand the political agency of nonhumans, and that serious consideration of animals as political actors can enrich explanation emerging from policy mobilities research. Through this engagement with policy mobilities, we also seek to expand understandings of animals as infrastructural, considering how animals are lively components of informational infrastructures that facilitate the mobilization of environmental policies. Below, we discuss how white-tailed deer are enmeshed in and actively structure policy assemblages and shape the circulation of knowledges and policies. We draw from our research on the mobilization of white-tailed deer management policies across Massachusetts to illustrate the intertwined mobilities of animals and policies as deer reconfigure socio-technical assemblages and construct ties that facilitate (or resist) policy mobilization.

Circulating Deer

Over the past few decades, many municipalities across the Eastern United States have identified white-tailed deer as an object of concern. Once extirpated from much of the Northeast, deer numbers have increased precipitously in recent years, benefitting from the limited predation, high availability of food, and intermix of forest in suburban landscapes. Amidst growing deer populations, many human communities in the region have raised concerns about property damage, vehicle collisions, and human health, sparking municipal governments to consider and/or implement programs to reduce deer numbers. Lethal management programs (i.e., hunting or culling) often entail transformation of longstanding municipal policies regulating hunting, discharge of weapons, and land access.

Since 2016, we have been exploring the mobilization of and conflict surrounding deer management policies in Massachusetts. Our research examines how municipalities and land managers determine the need for management, identify strategies and measures, and negotiate ensuing conflicts (REDACTED). Here, we draw upon our extensive field work, which has included municipal surveys, interviews, participant observation, and document analysis. Surveys conducted in 2017 included all 351 municipalities within Massachusetts and yielded a 74% response rate. Surveys were completed by elected officials, appointed board members, and/or municipal staff familiar with concerns related to deer management. The survey questions addressed concerns related to deer, specific efforts to manage deer, and sources of information on deer management. In addition to these surveys, we conducted 47 interviews with staff at state wildlife and conservation agencies, town officials, staff at non-governmental conservation organizations, hunters, residents involved in deer management discussions, and animal rights activists. The interviews discussed here span multiple studies, but all were semi-structured

interviews concerning changes in deer populations, as well as the need for and acceptability of deer management. Finally, we also attended public meetings about deer management programs in some towns and participated in public workshops about deer impacts.

Mobilizing Deer Management

In many communities across the Northeastern US, hunting has been de jure or de facto banned for decades through municipal and state regulations. In Massachusetts, 46% of towns have local bylaws that restrict hunting in some way beyond state regulations (REDACTED). In some municipalities, hunting restrictions are codified in bylaws that ban or limit hunting, the discharge of firearms, and/or the release of arrows. Hunting access is also limited by setback restrictions, which prohibit the discharge of weapons within a given distance of roadways and structures. In higher density settings, the combination of setbacks and private properties closed to hunting can greatly reduce the amount of huntable land. Ongoing processes of residential development and suburbanization have thus contributed to decreases in access to land for hunting (Karns et al., 2015; Larson et al., 2013). In this manner, the institutional landscape is dynamic, changing as the physical structure and arrangement of land uses transform over time, even when the law remains stable.

In contrast, the physical and institutional landscapes of the suburbs have facilitated the mobilities of deer. Subdivisions of larger properties combined with landscaping norms produce landscapes with an intermix of forest, lawns, and gardens that deer favor (Gaughan & DeStefano, 2005). These human-managed landscapes regenerate quickly as people replace damaged plants and add fertilize yards. Although deer had been absent for generations in many parts of the Northeast, these new socio-ecological assemblages have supported their recovery. Once deer

197 establish populations, their numbers can grow rapidly in these resource-rich landscapes with
198 limited predation and hunting. Female deer birth one to three fawns per year, and without
199 predation, survival rate for fawns is high. Although female deer typically maintain a small range
200 of about one square mile, mature yearlings may disperse up to 25 miles. In this manner, the
201 physical mobilities of the deer themselves, their preferences for certain features in the landscape,
202 social and reproductive behaviors, and capacity to live alongside humans have facilitated the re-
203 establishment and growth of deer populations. In some locations, particularly in Eastern
204 Massachusetts, deer likely exceed pre-colonial densities (Foster et al., 2002).

205 Due to the prior absence of deer, most municipalities and land managers have had little
206 experience with deer management. For instance, the Blue Hills Reservation (a state managed
207 park), located near Boston, MA, did not document the presence of deer from its establishment in
208 1896 until the 1980s, but by 2015, the park began efforts to reduce the population
209 (REDACTED). Across the state, the majority of surveyed municipalities report that deer
210 numbers have been stable (32%) or on the rise (52%) for the past two decades. As deer
211 populations increase and people encounter deer more frequently, many municipalities explore
212 strategies to manage deer numbers. In suburban and urban regions of MA, over 20% of surveyed
213 municipalities had considered or implemented efforts to reduce deer populations in the ten years
214 leading up to the survey. In deliberating if and how to manage deer populations, municipal
215 officials often solicit input from residents through public meetings and/or surveys and
216 occasionally conduct local population estimates. They also look beyond their borders for
217 management examples and expertise. Over a third of surveyed municipalities reported consulting
218 with MassWildlife (the state wildlife agency), hunters, other municipalities, nonprofit

219 organizations, and university experts to develop strategies for deer management. One member of
220 a deer committee describes that process of building a local deer management plan as follows:

221
222 [The deer committee] surveyed the surrounding towns that had programs for deer
223 control, and also some federal agencies and other people, and came up with a plan for
224 how the town would manage [the] deer hunt... [We] brought in some experts from out
225 of town and they had a meeting... there was some people from the state fish and game
226 board... and there were also a couple of people from the town of Dover, which had
227 successfully set up a town hunt a few years before that. (Interview, July 12, 2021)

228
229 The process of consulting between towns leads to strategies that bear great similarities. A typical
230 suburban deer management program includes changes in local policies and bylaws to allow
231 volunteer bow hunting on municipal lands and a process to interview and select hunters. In some
232 cases, the approaches and language in documents are directly replicated from nearby towns. For
233 example, multiple towns modeled their deer management plans and programs on those of
234 Framingham, MA (a small city with about 72,000 residents). Framingham had one of the state's
235 first deer management programs and some involved staff went on to positions in other
236 communities, where they then influenced deer management activities.

237 State agencies also disseminate information to municipalities and recommend
238 management practices. The reliance on hunting across Massachusetts (as opposed to culls,
239 trapping and euthanizing, and non-lethal approaches that are used in other states), for instance,
240 stems from the philosophy that informs the recommendations of wildlife agency staff.

241 MassWildlife views deer and other "game" as the property of the people of the state and

manages their populations for the public use of that resource. As such, MassWildlife relies on “volunteer hunts” (whereby licensed hunters “harvest” deer) as the primary management tool to reduce deer populations. As one state wildlife biologist in Massachusetts described:

That’s kind of the overriding philosophy of all State wildlife agencies, is that North American Model, which is basically that the State agency is here to manage a resource for the Commonwealth, for the public. And the sportsmen are providing the money that goes into managing that resource. And so, you know, they should be able to utilize that resource...not have it become a private industry or anything. (Interview, June 21, 2016)

While many towns consult with MassWildlife, the agency does not generally enter into municipalities unprompted. Rather, MassWildlife generally waits for someone in a municipality to contact them. The towns then create opportunities for hunters that do the work of reducing deer populations. The mobility of deer management is thus driven by the desires of municipal actors and the transfer of policies among municipalities, but also constrained by the management strategies supported by the state. As a result, certain techniques of deer management and hunting policies are replicated across municipalities due to the flow of personnel, the consultation of nearby municipalities, and engagement with agency experts. Despite the similarity in management approaches, many residents, large landowners, and municipalities have also advocated for more aggressive approaches (e.g., culling) or non-lethal approaches. As we discuss below, these policies, however, do not simply follow the deer. Rather, deer are also active in shaping these political processes, and the processes by which deer become known and legible as a problem motivate different responses.

Deer as Political Actors

The interactions of deer and humans are greatly shaped by their shared spatiotemporal mobility patterns. Most active at dusk and dawn, deer activities closely correspond to periods of commuter traffic during Fall and Winter months, during which rutting males also increase their activity and travel distances. During these active hours, deer frequent backyards, roadways, and parks in search of forage. As such, the spatial and temporal synchronicity of human and deer movements has bearing on their detectability. Lorimer (2007) notes that the *detectability* of a species contributes to its charisma, which he uses to understand the affective capacities of nonhuman bodies. The mobilities of deer thus contribute to their charisma, shaping human awareness through encounters with deer and their traces, such as chewed branches, thinned understory, or ticks. These interactions with deer spur concern when people begin to recognize deer as a threat to life (human or otherwise), health, property, or infrastructures. In our study area, deer rose to the municipal agenda after residents or town officials raised concerns about Lyme disease, property damage, deer-vehicle collisions, forest damage, or some combination of these. Each of these significant human concerns is motivated by traces wrought by nonhuman agents (including deer, ticks, and bacteria). In the context of these concerns, many municipalities have discussed deer management as a security strategy, regulating the capacity of deer to alter social-ecological assemblages.

In other cases, direct and sometimes intimate interactions with deer, such as viewing or even feeding deer, can be drivers of positive affective and emotional reactions. In interviews and open-ended responses on surveys, residents frequently noted the joy of seeing deer and how this shaped understanding of deer management. One resident of Carlisle, MA (Interview, July 22,

2021) told us that it is “just a delight” to see deer “in the sort of early evening light, just browsing... people go to Africa to look at stuff like this. We can just drive home from the other side of town and see this.” This aesthetic charisma (Lorimer, 2007) triggers emotional responses from humans and may stir an interest in some humans to either preserve or remove deer. In some cases, deer presence can trigger a sense of “response-ability” (Haraway, 2008), whereby residents seek to care for deer, whether directly or through their political actions. In this way, nonhuman political agency arises through the capacity of an encounter (with a deer or its traces) to effect human action.

The most common initial motivation for exploring municipal deer management, though, does not arise from direct encounters with deer bodies. Rather, many municipalities explore deer management in response to concerns over Lyme disease. Lyme disease is the most reported vector-borne illness in the US (Schwartz, 2017), and over three quarters of towns in our survey indicated that Lyme disease was a moderate or strong concern among residents. Lyme disease is primarily transmitted to humans by the blacklegged tick (*Ixodes scapularis*), commonly known as the deer tick. Although deer do not host the pathogen that causes Lyme, they support the reproductive cycle of ticks and physically transport them (Kugeler et al., 2016). Given this topological relation to ticks, many people see deer as a visible symbol (and possible driver) of this human health threat. In this context, actions to regulate deer do not respond to direct human-deer relations, but instead seek to manage human health by reducing the mobility of pathogens. In our review of policy documents from towns with deer management programs, we found that municipalities frequently discussed deer management in the context of these human health concerns. In Carlisle, MA, for instance, “the original discussion [of deer management] came up

with the Board of Health when they were working on how to get a control on Lyme disease”
(Interview, September 29, 2021).

Scientific uncertainty about the relationship between deer population control efforts and Lyme disease incidence (Kugeler et al., 2016), however, has led to a decreased emphasis on Lyme by officials: “the whole Lyme disease aspect kind of went by the wayside officially” (Interview, July 27, 2021). Even as portions of the public continue to view deer as a significant health threat, most deer management plans, particularly after 2011, no longer cite Lyme disease as a rationale for *implementing* deer management. Instead, forest health is usually the primary justification for deer management in recent municipal policy documents. These documents note that deer alter forest ecosystems by reducing understory and saplings, hindering forest regeneration. This perspective aligns with some conservation groups’ concerns that deer jeopardize the resilience of forests and reduce biodiversity: “I spoke to a lot of people in birding groups early on... and they were like, well, thank God you’re getting it... because they’ve been watching the [bird] populations and how they’re impacted” (Interview, October 28, 2016).

Residents and town officials, however, rarely initiate conversations about deer management with an attention to these ecological impacts of deer. Rather, ecological concerns tend to emerge only after municipalities form committees to examine issues of deer “overabundance” and look for management guidance. Ecological concerns then arose through conversations with other municipalities or state wildlife agencies. For example, MassWildlife administers workshops to teach residents and municipal officials how to conduct vegetation surveys to assess deer browse impacts. We participated in one of these workshops, which included a presentation by a wildlife biologist on the negative impacts of deer on plant diversity and forest regeneration, demonstrated by photographs of exclosures – fenced areas designed to

333 exclude deer. The difference between the plots is obvious, with much more understory and
334 denser vegetation cover inside the exclosures. Following this presentation, workshop participants
335 visited a nearby forested area, where the biologist identified plants browsed by deer and
336 participants filled out a worksheet to calculate the density of deer based on browse impacts.
337 These vegetation surveys are the primary tool used by state officials to estimate deer densities
338 across the state, and agency staff encourage their adoption by local municipalities to increase
339 awareness of deer impacts on forests. In this way, these trainings and materials draw attention to
340 and enhance the legibility of the traces left by deer, allowing them to be understood as an
341 ecological threat. These trainings contribute to the ecological charisma of deer, allowing them to
342 be detectable even when absent.

343 The presence of deer in a community and emergence of deer-related concerns thus draws
344 municipalities into policy networks. As municipal officials and residents seek out and wildlife
345 agencies disseminate information, these new connections facilitate policy mobilizations. At the
346 same time, networks of resistance against deer management also form among residents in
347 communities exploring deer management. Opponents of hunting often see deer management as
348 merely facilitating the expansion of hunting. One skeptical resident described MassWildlife
349 agents as going “on the warpath, trying to get suburban towns to institute deer hunting, bow
350 hunting programs... and people bought into it, that we had a serious problem with deer
351 overpopulation destroying our forest.” Hunting opponents regularly questioned the documents,
352 presentations, and trainings that sought to disseminate knowledge about deer impacts. And
353 opponents from several towns used social media to exchange information about animal rights,
354 non-lethal management, and uncertainty about Lyme-deer relationships. For instance, hunting
355 opponents in multiple municipalities referenced the work of Allen Rutberg, a veterinary

professor who studies deer contraceptives, and some also invited him to give presentations at town meetings.

As seen in these examples, deer agency emerges through their charisma and affective capacities, but also through their capacity to materially alter social-ecological assemblages. Through their mobilities, deer also (re)craft relational networks among human and nonhuman actors. At the same time, humans construct and act to make visible certain topologies, such as deer-tick and deer-forest relations. Below, we discuss this relation-making capacity of deer and propose that deer can be understood as infrastructure. In particular, we argue that this infrastructure has been critical to shaping environmental policies.

Deer as Infrastructure

A growing body of scholarship in urban geography and urban studies addresses urban infrastructures as complex socio-material assemblages that facilitate and direct the circulation of people and capital (Angelo & Hentschel, 2015; Graham & McFarlane, 2014; Swyngedouw, 2004). Suburbs too are characterized by distinctive biophysical attributes (e.g., lower density development with intermingled residential areas, parklands, and roadways) and social relations that shape the movement of human and nonhuman life, and economic activities (Addie, 2016; Huber, 2013; Mattioli et al., 2020). The interactions between humans and deer in Massachusetts reflect these infrastructural geographies: automobile reliance contributes to collisions with and sightings of deer; private gardens and yards attract deer and facilitate interactions with humans; and forested parks support outdoor recreation where humans may encounter ticks. These interspecies interactions within suburban infrastructures also create possibilities for violence

(c.f., Enns and Sneyd 2020) as deer become objects of lethal management aimed to reduce undesired deer impacts (REDACTED).

Deer, however, are not merely passive elements in suburban environments; they continuously shape landscapes and social-ecological assemblages through their browsing of vegetation and movements. Deer are thus active in producing and transforming suburban infrastructures that affect ecological processes. Moreover, the bodies of deer themselves constitute infrastructures for the movement and reproduction of other nonhuman life, such as seeds, ticks, and parasites. In this manner, deer themselves can be understood as infrastructures – “objects that create the grounds on which other objects operate,” both “things and also the relation between things” (Larkin, 2013:329). In this broader conception, “infrastructure” extends beyond objects designed or constructed by humans (cf. Enns and Sneyd 2021). Although humans may actively manage or recruit nonhuman life as infrastructures to support material flows or provision of ecosystem services (Barua 2020, Barua 2021), this is not the case with suburban deer. On the contrary, wildlife managers seek to reduce the influence of deer on humans and landscapes, reducing effects of deer on human mobility (i.e., traffic collisions), disease mobility (i.e., Lyme disease), and ecosystem alteration (i.e., forest degradation). Through this capacity to elicit and direct human responses, however, deer are an unruly form of infrastructure, shaping the relationships among an array of human and nonhuman actors. As described above, the charisma and mobilities of deer draw backyards, the interior of homes, and bodies into new relations with forests, parks, and disease. In this manner, deer construct topological linkages among sites, people, and other nonhuman life.

As deer construct these relational networks, they incidentally provide not only a mechanism for the mobility of other nonhumans (a biophysical infrastructure), but also facilitate

flows of policies and knowledge (an *informational* infrastructure). Deer are central to crafting the connections among places that mobilize specific environmental practices and the production of a shared management regime. As Temenos and McCann (2013: 353) state, “[policies] are the works of numerous policy mobilizers, agents, institutions, and infrastructures who act to condition ideological fields of accepted knowledge and practice, to define certain policies as best practice models, to create connections among places, and to circulate models through those connections.” People are critical components of such informational infrastructures (Ward 2018, Simone 2004), but nonhumans too can be agents of policy mobilization. As deer populations spread and grew across Massachusetts, informational infrastructures emerged in the form of public meetings, presentations, and workshops to disseminate information about the impacts of deer on forests and the best practices to counter these impacts. Although deer do not directly distribute information on best practices, they nonetheless craft relationships among communities that ultimately exchange information about management and thereby create the possibilities for the circulation of particular practices (e.g., hunting).

As we describe above, deer constitute infrastructure with their physical bodies and movements, their charisma and affective relations to humans, and their capacity to (re)shape social-ecological assemblages. The mobilities of deer themselves have thus supported the circulation of environmental imaginaries and shaped the social-ecological assemblages that come to be governed. Drawn into relation by deer, municipalities have exchanged information about management practices as well as ideas about forest health and disease. In these ways, this capacity of nonhuman life to craft and become infrastructure that can configure political networks also represents a form of political agency.

Conclusions

In this brief overview, we have illustrated the ways that the mobilities of deer construct connections between different actors, linking different municipalities and motivating exchanges of policies. As this example illustrates, the mobility and agency of nonhumans shape mobilities of policies, and vice versa, and nonhuman life can play a central role in shaping the infrastructures that link policy actors. As deer move across the landscape, transgressing bounds between perceived human and animal spaces, they alter the flow of people, nonhuman life (ticks and pathogens), materials, and information. We argue that through this process, deer produce and become infrastructure, crafting linkages across sites and facilitating the movement of environmental imaginaries and policies. As wildlife agencies, town officials, activists, and others respond to deer, they turn to practices and ideas from other sites. An attention to nonhumans infrastructures thus provides insights into the political agency of nonhumans and the role of nonhuman life in policy mobilization. In framing nonhuman life as a form of infrastructure, we acknowledge the risk of reducing living animals to instrumental objects, making them susceptible to technocratic management and violence. At the same time, we argue that understanding nonhuman life as infrastructure in policy mobilization can reveal the agency of nonhuman actors and expose the ways that nonhuman life becomes an object of management and violence. An ontology of infrastructure that is inclusive of nonhuman life can thus support policy mobilities scholarship, exposing environmental policy and practice as situated in a socio-ecological milieu, demonstrating how life becomes the object of particular forms of management, and thereby creating a space to examine other possibilities for (re)crafting human-nonhuman relations.

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