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Ambiguity and clarity in residential yard ordinances across metropolitan areas in the United States

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ABSTRACT

Despite the social and ecological importance of residential spaces across the country, scant research examines urban yard management policies in the U.S. Governance scholarship points to the implementation challenges of navigating policy language. Our research provides an exploration of yard ordinance language, with implications for communities across the U.S. Specifically, we sought to determine whether—and in what instances—vegetation- and groundcover-related yard ordinances in the U.S. are ambiguous or clear. Our findings suggest that ordinances are often ambiguous when referring to the state or quality of the constituent parts that make up the residential yard (e.g., "neat" or "orderly"). Yet they are clear when providing guidance about what plant species are or are not allowed, or when articulating specific requirements regarding the size or dimensions of impervious surfaces and plants. We discuss the policy implications of these findings, especially in the context of how such policies may invite the subjective judgment by enforcers, leaving open the potential for discriminatory enforcement, especially with regard to marginalized communities where different cultural values and esthetics may be expressed in yards.

Introduction

The social and ecological benefits of urban green space—including the mosaic of developed and open private and public lands within metropolitan areas—are becoming better understood (Hartig & Kahn, 2016). Residential yards (hereafter, yards), include the plants, hard surfaces, and other features within the space of residential properties managed by homeowners (Cook et al., 2012). Similar to urban green space more generally, yards have the capacity to play important social roles for humans and provide ecological services and functions (e.g., supporting biodiversity and sequestering carbon). To realize the ecological and social potential (and to minimize the negative impacts) of yards in urban areas, it is essential to understand the policy context within which yard managers (i.e., the property owners and renters responsible for yard stewardship) and policy implementers (i.e., planners and the on-the-ground workers responsible for the enforcement of yard ordinances) are situated. Part of understanding the policy context is to determine the extent of ordinance ambiguity, as on-the-ground workers are ultimately responsible for interpreting and implementing these policies in ways that people—and the yards themselves—experience the power of the state (Lipsky, 2010). Thus, our primary goal is to provide an exploration of the ambiguity and clarity of yard ordinance language and

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discuss implications for communities across the U.S. given the important role that local-level policies may play in propagating—or precluding—the social and ecological benefits of yards.

Yard ordinances in the U.S.

Yard ordinances are policies created by municipalities to ensure that residential landscaping aligns with particular municipal management goals. The lack of existing research on yard ordinances affords a rich opportunity to bring the insights of public administration scholarship, which provide useful perspectives on policy implementation, to bear on ordinances' possible influence on residential yards. Most social science research on the topic of residential yards has focused on the social-psychological factors and informal institutions guided by social norms that influence individuals' yard management behavior, homeowner perceptions of the yard and its services, and critical studies of the yard (e.g., Dahmus & Nelson, 2014; Goddard et al., 2013; Groffman et al., 2016; Larson & Brumand, 2014; Larson et al., 2016; Martini et al., 2015; Nassauer et al., 2009; Polsky et al., 2014; Robbins, 2007).

Except for Larson et al. (2020) and Sisser et al. (2016), previous scholarship has not interrogated the content of the policies themselves, although some scholarship has explored the relationships between policy and residential yard management behavior at the individual level (e.g., Carrico et al., 2013 from a social-psychological perspective as well as Fraser et al., 2013; Lerman et al., 2012; Martin et al., 2003, which all consider Homeowner Association, but not municipal policies). Sisser et al. (2016) examined yard ordinance content and found that while most homeowners were aware of vegetation height and irrigation rules, enforcement of these rules was largely driven by neighbors' complaints, as a form of *norm enforcement*. Larson et al. (2020) classified the yard-related content of city codes, including vegetation and groundcover rules, in select municipalities across six metropolitan areas in the U.S. While the Larson et al. (2020) study expanded our understanding of the variation in yard ordinances across metropolitan areas and climatic conditions in the U.S., it did not explicitly interrogate the ordinance language in ways that may reveal implications for their on-the-ground implementation.

Policy ambiguity

Despite the ostensible connection between policy and desired ends, policies are notoriously ambiguous—i.e., interpretable in multiple ways (Feldman, 1989)—across a variety of public sector contexts (Lipsky, 2010; Matland, 1995). Scholars have argued that lawmakers write policies in ambiguous ways for various reasons. For instance, some argue that conflicts between policymakers may lead to ambiguity or vagueness in policy language as a form of compromise (Matland, 1995). Others suggest that policy makers, knowing the complex and unique on-the-ground contexts in which policies are implemented, purposefully codify broad language to give implementers flexibility as policies are actualized (Jakes et al., 2011).

In policy research, there are two predominant ways to study and describe implementation: from the top-down and from the bottom-up. According to Matland (Matland, 1995, p. 146) "top-down theorists see policy designers as the central actors and concentrate their attention on factors that can be manipulated at the central level." Generally speaking, top-down theorists argue that clarity and precision are needed in policy language for fair and even implementation. Such an approach implicitly takes the normative stance that ambiguity in policy language is *bad*. These scholars argue that misunderstandings or misinterpretations inherent in interpreting vague laws may lead to failures in policy implementation (Cohen & Moffitt, 2010).

Opposed to top-down theorists, "bottom-up theorists emphasize target groups (i.e., public clients) and service deliverers (i.e., public employees), arguing that policy really is made at the local level" by on-the-ground frontline workers when they use their personal discretion to exercise judgment (Matland, 1995). Rather than focusing on how policies are written, as is often the case with top-down theorists, these scholars generally focus on on-the-ground policy implementation. Lipsky (2010) argued that ambiguous laws and policies open the possibility for frontline workers to use their personal judgment to

interpret policies and to determine appropriate courses of action rooted in specific situations. Thus, some bottom-up theorists insist that policies are purposefully codified in ambiguous ways to allow for latitude in their implementation. This street-level discretion is an important aspect of policy implementation scholarship to bottom-up theorists because the personal judgments and choices made by frontline workers, such as code enforcers in the context of yard ordinances, may influence the on-the-ground practice—and the ultimate performance and outcomes—of policy. Bottom-up theorists, then, suggest that such frontline workers are, in effect, the real policymakers—not the lawmakers who write laws—and that to fully understand policy, scholars must describe and explore how it is actually performed and not simply analyze how it is written (Lipsky, 2010).

Some bottom-up scholars focus on the implications of interactions between frontline workers of the state and their clients, the public. Such scholars have shown that frontline workers are sometimes more influenced by social norms than laws, policy, and formal guidance in their interactions with the public (Maynard-Moody & Musheno, 2012). Accordingly, frontline workers often consider a client's worthiness (i.e., whether or not a member of the public aligns with a frontline worker's schema of what constitutes a *good citizen*) during their interaction (Maynard-Moody & Musheno, 2003, 2017). For example, a police officer or a teacher, a representative and embodiment of state power, may bring their normative—and often unarticulated—assumptions about an individual's worthiness to bear when interacting with that member of the public, which may influence the outcome of that interaction. In the context of the yard, such an interaction between a representative of state power and a member of the public could mean the difference between a fine for a yard ordinance violation for a resident whose yard characteristics do not align with what a frontline worker perceives as reflective of *proper* citizenship (e.g., looks like a "slum" or not "orderly") and a code enforcer ignoring the exact same violation of another whose characteristics align with their ideas of a *proper* citizen (e.g., looks like a "well maintained lawn" or a "neat" yard) (Robbins, 2007). Within the context of the American yard, where esthetics and composition are conflated with ideas of *good moral character* and *proper American citizenship* (Robbins, 2007), code enforcers likely bring their personal beliefs—mediated through culturally constructed and contingent social norms (Nassauer et al., 2009)—about what a *proper* yard looks like to the fore when considering how to enforce yard ordinances. Thus, a first step to understand code enforcers' latitude of discretion they have in the implementation of policies is to describe the extent and type of policy ambiguity that they navigate in their implementation duties.

Of analytical interest to this study is *directive goal* ambiguity, which is defined as "the amount of interpretive leeway available in translating an organization's mission or general goals into directives and guidelines for specific actions to be taken to accomplish the mission" (Chun & Rainey, 2005, p. 3). Specifically, our interest is in the language of directives and guidelines in yard ordinances that code enforcers are meant to implement given the social and ecological importance these ordinances may play in the American residential macrosystem, or the mosaic of privately-owned yards that compose much of the greenspace across the U.S. (Groffman et al., 2016).

Social and ecological benefits of urban green spaces and residential yards

Urban greenspace has myriad—and often underappreciated—social and ecological benefits. Among the social benefits, urban green spaces may improve mental health (Barnes et al., 2019; Barton & Rogerson, 2017; Engemann et al., 2019; Hartig et al., 2014; Maas et al., 2009; Triguero-Mas et al., 2015), mitigate noise pollution and promote natural sounds (Gidlöf-Gunnarsson & Öhrström, 2010), and reduce the urban heat island effect (Susca et al., 2011). Further, urban green space can be biodiverse (Andrade et al., 2018; Baldock et al., 2019; Callaghan et al., 2019; Gallo et al., 2017) and serve as refugia for threatened and endangered species (Droz et al., 2019; Planchuelo et al., 2019). A diversity of green space types can provide these benefits, including natural preserves, managed parks, and residential yards. Here we focus on residential yards, which are a dominant land cover in urban systems (Loram et al., 2007; Milesi et al., 2005).

Although public urban green space is important, like other urban green spaces, yards have the capacity to play important social and ecological roles. From a social perspective, yards are the primary contact with the environment for many urban residents (DeStefano & DeGraaf, 2003). Yards also provide personal enjoyment and leisurely activities and, in certain areas, respite from hot weather (Larson et al., 2009; Larson et al., 2010). Despite the evident benefits of yards, social pressure to maintain them in ways reflective of dominant norms may cause anxiety for residents, especially given the conflation of *proper* maintenance and *good* moral character (Robbins, 2007). From an ecological perspective, yards have conservation value for supporting native bird communities (e.g., Belaire et al., 2014; Lerman & Warren, 2011). In addition, yards can serve as connectivity corridors within an urban matrix, as well as provide habitat for migratory species (Rudd et al., 2002). Additional studies have shown the potential of lawns in yards to support pollinators, when managed in ways that promote the growth of floral resources (e.g., Lerman et al., 2018; Lerman & Milam, 2016). In the greater Boston region, back yards contain roughly the same amount and percentage of tree canopy cover as parks and open space, but backyard tree canopy is taller and more connected (Ossola et al., 2019). Despite the evident social and ecological importance of residential yards and the acknowledgment of the role of formal institutional forces influencing landscape decisions (Cook et al., 2012; Larson & Brumand, 2014), little research has been conducted on municipal yard ordinances (i.e., the policy context within which residents make yard management decisions and public employees enforce codified rules), with the exceptions of Larson et al. (2020) and Sisser et al. (2016), or the informal, or every day, implementation of these often ambiguous polices by on-the-ground workers.

Aim of study

Inspired by both top-down and bottom-up thinking, we predicted that most yard ordinances are clear in some parts and ambiguous in others. With this in mind, we sought to understand whether (and how) aspects of these ordinances are both ambiguous and clear, and the instances in which policy language is vague or precise. Given the occurrence of ambiguity and clarity in policies in general (Lipsky, 2010), our goal was to qualitatively explore what this looks like in actual yard ordinances and discuss potential implications, not to conduct a quantitative analysis to capture the extent of such themes or compare them across metropolitan areas. Such a quantitative approach does not cohere with our qualitative exploratory approach and, as will be shown, would not yield useful findings given the characteristics of the ordinances themselves. Thus, our research questions are as follows:

RQ1: Are vegetation- and groundcover-related yard ordinances in the U.S. ambiguous or clear?

RQ1a: What is the focus of the ordinance language when it is ambiguous?

RQ1b: What is the focus of ordinance language when it is clear?

We fully acknowledge that code enforcers—an unexplored group of workers—are ultimately responsible for the implementation of these ordinances. This manuscript provides an explicit analytical focus on "policy as written" to better understand the municipal institutions that shape the structures within which code enforcers and residents situate themselves, navigate decisions, and shape the interpretive tensions of yard management across the urban landscape.

Methods

Sampling approach

For this research, we examined yard ordinances across urban, suburban, and exurban municipalities with populations greater than 2,500 within the following six federally-determined Metropolitan Planning Organizations (MPOs): Boston, Massachusetts; Baltimore, Maryland; Miami, Florida;

Minneapolis–Saint-Paul, Minnesota; Los Angeles, California; and Phoenix, Arizona (Figure 1). We chose municipalities within these MPOs because our collaborative team has historically focused on these areas in our research on the question of ecological homogenization of the American residential macrosystem (Groffman et al., 2014). These MPOs represent diverse environmental and social contexts across the continental U.S. Within these six MPOs, we sought to sample a roughly equal number of municipalities. Because two of the six MPOs had approximately 30 municipalities, we sampled approximately 30 from each MPO (except Baltimore, for which we completed a census of all nine municipalities within its MPO) for a total of 156 municipalities (See Appendix A for a list of municipalities included in this study). We randomly sampled municipalities within three (Boston, Los Angeles, Minneapolis-St. Paul) of the six MPOs because these had a high number of municipalities.

The data on which our analysis is based is on ordinances collected and analyzed for municipal yard goals and required actions to achieve those goals in a study conducted by Larson et al. (2020); our analysis focused on the ambiguity and clarity of the vegetation- and groundcover-related yard ordinances they analyzed. To collect the landscaping ordinance data for analysis, Larson et al. (2020) compiled city ordinances from all 156 municipalities. These ordinances were often—but not always—on a municipality's official website. For instances when they could not locate the ordinances through the official website, Larson et al. (2020) conducted Google searches to locate the relevant ordinances. With the exception of Baltimore, municipalities commonly hosted these documents on external legal websites including Code Publishing, American Legal Publishing Corporation, and Municode.

Analysis of city ordinances

After Larson et al. (2020) collected the ordinances of all municipalities, they uploaded all the content to the qualitative data management software program NVivo to conduct a content analysis (Krippendorff, 2018). They then coded the landscape ordinances for their articulated "goals," and

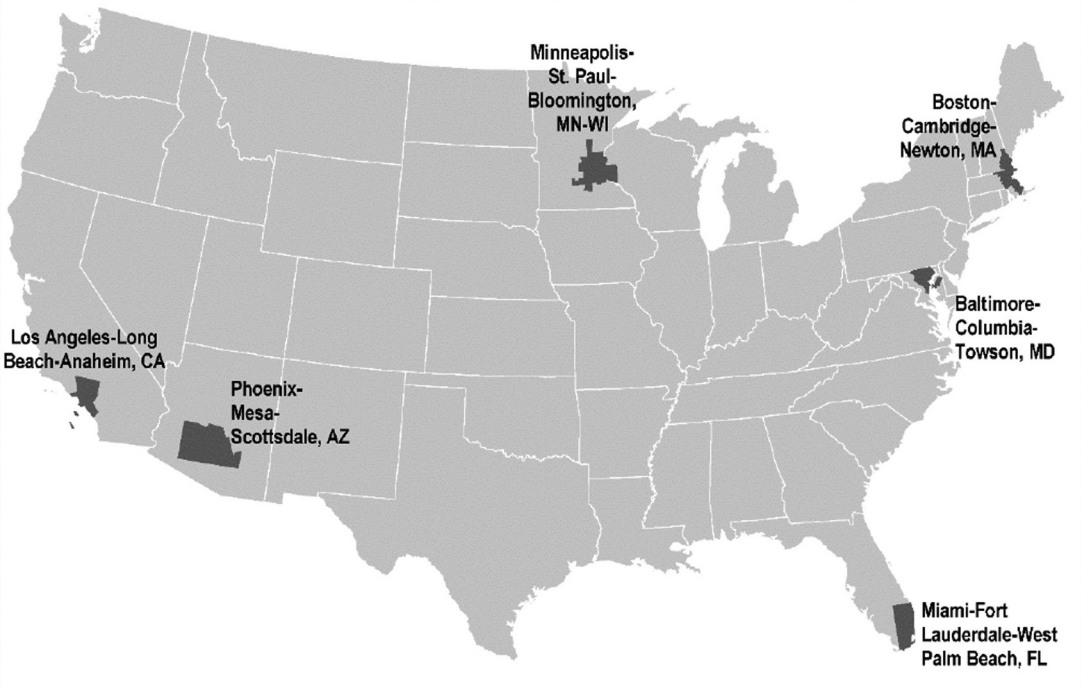

Figure 1. Location of study regions within the US: Metropolitan planning organizations (from Larson et al. (2020)).

"actions" to achieve those goals, and "enforcement" mechanisms available to the code enforcers responsible for implementation.[1] Since our focus here is on the vegetation- and groundcover-management language within the "actions" sections of the yard ordinances, our analysis focused on language associated with actions, i.e., the mandated landscaping regulations that prohibit or require certain practices (Larson et al., 2020) or the *directive goals* within yard ordinances (Table 1 for specific "actions" analyzed for this manuscript). We consider "actions" as related to what is legally prohibited, allowed, and/or required in the yard. Within the "actions" language, we described whether and how such language was ambiguous (RQ1 and R1Qa) and situations in which ordinance language was clear or precise (RQ1b).

To begin our coding process, we conducted a close and repeated reading of all "action" codes included in our analysis to assess their ambiguity or clarity (Braun & Clarke, 2006). Our codes were qualitative and iteratively determined with the sentence-level as the unit of analysis with focus on specific phrases and words that we agreed contribute to the clarity or ambiguity of a sentence within the text and thus that aspect of the ordinance itself. We considered parts of ordinances to be ambiguous when they were vague or inexact and described the objects of the yard with unclear—or highly subjective—adjectives, such as "neat," "orderly," or "attractive" (i.e., enforceable requirements related to vegetation were unclear or based solely on subjective judgment). We also considered ordinances ambiguous when they were inexact, or lacked precision. For example, when an ordinance required characteristics of the yard to align with the "community standard" without providing precise descriptions of what that standard was, we considered it ambiguous. Alternatively, we considered ordinances to be clear when they were precise in describing the mandated characteristics of the yard and its constituent parts. We coded ordinances as clear when they included enforceable requirements related to vegetation and groundcover that were exact, quantifiable, or written in a way that required little obvious subjective judgment. For example, we considered an ordinance to be clear when it referred to the measurable, allowable, or required spatial dimensions of yard objects, such as patio or artificial turf sizes, or named specific required or prohibited plant species.

Results

We observed both clear and ambiguous language in ordinances across all six MPOs. In parts of ordinances that were clear, they typically provided guidance about what plant species were or were not allowed, or articulated specific requirements regarding the size or dimensions of impervious surfaces or plants. However, parts of ordinances were ambiguous when referring to the state or quality of the constituent parts that make up the residential yard. Interestingly, and as will be seen below, ordinances were not wholly ambiguous or clear: line-by-line and phrase-by-phrase, they often oscillated between

Table 1. "Actions" within yard ordinances analyzed (Larson et al., 2020).

Actions: The mandated landscaping regulations that prohibit or require certain practices			
Vegetation management: To plant or maintain trees, shrubs, and other plants (excluding groundcover vegetation) in certain ways.		**Groundcover management**: To regulate built and natural groundcover.	
Maintenance:	Requires vegetation to be maintained to create a well-kept, esthetically pleasing landscape.	**Impervious surfaces:**	Limits the amount of impervious surface, such as rooftops or driveways, on parcels.
Minimums:	Requires a minimum amount of trees or plants in yards.	**Turfgrass:**	Controls the amount of grass, or lawns, in residential yards.
Natives/non-natives:	Regulates the management of native or non-native plants, by requiring the presence of natives or the removal of non-natives.	**Weeds:**	Dictates how "weeds" must be removed or managed, typically with height limits.
Trees:	Specifies how trees must be managed, including stipulations regarding height requirements, pruning, and acceptable species to be planted.		

extremely clear and ambiguous language. Thus, given the characteristics of the ordinances, in what follows includes excerpts from ordinances with both ambiguous and clear language. Below we present results of our content analysis to address whether and which aspects vegetation- and groundcover-related yard ordinances in the U.S. are ambiguous or clear.

Ambiguity in yard ordinances across the U.S.

Ambiguity was evident in the language of both vegetation- and groundcover management ordinances in two distinct ways: (1) the adjectives used to describe the constituent vegetation and groundcover in the yard were highly subjective and (2) the ordinances were written in normative ways. (Table 2 for the extent and type of vegetation- and groundcover-related ordinances across the 156 municipalities within the six MPOs).

Ambiguity of adjectives

Adjectives were used to describe parts of the yard that were meant to be in a particular condition or state that were unclear, inexact, or based on subjective judgment to enforce. For example, one code from Mound, Minnesota, stated that "If any yards are to be landscaped, they shall be landscaped *attractively*[2] with lawn, tree, shrubs, etc. Any areas left in a natural state shall be *properly* maintained in a *sightly* and *well-kept condition*." Such language (i.e., "attractively," "properly," "sightly," or "well-kept condition") is open to interpretation. Different people—such as residents and code enforcers—could easily have different ideas about what constitutes each vegetation state. In another example, an ordinance from San Fernando, California, stated that, "hedges, trees, lawns, plants, or other vegetation that are not maintained in a *neat, orderly*, and *healthy* manner as a result of a *lack of adequate* mowing, grooming, trimming, pruning, fertilizing, watering, and/or replacement" are forbidden. In an example from Miami Shores, Florida, the city code stated, "Lawn, turf grass and sod must be mowed *regularly*, must not exceed eight inches in height and at all times lawn must be kept at a length that provides a *neat, well-kept* appearance." While this example, and others not presented here, does state a maximum length of grass allowed, terms such as *neat* or *orderly*, are subjective and people likely hold different ideas about what represents each in the context of the yard and its parts. In another example from Mount Airy, Maryland, an ordinance stated, "it shall be the duty of each occupant or owner of a dwelling unit or commercial or industrial structure to keep in a *clean* condition that portion of the property which he [sic] occupies or over which he has *exclusive control*." In this instance, both "clean" and "exclusive control" are unclear and undefined.

In the context of alternatives to turfgrass for ground cover, there was also great ambiguity. For example, one ordinance from Doral, Florida, stated that "Ground cover used in lieu of grass shall be one uniform type through a given lawn area and shall not be permitted to become *adulterated with weeds*." As may be obvious, the term "adulterated" is unclear and the term "weeds" is not defined in the city's code of ordinances. In another example from Glendale, Arizona, one code said that "no person owning or occupying any property fronting on any street, alleyway, or public place in the city, shall allow thereon grass or weeds characterized as *uncontrolled, unmaintained*, or *overgrown*, including those areas between the property line and the street, when such conditions create

Table 2. Percentage of study municipalities across six U.S. metropolitan planning organizations with vegetation management actions within ordinances (modified from Larson et al. (2019)).

Vegetation management: 91%	Trees:	78%
	Maintenance:	73%
	Minimums:	46%
	Natives/non-natives:	32%
Groundcover management: 73%	Impervious surfaces:	71%
	Weeds:	68%
	Turfgrass:	66%

a *blighted condition* or may harbor infestations or are *likely to become a hazard* to the public health or safety." Again, the italicized terms are unclear and involve a great deal of subjectivity in their interpretation.

Ambiguity in normative language

Some yard ordinances explicitly referred to the descriptive norms of neighborhoods, likely to assist code enforcers in the enforcement of municipal codes. Ordinances explicitly included normative language related to perceptions about what a yard ought to look like based on the visual qualities of the neighborhood or jurisdiction the yard is in. In a common refrain, one ordinance from Claremont, California, stated that "visible front and side yards shall be landscaped and *maintained to the neighborhood standard*," without defining what that standard is, leaving the code enforcer to use his or her own personal judgment based on what other yards look like in the neighborhood. In another example from Bellflower, California, an ordinance stated that "vegetation causing or tending to cause detriment to neighboring properties, or *that is out of conformity with neighboring community standards* to such an extent as to result in, or contribute to, a diminution of property values" and goes onto define these standards using unclear or subjective adjectives, as described previously.

Measurable and identifiable yard ordinances

Despite the ambiguity about the state or quality of the yard's constituent living parts, other components of the yard ordinances—i.e., species requirements, chemical usage, and built infrastructure—were often clearer. However, as noted above and as will be seen below, the ordinance language is sometimes simultaneously clear and vague, fluctuating between the two in a municipality's ordinance.

Species requirements

Ordinances included content focused on specific plant species that were required, allowed, or prohibited in yards within their associated municipalities. Certain city codes required that specific species of turfgrass be used for lawns. In an example that is both ambiguous and clear, the ordinance of Aventura, Florida, stated that, "lawn grass: shall be St. Augustine 'Floratam' [a low-input variety of turfgrass] solid sod, or other lawn species *well adapted* to localized growing conditions, as approved by the Director, *reasonably* free of insects and noxious weeds." Notably, this particular ordinance still contains ambiguous language (i.e., "reasonably" and "well-adapted") in describing the state or quality of the lawn and the characteristic of the required turfgrass, respectively. Similarly, but not suggesting a specific species, an ordinance from another city in Florida stated that "Lawn areas shall be planted with species *well adapted* to localized growing conditions in Homestead." Again, there is ambiguity in terms of the judgment needed to discern whether species are "well-adapted," especially in the uncertain context of climate change, but it does provide some direction for empirically-justified decision-making. Ordinances that prohibited certain species were much more precise. For example, the code of Apache Junction, Arizona, stated that, "No person shall offer to sell, or plant any male mulberry tree (*Morus alba*) or olive tree (*Olea europea*) in the city unless it is one of the non-pollinating varieties of such trees." Other cities, such as Scituate, Massachusetts, referred to lists of species that were prohibited, such as the "Massachusetts Prohibited Plant List," while others, such as Mesa, Arizona, required that vegetation be aligned with the character of the surrounding ecosystem in accordance with the "Preferred Desert Uplands Plant List." Such precision was not only limited to species, but to other elements of the ordinances, such as specified requirements regarding the dimensions of vegetative and built infrastructure, as presented in the following sections.

Measurements and minimums

Yard ordinances included precise quantitative measures in regards to maximum and minimum sizes of vegetation as well as dimensions of vegetative groundcover. Many municipalities prohibited

vegetation, except for shrubs and trees, that grow above a specific height. In one example, Mount Airy, Maryland, required that, "all yards, lawns and vacant lots shall be similarly kept *clean and free* from weeds, grass or plants (other than trees, bushes, flowers or other ornamental plants) exceeding 12 inches in height." While referencing the normative order of the city, the ordinance of New Hope, Minnesota, clearly stated that "any weeds or grass, including turf grass, growing upon any lot or parcel of land in the city to a greater height than eight inches or which have gone or are about to go to seed are hereby declared to be a nuisance condition and dangerous to the health, safety and good order of the city." In another example, the ordinance of Apache Junction, Arizona, stated

> Any landscaping, visible from public property or from beyond the lot boundaries, that is dead, damaged, or characterized by uncontrolled growth, or presents a deteriorated or *slumlike* appearance is *uncared* for and any weeds, tall grass, shrubs or growth (whether growing or otherwise) higher than 10 inches, or any dead trees, bushes, shrubs or portions thereof, including stumps, or any palm or similar type tree having dead or dry fronds descending downward from the base of the lowest living frond more than 8 feet or dry fronds longer than 5 feet and closer than 8 feet to the ground, shall be removed and disposed of in a lawful manner.

This example is particularly ambiguous, with exclusionary overtones given its reference to "slumlike" appearances. Despite this, it does go on to define what "slumlike" means in terms of measurable vegetative characteristics. Such quantifiable requirements are not limited to weeds and turf. In North Miami Beach, Florida, trees were treated in a similar way:

> Required trees shall be of a species, which normally grow to a minimum height of twenty-five (25) feet and have a mature crown spread of not less than twenty (20) feet with trunks, which can be maintained, with over six (6) feet of clear wood. The Director shall maintain a list of acceptable trees. (2) All required trees shall be field grown and have a minimum caliper or diameter at breast height (D.B.H) of three (3) inches and be a minimum of twelve (12) feet in height and five (5) feet in spread at time of planting.

Such measurements were also articulated in terms of percentages of required vegetation. In one example from Artesia, California, the code stated that, "Acceptable landscaping shall consist of a combination of trees, shrubs, and live groundcover, which groundcover shall not exceed fifty (50%) percent of the total landscaped area within any planter." In another example from Pinecrest, Florida, the code stated that, "On each lot there shall be provided green space equal to at least 40% of the total lot area. The required green space shall be unencumbered with any structure or off-street parking and shall be landscaped and *well-maintained* with grass, trees and shrubbery." Thus, whether it is the allowable length of grass or the percentage of required or allowable vegetation, yard ordinances often relied on quantitative measures.

Impervious surfaces and artificial turf

Yard ordinances related to built and impervious surfaces were generally precise in terms of size allowed and acceptable material and dimensions. In one example speaking to size, one city's code (Bal Harbor, Florida) precisely stated that:

> The maximum Lot coverage by buildings and/or structures shall not exceed 40 percent. Other impervious areas, including, but not limited to, driveways, walkways, decks and similar areas shall not exceed ten percent of the Lot area. Lot coverage accomplished by a combination of structures together with other impervious areas shall be subject to a 50 percent total maximum of Lot coverage.

In an illustrative example related to acceptable material of impervious surfaces in one city, the ordinances of Bay Harbor Islands, Florida, clearly codified what was and what was not allowed:

> The following materials shall be prohibited in the construction of new driveways and all other parking areas, except as provided in subsection (h) below:(1) Loose gravel. (2) Epoxy Chattahoochee. (3) Plain concrete. (4) Asphalt.(h) [Use of colored or decorative concrete.] The use of plain concrete impregnated with color, stamped concrete, decorative concrete slabs separated by grass (natural or artificial), pavers, stone, or similar material, or any combination thereof is allowed.

Related to allowable dimensions of driveways, the ordinances for Bedford, Massachusetts, simply stated, "The minimum width shall be 15 feet. (d) The maximum length shall be 250 feet."

In addition to providing precision related to impervious surfaces, ordinances articulated clear and detailed guidance on artificial turf in residential yards. In an example illustrative of other cities in Florida and California, where the artificial turf related ordinances were limited to in our sample, the yard ordinances of Alhambra, California, articulated a clear definition of artificial turf (i.e., "A synthetically derived, natural grass substitute that may be used in lieu of natural turf, and must *simulate the appearance* of natural live grass, in a single-family residence and in the landscape areas of multi-family and non-residential properties"), articulated specific material requirements (i.e., "Artificial turf must have a minimum eight-year no-fade warranty as issued by the manufacturer; be cut-pile infill, minimum pile height one and two-thirds inches and a maximum of one and three-quarter inches, with parallel long slit blades"), and specifications for installation (i.e., "Installation must include removal of all existing plant material and three inches of a compacted aggregate base that provides adequate drainage and ensure stability … [and] the area must be sloped and graded to prevent excessive pooling, runoff, or flooding onto adjacent property"). Despite this precision, language about the maintenance of artificial turf relied on similar ambiguous language as non-artificial components of residential yards: "artificial turf must be maintained in an attractive and clean, unfaded condition free of weeds, stains, debris, tears, holes, depressions, ruts, odors and looseness at edges and seams." Given these examples, it is clear that there is relatively precise guidance in yard ordinances in terms of the use of non-living infrastructure, such as impervious driveways and artificial turf.

Discussion

Relevant to the on-the-ground implementation of yard ordinances by code enforcers as well as the residents navigating such policies, it is evident that both ambiguity and clarity are common across yard ordinances in this study of municipalities of the U.S.[3] Further, the ordinances, when analyzed at the sentence level, have both vague and clear components. This aligns with the findings of other studies conducted in other sectors, as policies are notoriously ambiguous across a variety of public sector contexts (Feldman, 1989; Lipsky, 2010; Matland, 1995) for various reasons that have been articulated by other scholars (Jakes et al., 2011). Rather than take solely a top-down or bottom-up stance, we present potential implications of our research from both perspectives.

The top-down perspective of policy implementation assumes a normative stance that ambiguity is *bad* because it is a hurdle to effective and equitable policy implementation (Cohen et al., 2010; Scollon & Scollon, 2001). As our findings suggest, yard ordinances in the U.S. are ambiguous in many ways. Given this, it may be the case that yard ordinances may not be enforced evenly—or much at all, given the geographical extent of ambiguity—in MPOs in the U.S. For example, ordinances state that naturalized areas of residents' yards must be kept in an "orderly" or "sightly" manner and that yards are required to be maintained to either an undefined or vaguely-defined "neighborhood standard." Such ambiguity may be problematic for municipal governments who seek to have residents abide by city ordinances ostensibly put in place to impose order within communities. However, given the impactful role that neighborhood norms play in influencing residents' yard management choices (Goddard et al., 2013; Locke et al., 2018; Martini et al., 2015; Nassauer et al., 2009; Robbins, 2007), perhaps cities' vegetation- and groundcover-related goals are already met without the need for municipal enforcement. There might be instances when descriptive and injunctive norms—i.e., the perceptions of others' behavior and the perceptions of which types of behaviors are approved or disapproved by others, respectively—do not spur offending residents to abide by codes that align with neighborhood norms (Stern, 2018). When this is the case, a top-down theorist may argue that, because many aspects of yard ordinances are ambiguous, such codes may be difficult—if not impossible—to enforce. In other words, residents, neighbors, code enforcers, and judges may all have different ideas about what constitutes a "neat" or "orderly" lawn (and perhaps different ideas about what technically

constitutes a "lawn"). Because many cities do not have definitions for such terms (and when codes do have definitions, they are often composed of the same types of vague and subjective language), they may not be able to impose the order they originally sought with the creation of yard ordinances.

From a bottom-up perspective, it is hardly surprising that much of the language in yard ordinances is ambiguous. From this perspective, ambiguity in vegetation- and groundcover-related yard ordinances may be beneficial because (1) ambiguity allows cities/towns to be flexible in an uncertain world and (2) the judgment of adjectives, especially those related to esthetics, can change over time (i.e., what is not considered neat or orderly today may change in the future or "neighborhood standards" may change over time) to reflect more sustainable values in the future.

Despite the potential benefits of ambiguous yard ordinances, such ambiguity may also be problematic. By juggling normative judgments based on ideas of what constitutes an ideal (e.g., "neat" and "orderly") and a non-ideal (e.g., "slumlike") American yard, ideas that are conflated with being a *good* or *bad* neighbor and having *good* or *bad* moral character, code enforcers may help define in a very real sense what it means to be a citizen in America (Robbins, 2007). Because these policies are highly ambiguous, it may be likely that code enforcers' ideas about residents' worthiness—based on enforcers' beliefs and social norms about the esthetics and composition of residents' yards—may influence the character of implementation (Maynard-Moody & Musheno, 2003, 2017). Thus, more than merely enforcers or implementers of law, these code enforcers, in addition to implementing policy, may reenforce a nativist set of values which are either explicitly constructed in the normative aspects of ordinances themselves or implicitly applied to ambiguous adjectives in the ordinances. Because the required quality or state of the constituent parts of the yard is often codified in ambiguous terms, such as "neat" or "orderly," code enforcers—and people who may complain to the city about their neighbors' yards—are likely using dominant ideas of what the American yard and lawn *should* look like (e.g., Robbins, 2007). Thus, ambiguity in wording of yard ordinances may invite subjective judgment by code enforcers, which could potentially lead to discriminatory enforcement, especially with regard to marginalized communities where different cultural values and esthetics may be expressed in yards. Further, the on-the-ground material consequences of these contemporary normative ideas about *proper* yards may have cascading legacy effects and be perpetuated into the future (Larson et al., 2009). The normative quintessential American lawn—vibrant green, unnaturally uniform—relies heavily on human inputs, depending on the climate, which often include irrigation, fertilization, and pesticide application and frequent mowing (Robbins, 2007).

From an applied standpoint, the apparent ambiguity of much of the ordinances may have profound implications for ecological function (e.g., as wildlife habitat or carbon storage; Davies et al., 2011; Goddard et al., 2010) that residential yards and lawns can play in urban areas in the U.S. Intensive management, especially mowing and pesticide application, has negative implications for biological diversity (Lerman et al., 2018) and fertilization has impacts on air and water quality (Carey et al., 2012). The focus on a normative ideal lawn in enforcement could increase the negative environmental impacts of residential land use by facilitating increases in the intensity of management. Among our six cities, approximately 50% of lawns are fertilized and an even lower percentage receive pesticide applications (Fraser et al., 2013; Groffman et al., 2016; Polsky et al., 2014; Wheeler et al., 2017). Ambiguous enforcement of ideas about *proper* yards could lead more people to fertilize and/or use pesticides even if they did not originally intend to.

From a top-down perspective, unless there is greater clarity in the laws or if normative ideas about the American lawn change, current policy—for places where low-input yards are not articulated as an option in yard ordinances—may not fully support a national transition to a more sustainable yard, i.e., one that does not require continual inputs for achieving an esthetically-pleasing and low maintenance landscape (Larson et al., 2016). In an example of a law to promote alternative yard futures, the state of Florida recently passed a law that prohibits local municipalities from banning vegetable gardens in any part of people's property, including residential front yards (Vegetable Gardens, CS/SB 82, 2019). Clear laws like this, from a top-down perspective, could facilitate the development and proliferation of non-traditional lawns into the future.

Given the apparent strength of normative pressure in residential yard management (Goddard et al., 2013; Locke et al., 2018; Martini et al., 2015; Nassauer et al., 2009; Robbins, 2007; Sisser et al., 2016), the power of social norms may paralyze needed action unless those norms change to reflect the novel ecological contexts cities will likely find themselves in. If these social norms continue into the future, then the American residential macrosystem will likely continue to collectively use pollutants and large amounts of water to maintain the dominant American lawn. Further, residents who either are unable—or refuse—to abide by these norms may be punished by local governments, which may disproportionately impact disaffected and historically marginalized communities, further perpetuating their marginalization. Although this marginalization has not been considered in empirical research in the context of yard ordinance enforcement, it has been well-documented in other contexts, such as law enforcement and education (e.g., Maynard-Moody & Musheno, 2003, 2012). Either way, it is apparent that ambiguity in residential yard ordinances will play a role, perhaps a differential one depending on the social-ecological characteristics and contexts of individual communities, in what happens in the future the U.S. yard.

This study has several limitations. First, our dataset only included MPOs and not rural communities. An expansion to rural communities may yield insight on the generalizability of our findings. Also, our study only included vegetation- and ground-cover related residential yard ordinances. Other ordinances, such as chemical and water management, can have profound implications for urban areas facing uncertain futures within the context of climate change. Thus, we do not argue that all yard-related ordinances have tensions related to ambiguity and clarity, simply those we analyzed related to vegetation and ground cover. Further, our research did not include an investigation into residential yard ordinance enforcers to understand the actual enforcement or performance of these policies. Such a study would yield great insight, especially into (1) the tensions enforcers may feel while enforcing ambiguous rules within the context of ordinances that allow low-input yards and (2) what norms ultimately get enforced on-the-ground, which would provide the empirical foundation to explore ecological, social, and justice-related outcomes of enforcement. Further, our framework and discussion are written from the perspective of policy implementation and not how residents interpret policy, which would provide a holistic perspective of policy ambiguity. Lastly, we did not link our findings with ecological outcomes: does differential ambiguity between communities lead to differential ecological outcomes?

Conclusion and future research

Because of the social-ecological role that the residential yard plays in urban ecosystems, it is essential to explore the policy contexts in which yards are situated. We found that yard ordinances are both clear and ambiguous: clear on specific attributes of the yard yet ambiguous about the overall state of the yard in relation to other yards or as a whole. Importantly, they are ambiguous in ways that likely leave great discretion to workers responsible for yard ordinance enforcement. As Sisser et al. (2016) showed, ordinances were largely enforced in ways that reflected the embedded neighborhood norms. It is evident that workers can use the discretionary space that the ambiguity of ordinances creates to enforce these social norms, which may perpetuate dominant (and not particularly accurate) ideas about the high-input American yard (Robbins, 2007). If ordinances are going to support alternative futures for residential yards, then they may need to incentivize creativity and landowner preferences through multiple options for vegetation design as long as performance standards are met. To understand the extent of ambiguity across the U.S. and to provide comparisons, a quantitative analysis driven by a priori research questions is needed in the future, but was beyond the scope of this manuscript.

Our findings establish part of the relationship between ordinances and enforcement. This manuscript provides insights about "policy as written," and we hope that it will inspire future research on how such ordinances are actually enforced by the on-the-ground workers who, in effect, produce policy as citizens—and urban ecosystems—experience it (Lipsky, 2010, p. xvii) and whether (and where) such

ordinances are actually enforced (as well as the extent and volume of their enforcement). A better understanding of how—and whether—yard ordinances are enforced across the U.S. will allow us to (1) determine who is responsible for enforcement, (2) operationalize the types and extent of on-the-job training these enforcers have, (3) understand the professional requirements for expert yard judgments and (4) explore the ecological consequences of yard ordinance enforcement. Such research would serve as the foundation to developing an understanding of how code enforcers understand and ultimately navigate these policies to determine how the policies are actually implemented on the ground. Further, it would be informative to explore how residents understand these ordinances and how they abide—or do not abide—by them. Such studies would expand our understanding of the interaction between "policy as written" and "policy as practiced" and the influence on the social—ecological system.

If yard ordinances are ambiguous in ways that lead to adverse effects for valued urban ecosystem components or for the people living in urban areas, then we suggest to reappropriate adjectives like *attractive, well-kept*, or *sightly* through comprehensive communication and educational campaigns designed to capture attention and change perceptions about what constitutes a *proper* yard. For example, we could support the development—and study the implementation—of programs similar to the State of Minnesota's *Lawns to Legumes* program (Minnesota Board of Water and Soil Resources, 2019), which provide training and money to convert traditional turfgrass lawns to pollinator habitat or the Turf Replacement Rebate program offered by the California's Department of Water Resources (California Department of Water Resources, 2019). These types of programs may help increase the popularity of such yardscapes, and will thus foster the development of descriptive norms of pollinator habitat and low-input yards in urban residential areas. More generally, these programs may disrupt dominant ideas of the *proper* American lawn to the benefit of ecosystems and ourselves.

Notes

1. See Larson et al. (2020), for an overview and description of the content of the municipal yard-related ordinances across all six MPOs.
2. Italics emphasis added for all ambiguous adjectives in the ordinances.
3. It is important to note that case law may have clarified some ambiguity in the courts, but code enforcers may be unfamiliar with legal rulings across different jurisdictions that otherwise may have provided some clarity on vague ordinances.

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Appendix A

Table A1. Summary of sample and names of municipalities (adapted from Larson et al., 2020).

MPO	Number of qualifying municipalities in each MPO	Number of sampled municipalities	Names of municipalities
Baltimore	9	9	Aberdeen, Annapolis, Baltimore, Bel Air, Havre de Grace, Manchester, Mount Airy, Taneytown, Westminster
Boston	99	31	Bedford, Boston, Canton, Carlisle, Duxbury, Everett, Hamilton, Hopkinton, Hudson, Lynn, Lynnfield, Malden, Marshfield, Melrose, Milton, Nahant, Natick, Norfolk, North Reading, Norwood, Peabody, Pembroke, Randolph, Scituate, Southborough, Topsfield, Watertown, Wayland, Weston, Westwood, Winthrop Town
Los Angeles	83	31	Alhambra, Artesia, Avalon, Bellflower, Beverly Hills, Claremont, Covina, Downey, El Monte, Glendale, Hermosa Beach, La Canada Flintridge, La Puente, Lancaster, Lawndale, Los Angeles, Lynwood, Montebello, Palos Verdes Estates, Paramount, Pico Rivera, Pomona, Rancho Palos Verdes, Redondo Beach, San Dimas, San Fernando, Signal Hill, Temple City, Torrance, Walnut, Whittier
Miami	29	29	Aventura, Bal Harbor, Bay Harbor Islands, Coral Gables, Cutler Bay, Doral, Florida City, Hialeah, Hialeah Gardens, Homestead, Key Biscayne, Miami, Miami Beach, Miami Gardens, Miami Lakes, Miami Shores, Miami Springs, North Bay Village, North Miami, North Miami Beach, Opa Locka, Palmetto Bay, Pinecrest, South Miami, Sunny Isles, Surfside, Sweetwater, Virginia Gardens, West Miami
Minneapolis	110	31	Afton, Anoka, Bayport, Brooklyn Park, Burnsville, Chaska, Corcoran, Cottage Grove, Crystal, Fridley, Grant, Lakeville, Medina, Minneapolis, Mound, New Hope, North Oaks, North Saint Paul, Norwood Young America, Oak Grove, Richfield, Rogers, Saint Anthony, Saint Francis, Saint Paul, Saint Paul Park, Shakopee, West Lakeland Township, West Saint Paul, White Bear Township, Woodbury
Phoenix	26	25	Apache Junction, Avondale, Buckeye, Carefree, Cave Creek, Chandler, El Mirage, Florence, Fountain Hills, Gilbert, Glendale, Goodyear, Litchfield Park, Maricopa, Mesa, Paradise Valley, Peoria, Phoenix, Queen Creek, Scottsdale, Surprise, Tempe, Tolleson, Wickenburg, Youngtown