

## Article

# Trends in Vegetation Ordinances across the Southern United States

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**Abstract:** Vegetation regulations or ordinances are the local laws that govern the policies surrounding urban trees and landscape management. The complexity of urban areas, within the mosaic of private and public vegetation, necessitates regulation to manage the numerous benefits of urban vegetation. As urban populations continue to increase, regulations governing vegetation become increasingly common. This article presents an analysis of the language and provisions of vegetation regulations within communities across the southern United States by using data from the Municode, a public database of ordinances, and employing a content analysis. Findings demonstrate both similarities and variations in ordinance language and content while identifying limitations such as unclear ordinance provisions, lack of essential ordinance provisions, duplications, and section contradictions. Overall, findings suggest a need to improve ordinance design, content, and language clarity therein, so they can have a more positive impact on community green infrastructure. Findings are useful for urban foresters, arborists, planners, and elected officials in efforts to develop or revise codes.

**Keywords:** ordinance; tree law; U.S. south; urban forest; arboriculture; planning



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## 1. Introduction

Urban forests are an integral part of the urban ecosystem as they provide numerous benefits and services including mitigation of the urban heat island effect, air and water purification, noise level reduction, and carbon sequestration [1,2]. These benefits decrease as urban expansion increases. The southeast United States (U.S.) has the second highest (7.5%) amount of urbanized area after the northeast U.S. (9.7%) [2], demonstrating a strong possibility of increasing these percentages in the future [3]. This could be further accelerated since the population of urban areas is expected to increase by 85% (or 439 million) by 2025 [4]. As population growth leads to expansion of the urban environment, urban tree canopy growth typically diminishes [5]. The impact of urban development pressures over time, motivated communities to use various tools to achieve and maintain sound, healthy, and well-managed forests.

The establishment, management, and protection of vegetation on urban landscapes is shaped by public and private property owners' decisions as well as regulations established by municipal authorities [6]. Local laws and regulations governing the policies surrounding urban trees and landscape management are known as vegetation ordinances. The success of these ordinances depends on several factors, including sociodemographic and cultural characteristics of the community, ordinance enforcement, and community leadership that supports urban forest conservation [6]. Many guidelines to developing ordinances exist, often from state forestry commissions and tree councils. In addition, local governments have employed guidelines written by Grey [7], Fazio [8], Abbey [9], Bernhardt and Swiecki [10], and Burgess et al. [11] as frameworks for developing ordinances. Weber [12] stated all communities differ, among other things, by soils and climatic conditions, cultural traditions,

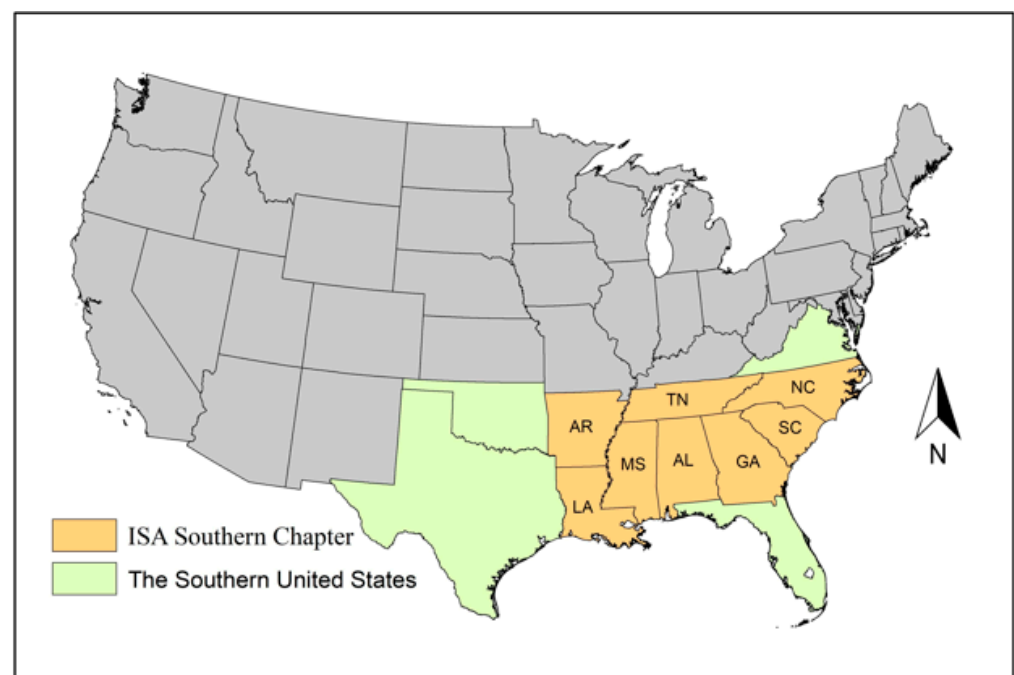
political and economic climates, and legal frameworks. Such varying biophysical and social factors are essential to address when developing ordinances to achieve desired impacts.

Several previous work has focused on frequencies of the existence of tree ordinances and provisions (e.g., [13–15]. A few studies (e.g., [16] and a report by Head [17]) paid attention to the intricacies of tree ordinance language, clauses, and specific provisions. Most of these findings are, however, at the state level. Furthermore, research must not only assess tree ordinances, but also a variety of regulations that fall under the umbrella term of “vegetation ordinances” that includes vegetation, trees, plants, landscapes, grass, weeds, and shrubs. This more inclusive approach provides a broader analysis of regulation of green infrastructure than focusing on “trees” alone. Therefore, this study for the first time aimed to provide an overview of existing vegetation ordinances across the southern United States. Specifically, we examined the language, provisions, and organization of vegetation ordinances within communities across the southern United States. A detailed and systematic analysis of ordinance helps in understanding communities’ priorities and scopes [18]. In addition, the study of language and provisions of vegetation ordinances helps in examining whether these ordinances are interpreted and understood clearly in terms of contributing towards community and urban tree management. This study adds to the body of work addressing municipal ordinances, which are critical aspects of urban forest governance, by empirically observing and describing the differences and similarities. Findings will help local policy makers identify strengths and weaknesses of their ordinances to improve ordinance design, implementation, and enforcement practices.

## 2. Materials and Methods

### 2.1. Study Area

The study was conducted across eight states of the International Society of Arboriculture Southern Chapter (ISASC), including Alabama (AL), Arkansas (AR), Georgia (GA; as of 2021, the state of Georgia contained two ISA chapters, namely the Southern Chapter and the Georgia Arborist Association), Louisiana (LA), Mississippi (MS), North Carolina (NC), South Carolina (SC), and Tennessee (TN) (Figure 1).



**Figure 1.** Location of the International Society of Arboriculture Southern Chapter (ISA-SC) in the map of the United States.

## 2.2. Sample Selection

We collected data from Municode ([www.municode.com](http://www.municode.com)), an online platform that publishes local codification of municipal legislation for every state. Since communities must pay a membership fee to have their codes posted to Municode for free public access, not all community ordinances are available on Municode. We focused only on the municipal level of government; therefore, we excluded county and parish ordinances as well as communities which were not incorporated places as listed in the U.S. Census. In total, 678 communities in Municode satisfied the sampling criteria. To create a manageable sample size for qualitative data analysis, we set sampling intensity to 10% of communities listed in Municode for each state (Table 1). Though numbers of samples were sufficient for five states (AL, GA, LA, NC, and SC), 10% sampling intensity yielded less than four samples for AR, MS, and TN. Therefore, the least sample size of five states (i.e., eight from SC) was set as a minimum threshold for AR, MS, and TN (Table 1). Given the minimum threshold, we sampled 83 out of the 678 communities.

**Table 1.** Total number of communities represented in Municode and the corresponding adjusted sample size selected by state.

States	Communities Listed in Municode	10% Sample Size	Adjusted Sample Size
Georgia	214	21.4	21
North Carolina	119	11.9	12
Louisiana	93	9.3	9
Alabama	90	9.0	9
South Carolina	84	8.4	8
Mississippi *	37	3.7	8
Arkansas *	24	2.4	8
Tennessee *	17	1.7	8
Total	678		83

\* States with a minimum threshold of eight communities.

We next selected communities based on population size to ensure a reflection of large, medium, and small communities. Reflecting Kuhns et al. [13], we created three population categories of residents: (1) less than 10,000, (2) 10,000 to 50,000, and (3) more than 50,000. The number of sample communities to each population stratum was allocated by multiplying the proportion of communities in that stratum with the total number of samples for each state (Table 2). Finally, we used the Microsoft Excel RAND function to randomly select communities for each population category.

**Table 2.** Final sample size by state and population stratum.

States	Small (<10,000)	Medium (10,000–50,000)	Large (>50,000)	Total Number of Communities in Each State
Georgia	14	6	1	21
North Carolina	7	4	1	12
Alabama	4	4	1	9
Louisiana	6	2	1	9
Arkansas	1	4	3	8
Mississippi	1	6	1	8
South Carolina	5	2	1	8
Tennessee	1	4	3	8
Total	39	32	12	83

## 2.3. Data Collection and Analysis

We collected data in the years 2019–2020 and involved two phases. First, we identified ordinance chapters addressing vegetation, including trees, in each municipal code. Second,

we involved querying the entire code using words such as vegetation, trees, plants, landscapes, grass, weeds, and shrubs to identify vegetation and tree regulations that lacked specific standalone chapters but were presented under other chapters and sections. We used qualitative content analysis and NVivo (QSR International 2017) software to observe differences and similarities among ordinances. Content analysis is a research method used for interpreting text-based information with a systematic procedure of coding and identifying themes or patterns [19]. Widely used in the social sciences, it is a fundamental tool for examining collected government documents [20]. Following Berg and Lune [21], we formulated codes based on identification and analysis of keywords, sentences, phrases, and purposes of ordinance sections. Codes were then constructed into themes and sub-themes of data. We sorted these themes and sub-themes based on similar phrases, patterns, relationships, and commonalities or disparities. Data representing these themes are presented as quotes in the results.

### 3. Results and Discussions

#### 3.1. Organization of Ordinances

The proper organization of vegetation ordinances in Municode aids in quick and easy access of existing laws to local policymakers and stakeholders. In this study, we found large variation in the location of vegetation ordinances in Municode. Some vegetation ordinances were in the body of codes while others were in the codes' appendices. For example, one (medium) community included two sections and one article within an appendix. One section was entitled 37-14—*Landscape and Tree Protection* under the article XXXVII.—*EASTERN SHORE PARK OVERLAY DISTRICT GENERAL PROVISIONS*. Another section was entitled 39-14—*Landscape and Tree Protection* under the article XXXIX.—*JUBILEE RETAIL DISTRICT OVERLAY*. In addition to the aforementioned articles, the code included a stand-alone article: *ARTICLE XIX.—LANDSCAPE STANDARDS AND TREE PROTECTION*. Similarly, other vegetation ordinances were located within multiple chapters within the body of the code. For example, one (large) community addressed two vegetation articles under the two chapters of *Landscaping and Tree Protection* and *Parks, Recreation, and Cultural Affairs*. Another (small) community mentioned its three vegetation articles within three separate chapters: (1) *Street, Sidewalks, and Public Places*, (2) *Environment*, and (3) *Zoning*. By contrast, most communities addressed vegetation ordinances within a single chapter, but not necessarily a chapter devoted solely to vegetation. For example, commonly found single chapters were under the topics of *Environment*; *Streets, Sidewalks, and Public Places*; *Trees*; *Buildings and Building Regulations*; *Nuisance*; *Parks and Recreation*; *Boards, Commissions, and Committees*; *Administration*; *Landscaping*; and *Zoning*. In some cases, communities lacked standalone vegetation ordinances, but regulations related to vegetation were found scattered in multiple sections of the code. For instance, one (small) community addressed vegetation regulations in two sections of the code: (1) *Sec. 109-229.—Street Trees* and (2) *Sec. 49.—Trees in Public Places*.

The unsystematic placement of vegetation ordinances in Municode is an important finding, consistent with Zhang et al. [15]. The presence of vegetation ordinances in an appendix section demonstrates the poor understanding of code placement in the ordinance because an appendix, by definition, is supplementary information. Ordinances related to vegetation could be organized under the broad chapter titles of “vegetation” or “environment” in the code section of Municode.

#### 3.2. Variations in Terminology and Lack of Clarity in Ordinance Language

The language and words used plays an important role in the formation of any policy. They provide the basis for interpreting the meaning of laws and provisions stated. Despite this knowledge, the meaning of words used in legal documents are not always apparent [22]. In this study, we identified ambiguous language in tree topping and tree removal provisions of vegetation ordinances. While a number of ordinances stated, “tree topping of all public trees is prohibited”, one (medium community) ordinance addressed tree topping provisions

as “the practice of topping a tree for growth control is prohibited” leading to the idea that topping was acceptable for some objectives (e.g., minimize risk of failure or reduce tree height). Growth controls are the key words that lead to ambiguity in the clause and are open to subjective interpretation. Regarding tree removal, one (medium community) ordinance indicated, “If the tree is removed from the city’s right-of-way, easement, or servitude, an appropriate species of tree shall be replaced if space is available ( . . . )”. The provision would be clearer if it were to specify tree replacement with the appropriately sized tree at maturity based on the available space. Ordinances like this may not achieve the overall goals of ordinances as it lacks the basic standards for performance [10]. In addition, unspecific ordinance provisions (e.g., appropriate species) may not be enforceable. The existence of such ambiguity or vagueness in ordinances could refer to various reasons. For example, Jakes et al. [23] found policy makers write ambiguous language intentionally to provide flexibility to implementers, while Matland [24] stated conflict between policy makers leads to compromise and thereafter ambiguousness in policy.

By comparison, other tree topping and pruning practice provisions included encouraging verbiage. In one example regarding tree topping, an (medium community) ordinance stated, “The practice of tree topping is strongly discouraged on all public trees and as a tree care practice for private trees”. In another example regarding pruning practices, an (medium community) ordinance wrote, “The city shall make every effort possible to prune public trees as necessary to encourage healthy form and resistance to breakage”. In these instances, both “strongly discouraged”, and “every effort” reflects encouraging verbiage in one way, and signals communities’ concerns regarding negative consequences of tree topping (e.g., disfigures the tree, excessive crown removal limits the food-making capacity of tree-leading to tree starvation, rapid growth of weak limbs and branches, vulnerable to insects and decay, and in some cases leading to tree death) and advantages of pruning practices (e.g., promotes plant health, fruit production, and growth control; provides good appearance and adds value to the adjacent property), respectively, while on the other hand, these provisions are subjective.

Language involving ordinance enforcement was a common limitation with a few exceptions. In very limited ordinances with enforcement clauses, the person and/or department responsible for enforcing the article varied. For example, some ordinances indicated director of public works, city departments, mayor, planning department director, and urban environment officer as their enforcement officers, while others noted city building and neighborhood services department; city building and zoning department; city arborist, department of community’s services, and city park commission. However, in one extreme case, an (medium community) ordinance gave the authority of right-of-way (ROW) tree pruning decisions on private property to the police: “The city shall have the right to prune any tree or shrub on private property ( . . . ). The discretion to prune such trees or shrubs is vested in the chief of police”. Most municipal tree care programs-maintained trees in the ROW, but the authority lies with someone more familiar with tree management or infrastructure maintenance than the chief of police. This shows that some municipal ordinances provide numerous authorities to enforce tree management tasks (e.g., tree pruning) while some are much more restrictive [25].

Clear, specific, and measurable ordinance objectives are important so provisions can be assessed after a period of enactment; however, such characteristics were fairly uncommon in the sample. For example, one (large) community stated the purpose of the ordinance was “To establish and maintain the maximum sustainable amount of tree cover on public and private lands in the city”. In another (small) community, the overall purpose of the ordinance was “To promote tree conservation, the increase of tree canopy, and the protection of existing trees in the city”. These clauses, and other clauses that detail tree benefits in the objectives, would be more appropriate for an urban forest master plan than an ordinance. As local laws, ordinances should not manage the urban forest, but regulate behaviors that impact vegetation. The purpose clause of many communities appropriately stated



that the ordinance was adopted to provide requirements for planting, preservation, and maintenance of trees and vegetation on public and private lands.

### 3.3. Unique Provisions Identified in Ordinances

A minority of communities' ordinances contained provisions not commonly present across the region. These provisions were unique in the sense that they focused on urban and community tree management in terms of training and education ( $n = 3$ ), public input ( $n = 1$ ), guides used for tree board meetings ( $n = 1$ ), enforcement provision ( $n = 1$ ), and electronic record keeping of trees ( $n = 1$ ). We selected seven provisions to illustrate in this article. For example, some ordinances included a code of ethics as well as planning commission training for tree board members. These provisions may have referenced industry-accepted standards or guidelines. In addition, while most communities focused on several requirements that an individual should possess prior to serving as a tree board member, some communities emphasized professional credentials tree board members should fulfill following appointment to the board. One (small) community ordinance stated: "Each member must complete one hour of ( . . . ) the Code of Governmental Ethics per calendar year as per R.S. 42:1170 and each member must complete the planning commission training within one year of appointment ( . . . )". Providing additional knowledge and training to tree board members even after the appointment help succeed the urban forestry programs [26]. Many ordinances addressed state licensing, professional credentials, insurance, and bonding. However, only some communities specified expectations regarding professional qualifications, such as completing educational training. For example, as stated by one (medium community) ordinance:

"Each applicant shall attend educational training on basic tree science and the proper techniques of tree pruning; and/or shall demonstrate sufficient knowledge of basic tree science and the proper techniques of tree pruning ( . . . ). Requirements to procure a business permit ( . . . ) shall include attendance at, and completion of, an arborist training program approved by the city, with subject matter being related to cutting, pruning, trimming, removing, spraying, or otherwise treating trees".

Notably, some ordinances (medium and large communities) stated a specific objective of educating residents regarding trees benefits. As stated, the ordinance aims "To encourage public education about trees and their value to the community". This is an illustration of communities using ordinances as a means to educate public. Likewise, related to public input was another uncommon finding concerned with residents' rights regarding tree care. In many sampled communities, all rights regarding public tree care and management were given solely to municipal departments. One (medium) community ordinance specifically encouraged the public to look after public and private trees. The ordinance stated: "( . . . ) All city employees and the general public have the right and are encouraged to report any trees within the city limits that are in need to be protected, maintained, or removed to the designated city authority ( . . . )". This is an example of an ordinance integrating public participation into the code of law. Such provision should be emphasized in many ordinances because ordinances integrating public participation are more successful in achieving its objectives [15].

Another rare provision was the introduction of Robert's Rules of Order to be employed in tree board meetings. Robert's Rules of Order are a widely used guide in the U.S. for governing meetings and making group decisions [27]. With one (large community) exception, ordinances did not mention the procedure to be follow in tree board meetings, which can result in confusion and inefficiencies. The exception stated, "The tree board shall adopt Roberts Rules of Order as its rules of procedure and shall keep records of the applications and the actions, which shall be a public record".

One (large community) ordinance stated a very exceptional provision regarding its enforcement. While the majority of sample ordinances lacked enforcement provisions, this ordinance included the provision of designating alternative personnel to work as an enforcement officer under the absence of the main designated personnel. As stated by

that ordinance: “The UEO [Urban Environment Officer] shall cause the provisions of this chapter to be enforced. In the UEO’s absence, these duties shall be the responsibility of a qualified alternate designated by the City Manager”. This community gave the impression of strong concern for enforcing the article. Ordinances with enforcement officers specify ways of monitoring compliance with laws. In addition, the objective of many ordinances—to promote the health, safety, and welfare of community citizens—can be achieved through the proper development and enforcement of ordinances [9].

A final unique provision was the requirement of electronic record keeping of all trees maintained, planted, and removed within the community. As stated by one (medium) community: “Maintenance records: The day after this ordinance is adopted, the designated city authority shall start and maintain electronic records of all trees that are maintained within the city limits. Records shall include the following minimum information: Species, location, name of person that planted the tree, date tree was planted”. “Removal records: The day after this ordinance is adopted, the designated city authority shall start and maintain electronic records of all trees that are removed within the city limits ( . . . ). Species, location, name of person that removed the tree, date tree was removed”. “Planting records: The day after this ordinance is adopted, the designated city authority shall start and maintain electronic records of all trees that are planted within the city limits ( . . . ). Species, location, name of person that planted the tree, date tree was planted”. In some cases, the record keeping requirement was found in regulations dealing with tree fund/account finances (in lieu of contribution funds) and tree board meetings; however, electronic record keeping of all trees maintained, removed, and planted in the community was only found in a minority of ordinances. Provisions like this could exist as a reflection of a community that plans for future needs and could provide a good evaluation of various components of urban forest management. This is because the good record keeping of all trees in the community assists in recognizing poor practices that require improvement and good practices that needs to be sustained. It aids in identifying appropriate plant species for an area and monitors changes in the tree population. In addition, the electronic record keeping prevents accidental damage of tree information through natural calamities, theft, and rodents.

### 3.4. Loopholes in the Existing Ordinances

Duplication was commonly found among all sampled ordinances. Evidence of duplication included line-by-line and word-by-word duplication, duplication of clauses with only slight additions, deletions, or changes to some key words and phrases, paraphrasing and/or writing different section headings but duplicating the associated provisions, and replicating the same provisions within the same article. Duplication occurred in new ordinances as well as revisions of established ordinances. Unsurprisingly, duplication was higher among communities within the same state rather than across the states. For example, two communities within one state had the same language for the goal of the ordinance: “( . . . ) to promote and protect the public health, safety, and general welfare of citizens and visitors by providing for the development of a community forestry plan to address the planning, maintenance, and removal of public trees within the city in order to promote the benefits of our community forest resources”. These communities were characterized by small and medium-sized populations, respectively.

In another case, communities of two neighboring states closely duplicated eight sections of vegetation ordinances between two communities across the states. Sections included: spacing of street trees, distance from curb and sidewalks, distance from street corners and fireplugs, proximity to utilities, public tree care, pruning corner clearance, interference with city, and review or appeal. For example, a (medium) community in State A indicated,

“Sec. 24-78.—*Distance from curb and sidewalk*: The distance trees may be planted from curbs or curb lines and sidewalks will be in accordance with the three (3) species size classes listed in section 24-77, and no trees may be planted

closer to any curb or sidewalk than the following: Small trees, two (2) feet; medium trees, three (3) feet; and large trees, four (4) feet.”

This can be compared with a (small) community in State B:

“*Sec. 78-35.—Distance from curb and sidewalk:* The distance trees may be planted from curbs or curb lines and sidewalks will be in accordance with the tree species size classes listed in section 78-33, and no trees may be planted closer to any curb or sidewalk than the following: small trees, two feet; medium trees, three feet; and large trees, four feet.”

Language between these two examples is similar, except the word, “three” and “tree” and the way spacing distances are written. Duplication such as illustrated here is not necessarily a bad thing, as long as the unique contexts and needs of each community are taken into account, and the ordinance is not simply a nominal policy instrument. Such existence of duplication in vegetation ordinances could be due to the similarity in geographical, social and cultural characteristics among communities across the south.

Several decades ago, Weber [12] and Profous [28] suggested that municipal tree ordinances were rarely copied. Nevertheless, Head [17] found that many communities in Georgia used Fulton County’s (where most of Atlanta is located) tree ordinance as a template, possibly without fully considering how social and physical differences necessitate unique code. Our findings also demonstrate a substantial amount of duplication, suggesting that over time, possibly due to increasing urbanization, communities rushed to develop ordinances leading to problems with their design.

Some ordinances included the same text under different heading titles within the ordinances. In some cases, the content of the text did not reflect the title. For example, the text “Nothing in this article shall be deemed to impose any liability upon the city, its officers or employees, nor to relieve the owner of any private property from the duty to keep any tree, shrub, or plant upon any street area on his property or under his control in such condition as to prevent it from constituting a hazard or an impediment to travel or vision upon any street, park, pleasure ground, boulevard, alley or public place within the city” was placed under both “*Liability*” and “*Scope of Article*”. It seems the “*Liability*” section would be a better fit than “*Scope of Article*”. These sections were characterized in ordinances from two medium-sized communities.

Among the several themes that we classify as loopholes were sections within the same ordinance directly contradicting themselves. For instance, one (small community) ordinance stated that the scope of an article was limited to private property, i.e., “*Sec. 27-21.—Scope:* The provisions of this article shall apply to Oaks, Magnolia, Cypress, Sycamore and Cedar trees within the city limits of the City of ( . . . ), on all privately-owned property”. However, the same ordinance also included one section that dealt with public trees, i.e., “*Sec. 27-26.—Trees on public property:* All trees of any kind, regardless of size, located on public property belonging unto the ( . . . ) shall not be removed, cut down nor destroyed except upon action of the city manager ( . . . )”. Since the section “scope” in ordinances refers to the jurisdiction covered by the provisions in the article, the scope of the ordinance presented in the example was up to the trees owned on private property, but the article also included a provision for public trees, contradicting the scope of the article. Ordinances with such contradicting sections may struggle to achieve their goals or never accomplish them.

Finally, a few ordinances were not codified. Codification refers to collection and organization of regulations into a logical and systematic pattern [29]. One (small) community placed its updated ordinance on the Municode home page under the title “*Adopted Ordinances Not Yet Codified*” rather than in the appropriate code section. Under the said title, it was written as “This code of ordinances is up to date as indicated by the banner text above. Municipal codes may have received additional legislation, but it has not been posted for interim display and is not currently scheduled to be codified. Ordinance No. 24, Adopted 11/6/18. AN ORDINANCE AMENDING ORDINANCE NO. 24 REGULATING THE CUTTING AND REMOVAL OF TREES ( . . . )”. At the time of this study, the posting



was already more than a year old and still lacked codification. The lack of codification hinders the accessibility of ordinances for both authorities and the public. In addition, such inaccessibility could fail in determining policies that are contradictory, identical, and equivocal.

#### 4. Conclusions

We reviewed vegetation ordinances of 83 communities across eight states of the south-eastern U.S. Many of these communities referenced model ordinances, often developed by state forestry agencies and urban forest councils. These model ordinances provided a good starting point for designing a code that reflects the unique social and landscape contexts of each community [30]. Some vegetation ordinances were well-written, included distinct provisions that supported unique community needs, and well-organized in Municode, while others lacked important components and contained loopholes and ambiguities. Poorly written ordinances can be difficult to implement and may not yield desired outcomes [31].

The effectiveness of an ordinance depends on the presence or absence of key elements. For example, Bernhardt and Swiecki [10] mentioned five essential elements that should be included in ordinances to be considered as effective ordinances: clearly stated goals, the designation of responsibility, setting of basic performance standards, flexibility, and enforcement standards. Some of these components were rarely mentioned in our sample of ordinances. Many community ordinances stated very general goals (e.g., “to provide regulation or established standards for the planting, maintenance, and removal of trees, shrubs, and other plants within the city”). The goal of an ordinance should be the basis for interpreting its success [10]. Enforcement standards was another common issue (also see [17,32]). Public engagement and severability were also not commonly addressed, despite being recommended by most guidelines (e.g., [11]).

Unsurprisingly, the presence of vegetation ordinances in Municode depended upon community population size. Compared with their larger counterparts, communities with smaller populations were more likely to not have vegetation ordinances in Municode. Similar findings were observed by other studies [13,14,17,33,34]. This may be associated with fewer resources—particularly for urban forest policy—related to perceptions of low marginal return for such programs in small communities [33,35]. However, the systematic and proper placement of ordinances is essential for all communities regardless of size for the effective implementation of regulation.

Our findings showed the need for simplification of many ordinances to make them more understandable, actionable, and sustainable. For instance, the presence of minor errors in ordinances (e.g., typographical errors) illustrate the lack of careful reading of the ordinance before its adoption. As well, the quality of ordinances depended more upon its scope rather than the length and complexity of ordinances. For example, some vegetation ordinances included provisions for all vegetation types such as trees, shrubs, plants, and weeds, while few ordinances included provisions for weeds only. In such communities, management of weeds could be the major priority, but in the long term, a community should focus on holistic management of all vegetation types.

Findings of this study can help to overcome the issues that occur in many ordinances (e.g., inconsistencies, redundancies, and duplications). Local policymakers and municipal authorities can use the findings to make informed policy decisions for creating new ordinances and guide communities in the process of updating and revising ordinances. Cooperative Extension Services can disseminate these findings to educate stakeholders, such as local policy makers, municipal departments, and tree boards, which can mitigate possible weaknesses that might occur while developing effective enforcement mechanisms.

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