INFLUENCES OF COMMUNITY CHARACTERISTICS ON MUNICIPAL TREE ORDINANCES IN ILLINOIS, U.S.

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Abstract. While the overall objective of municipal tree ordinances is to provide safe and attractive community forests, the approach to addressing this issue varies profoundly among municipalities. This study explores the relationship between community characteristics and municipal tree ordinances using data from 151 Illinois communities. Results show significant correlations between ordinance provisions and community characteristics relating to wealth and education. Communities with higher mean income and level of education are more likely to have provisions biased toward the maintenance and protection of existing community trees, while communities where residents are less educated and poorer on average tend to have ordinances focused on community aesthetics and safety through resource improvement. Municipal governments, and the tree care professionals advising them, can use this information for guidance when revising or developing ordinances to match community preferences and objectives.

Key Words. Municipal tree ordinance; community; municipal forestry.

Tree ordinances are commonly enacted by municipalities to assign municipal authority, responsibility, and maintenance or management standards for trees on private and public land (Miller 1997; Bernhardt and Swiecki 1999). They are defined as regulations, authoritative rules, or laws of a municipal body that govern tree management beyond the limitations of federal and state statutes (Tereshkivich 1990). If properly developed and enforced, ordinances can promote health, safety, and welfare within the community (Abbey 1998). Tree ordinances also serve communities as vehicles to increase the likelihood of receiving funding through state and federal programs and to achieve recognition through the Tree City USA program (Fazio 1997, 1998).

Despite the existence of templates and guidelines for ordinance development, municipal tree ordinances (MTOs) are rarely similar among communities (Weber 1982). Following adoption of an ordinance, changes are enacted to better suit the social and biological structure of the community (Fazio 1997). In addition, Weber (1982) observed that ordinances, and resident attitudes toward ordinances, differ due to site characteristics, ethnic tradition, political and economic climate, and the legal framework of the community. Although attitude differences toward community forestry among demographic groups have been recognized, little academic research has addressed the relationship between community characteristics and tree ordinances (Abbey 1998).

MTOs differ not only among communities, but also among states and nations. Legislation in other nations differs considerably concerning management of trees on municipal land (Profous 1992). Within the United States, some states give municipalities greater sovereignty while others may be more restrictive or may authorize specific actions that may be performed by communities (Duerksen and Richman 1993). Because there are so many differences in laws underlying municipal tree ordinances, analysis must be carried out on a state-by-state basis.

Currently, at least 179 Illinois communities have adopted tree ordinances (Green et al. 1998). If present trends continue, interest and funding

opportunities for urban forestry initiatives are likely to increase over the coming years, spurring the adoption of tree ordinances by additional communities. In many cases, municipal governments that are developing new tree ordinances have based their work on ordinances already formulated by other communities with little regard for management priority, resource availability, or cultural differences. Although ordinances may eventually evolve to fit the community, this process often occurs at the unnecessary expense of time and money.

To help communities develop appropriate ordinances, the specific relationship between identifiable demographic characteristics and the nature of ordinance provisions must be better understood. Socioeconomic and demographic population descriptors may provide aggregate data characterizing human population distributions. In a natural resource context, fishery and game managers use community characteristic information to create profiles of selected constituency segments in order to develop responsive management programs (Hall 1998). Local governments chart changes and trends in community characteristic distributions over time to provide background for policy decisions and to evaluate overall performance (Tyler Norris Associates 1997). The present study compares community characteristics of 151 Illinois communities having municipal tree ordinances to determine if relationships exist between community population characteristics and the existence of explicitly stated provisions in their ordinances. This information can be used by other local governments in planning and implementing policies and regulations that will be compatible with community preferences.

METHODS

A list of 170 Illinois communities that have a municipal tree ordinance was obtained from the Illinois Department of Natural Resources (IDNR), Division of Forest Resources, Springfield, Illinois. Communities known to have a tree ordinance, but which did not have one on file with the IDNR, were contacted to obtain a copy. All but 19 of the 170 contacted communities responded (88.8% response rate). The study included 151 municipal tree ordinances available as of July 2000. Presence or absence of 27 specific tree ordinance provisions was recorded for each community.

Community characteristic data were obtained from the U.S. Census Bureau 1990 census using ProFiler 3.01 software (Wessex, Inc. 1993). The range of values for each community characteristic variable was converted to a two-category ordinal variable by categorizing the values as being above or below the median. The median value was selected as the measure of central tendency most appropriate for dividing non-normally distributed quantitative data into categories for subsequent bivariate contingency table analysis (Green et al. 2000).

Data were analyzed using SPSS 8.0.0 (SPSS, Inc. 1997) to evaluate the relationship between community characteristic variables and presence or absence of tree ordinance provisions. Bivariate contingency table analysis with Chi-square test statistic was used (α=0.05) to accept or reject the null hypothesis of independence (Green et al. 2000).

RESULTS AND DISCUSSION

Illinois communities with tree ordinances were found to represent a wide range of community characteristics (Table 1). The study also found considerable differences between the number of specific provisions that are developed by the communities (Table 2). A majority of the communities with tree ordinances have specific provisions that require private property owners to care for trees adjacent to or located on their property, establish penalty fines for ordinance violations, regulate disease abatement, authorize municipal workers to enter private property, and establish and set guidelines for community tree

boards. Few communities have provisions that establish and set guidelines for tree care personnel, require licensed tree care operations, or set guidelines for emergency removals.

Table 1. Community characteristic variable data for Illinois communities with municipal tree ordinances used in this study (n = 151).

Community characteristic variable	Maximum	Median	Minimum
Total population	2,783,726	15,319	313
Annual per-capita income	$62,482	$15,715	$5,350
Average price of home	$500,001	$98,800	$14,999
Residents living below federal poverty level	29.66%	2.10%	0.00%
Unemployment	8.57%	2.00%	0.40%
Education: HS diploma or below	63.67%	33.55%	5.85%
Education: Some college or higher	73.87%	39.39%	12.40%
Residents owning home within municipality	31.55%	23.80%	8.48%
Single head of household	34.48%	17.75%	9.13%
Age: < 25	61.75%	34.92%	21.72%
Age: 25–65	60.33%	52.36%	30.74%
Age: > 65	27.89%	12.38%	3.01%
Race (% Caucasian)	100.00%	95.08%	1.05%
Gender (% Male)	54.47%	48.26%	44.36%

Community characteristic variables that were found to have strong associations with ordinance provision variables were education level, annual per-capita income, average price of home, unemployment rate, residents living under the federal poverty level, and total population (Table 3). This finding suggests that community wealth and education may have the strongest influence on the tree ordinance composition of the community. Gender and race variables showed a moderate number of significant relationships with the presence of selected provisions. Age categories, however, yielded varied results. The 65 or older age group yielded a large number of significant relationships, while the 25 to 65 age group produced moderate significant relationships. The 25 and under age group variable had no significant correlation with ordinance provision variables. These findings may be related to a stronger involvement by retired residents in local politics. The community characteristic variables that showed little or no significant correlation with provision variables were proportion of residents who owned their homes in the municipality and those living in a single-head household.

The municipal tree board (TRBD) provision variable had the greatest number of significant associations with community characteristic variables. Higher income, price of home, population, and attainment of higher education were negatively associated with the TRBD provision, while poverty, unemployment, and lower educational attainment were positively correlated. The community forester (FRST) and other tree care personnel (OTHR) provision variables showed positive correlation with higher education and average price of home variables, while negative correlation was found with lower education. Communities characterized by lower population levels and lower levels of educational attainment and income among residents also were more likely to have an arborist license (ARBL) provision, which is counter to the correlations found with the FRST and OTHR provisions. These relationships indicated that communities with wealthier and better-educated residents were more likely to employ professional personnel to make tree care decisions, while communities with poorer and less-educated residents were more likely to delegate management responsibilities to a volunteer tree board and contract a private tree care industry to perform tree care. This may be due to the inability of smaller communities with poorer residents to employ a professional official—thus forcing the community to pool volunteer resources of knowledge and authority.

The topping (TOPG), curb distance (CURB), and stump removal (STMP) provisions

Table 2. Percentage of Illinois municipal tree ordinances that contain specific tree-related provisions.

Provision variable	Abbreviation	% contained in ordinances
Requires property owners to care for trees in or invading right-of-way zones adjacent to their property	DUTY	80%
Guidelines regulating penalty fines for ordinance noncompliance	PNTY	63%
Requirements for abatement of diseased trees	DISE	62%
Guidelines regulating permits required for tree planting, maintenance, or removal	PRMT	58%
Authorization for public workers to enter private property for tree inspections, maintenance, or removal	PRVT	57%
Guidelines for enactment of a municipal tree board	TRBD	56%
Prohibits damaging actions or defacement of trees	DAMG	50%
Prohibits interference with tree care personnel	INTR	48%
Refers to a document outside the municipal code for tree Planting, maintenance, or removal specifications	RFRA	42%
Specifies minimum and/or maximum allowable distance between street trees	SPAC	40%
Specifies minimum and/or maximum allowable distance between street trees and intersections	CURV	38%
List of acceptable species for planting	GDSP	34%
Specifies minimum and/or maximum allowable distance between street trees and street curbs and/or sidewalks	CURB	34%
Guidelines regulating tree preservation	PRSV	33%
Guidelines specifying planting stock and/or planting technique	PREQ	30%
Planting and/or maintenance specifications for trees near utilities	UTLY	29%
Prohibition of topping	TOPG	29%
Authorization and guidelines for a community forestry education program	EDUC	27%
Requirement for utility companies to follow ordinance	COMP	25%
Guidelines for enactment of tree care personnel other than community arborist or forester	OTHR	25%
List of prohibited species for planting	BDSP	24%
Authorization for community to place lien on property for tree ordinance violations	LIEN	24%
Requires stump removal after felling of tree	STMP	23%
Requires tree care personnel to have an arborist license	ARBL	18%
Guidelines for enactment of a community arborist	ARBT	15%
Guidelines for enactment of a community forester	FRST	9%
Guidelines for emergency tree removal	EMGY	8%

were, in general, negatively associated with population, average income, average price of a home, and higher education but were positively correlated with unemployment and lower levels of education. This finding indicates that smaller communities with residents that have lower levels of income and education enact ordinances concerned with improving the present level of attractiveness and safety.

Preservation (PRSV) and prohibition of damages to trees (DAMG) provision variables were positively correlated with population, average income, average price of home, and higher levels of educational attainment, but negative associations were found with poverty, unemployment rates, and lower education levels. These provisions essentially make trees public property by requiring that tree preservation and replace-

Table 3. Correlations between community characteristics and municipal tree ordinance variables[z]

	Municipal tree ordinance provisions[y]																
	TRBD	INTR	STMP	TOPG	ARBL	CURB	UTLY	PNTY	PREQ	OTHR	FRST	LIEN	EMGY	DISE	DAMG	PRSV	PRMT
Average price of home									–	–	+	+	+	+	+	+	+
Education: = Some college									–	+	+	+	+	+	+	+	+
Annual per-capita income							–		–	–	–	+	+	+	+	+	+
Total population						–	–	–	–	–	–	–	–	–	+	+	+
Gender (male)				–	–	–	–	–	+	–	–	–	–	–	–	+	–
Age 25–65				–		–	–	–	+	–	–	–	–	–	–	+	–
Single head of household	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		–
Race (Caucasian)	+	–	+	+	+	–	–	+	–		–	–	–	–		–	
Age > 65	+	+	+	+	+	–	–	–		–	–	–		–	–		–
Residents below poverty level	+	–	+	+	+	+	–	–		–	–	–		–	–		–
Unemployment	+	+	+	+	–	–	+	–	–	–	–	–		–			–
Education: = HS diploma	+	+	+	+	+	+	+	+	–			–		–			

[z]$P < 0.05$; + = positive correlation, – = negative correlation, blank = no significance.
[y]Municipal tree ordinance provision codes are explained in Table 2.

ment be practiced during land development. The disease abatement (DISE) and planting requirement (PREQ) provisions also showed various positive correlations with higher education, income, and average price of a home. These correlations show that communities with wealthier and better-educated residents are more likely to create ordinances that improve or preserve the current condition of trees.

The presence of permit (PRMT) and property lien (LIEN) provisions were positively correlated with higher education, average annual income, and average price of a home. These findings suggest that communities with wealthier residents have transferred more authority from individual property owners to a municipal authority and have sufficient personnel and funding to run an extensive permit and penalty program. No significant correlations with community characteristic variables were found for the RFRA, DUTY, PRVT, EDUC, and COMP provision variables.

While communities may share similar ordinance provisions to address specific management issues, large differences exist in the actual standards established (Table 4). Communities may not always include references within the tree ordinance to other municipal ordinances, or documents outside the municipal code that are relevant to tree care, even though tree care may indeed be addressed in another document (Cooper 1996). Specifically, provisions that authorize personnel to care for trees and establish penalty fines can be found in sections of a municipal code that do not pertain specifically to trees. This may have impacted the number of observed correlations between community characteristics and municipal tree ordinance provision variables.

A closely related problem was that many of the communities in the study have arboricultural specifications manuals in which guidelines and regulations for tree planting, maintenance, and removals are specified. Keeping the manuals outside of the municipal code allows the guidelines and regulations to be flexible, incorporating changes without the engagement of a potentially slow community political process (Fazio 1998). Because information contained within these manuals was not reviewed in this study, the number and nature of correlations between community characteristic variables and some arboricultural specifications and guidelines may differ somewhat from the values expressed here.

CONCLUSIONS

Correlations between a community's characteristics and municipal tree ordinance content have been

Table 4. Municipal tree ordinance provision data.

Ordinance provision	Maximum	Median	Minimum	Mode
List of acceptable species for planting (# species)	103	28	6	21, 24, 32, 38[z]
List of prohibited species for planting (# species)	40	10	2	12
Maximum allowable distance between trees (m)	22.9	15.2	9.1	15.2
Median allowable distance between trees (m)	18.3	12.2	8.4	12.2
Minimum allowable distance between trees (m)	18.3	9.1	4.6	9.1
Minimum allowable distance between street trees and intersection (m)	30.5	10.7	4.6	10.7
Maximum allowable distance between street trees and street curbs and/or sidewalks (m)	1.5	1.2	0.5	1.2
Median allowable distance between street trees and street curbs and/or sidewalks (m)	1.2	0.9	0.9	0.9
Minimum allowable distance between street trees and street curbs and/or sidewalks (m)	4.6	0.6	0.3	0.6
Maximum penalty fines for noncompliance	$10,000	$500	$25	$500
Minimum penalty fines for noncompliance	$1,000	$25	$1	$25

[z]Four modes occurred between the range of 21 and 38.

identified. Community characteristic variables most commonly correlated with specific municipal tree ordinance provisions are education, poverty, unemployment, average income, average price of home, and total population. Larger communities, and those with wealthier and better-educated residents, are more likely to have provisions geared toward preservation and protection of existing community natural resources, consequently restricting the ability of home owners to make tree-related decisions on their own property. These communities are likely to have ordinances that enact and set guidelines for tree care personnel, since they have more economic resources to create and maintain such a position. The communities also have provisions that set stringent permits, and liens for penalties, to enforce wider municipal authority.

Smaller communities, and those with poorer and less-educated residents, are more likely to rely on a tree board to make tree-related decisions, since they have less area to cover and fewer resources to provide for a tree care position. These communities appear to be more concerned with improving aesthetics and safety, given that they tend to have provisions requiring various improvements to the visual and engineering aspects of tree care in the community.

This study represents a first step toward the development of guidelines for communities seeking to update or develop tree ordinances that strike the best balance between municipal government objectives, home owner rights and responsibilities, expense, staffing, tree care quality, municipal forest integrity, and cultural preferences. Recognizing the existence of differences in the attitudes, economics, and the physical structure among communities can help municipal leaders develop better tree ordinances. Specifically, further efforts along these lines can be useful for the development of a decision support system, using socioeconomics to aid communities embarking on the potentially time-consuming and contentious process of ordinance development or revision.

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Résumé. Alors que l'objectif général des directives municipales sur les arbres est de s'assurer de la sécurité et de la beauté des forêts urbaines, les approches pour y parvenir varient profondément entre les municipalités. Cette étude explore les relations entre les caractéristiques des communautés et les directives municipales sur les arbres au moyen de données provenant de 151 communautés de l'Illinois. Les résultats ont montré des corrélations significatives entre le financement et les caractéristiques de la communauté en relation avec la richesse et le degré d'éducation. Les communautés avec un revenu moyen et un niveau d'éducation plus élevés sont plus susceptibles d'avoir des fonds consacrés à l'entretien et la protection des arbres existants, alors que les communautés où les résidants sont en moyenne moins scolarisés ou fortunés ont tendance à avoir des directives orientées vers la beauté des lieux et la sécurité au travers de l'amélioration de la ressource. Les autorités municipales et les consultants professionnels en arbres qui les conseillent peuvent utiliser cette information comme guide lors de la révision ou du développement de directives qui conviennent mieux aux préférences et aux objectifs de la communauté.

Zusammenfassung. Während das übergeordnete Ziel kommunaler Baumverordnungen die Gewährleistung sicherer und attraktiver Stadtwälder ist, variiert die mit dieser Studie verbundene Zielsetzung zwischen den Kommunalverwaltungen ganz erheblich. Diese Studie erforscht die Beziehungen zwischen den kommunalen Charakteristiken und den Baumschutzverordnungen und stützt sich auf die Daten von 151 Gemeinden in Illinois. Die Resultate zeigen signifikante Relationen zwischen den Bereitstellungen für die Umsetzung der Verordnungen und den Charakteristika der Kommunen bezüglich Wohlstand und Bildung. Gemeinden mit höherem Einkommen und besserer Bildung haben mehr Verordnungen, die auf den Erhalt und den Schutz bestehender Bäume fokussieren, während Gemeinden mit durchschnittlich weniger Bildung und Reichtum dazu tendieren, die Verordnungen auf Verbesserung von Ästhetik und Sicherheit auszurichten. Die Kommunalverwaltungen und die professionellen Baumpfleger, die diese unterweisen, können diese Information als Anleitung nutzen, um solche Verordnungen zu entwickeln, die den Zielen und Vorstellungen der Gemeinden gerecht werden.

Resumen. Mientras el objetivo principal de una ordenanza municipal para los árboles es proporcionar bosques seguros y atractivos, la aproximación de este estudio varía entre municipalidades. Se explora la relación entre las características de las comunidades y las ordenanzas municipales para los árboles usando datos de 151 comunidades de Illinois. Los resultados muestran correlaciones significativas entre las ordenanzas y las características de las comunidades relacionadas con salud y educación escolar. Las comunidades con alto nivel medio de ingresos y niveles de educación escolar están más inclinadas a la protección y mantenimiento de los árboles existentes, mientras que las comunidades donde los residentes son menos educados y más pobres tienden a buscar recursos para el mejoramiento de los árboles. Los gobiernos municipales y las compañías de cuidado de los árboles pueden utilizar esta información para orientar sus campañas y así armonizar los objetivos y las preferencias de la comunidad.