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Assessing local planning capacity to promote environmentally sustainable residential development

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Smart growth and sustainability planning have, in recent years, become central issues in planning discourse. Scholars have argued that planning capacity at the local government level is critical for smart growth planning, and that planners have a fundamental role to play in advancing local and regional sustainability. In this paper, we investigate the extent to which local planning capacity enables communities to promote more sustainable, smart growth residential development. Based on a 2013 survey of 38 county and 53 municipal governments in the state of Wisconsin, USA, this study finds that the majority of the sample communities have permitted residential developments characterized as transit-oriented, New Urbanist, mixed use, infill developments, or conservation subdivisions as alternatives to low-density, automobile-dependent conventional developments. The study also finds that jurisdictions with higher planning capacities are more likely to overcome significant barriers to more sustainable residential development.

Keywords: sustainability; smart growth; conservation subdivisions; planning capacity; environmental impacts of land development

1. Introduction

Land development regulations and practices during the second half of the twentieth century created countless low-density, automobile-dependent residential landscapes within and beyond the urban–rural fringe in the United States. Smart Growth America, a coalition of national, state, regional, and local organizations that includes the American Planning Association (APA), responded to the negative social, economic, and environmental consequences by embracing sustainability and smart growth planning. At the regional scale, smart growth and sustainability planning strive to direct development away from rural and natural areas into existing settlements and aim to create location-efficient neighborhoods that have a mix of land uses and are higher density, walkable, and transit-accessible (Hawkins 2011; Talen and Knaap 2003). At the site scale, sustainable development planning includes clustering of residences and infrastructure, best management practices for stormwater runoff, and energy-efficient building design (Dunham-Jones and Williamson 2011; Randolph 2011).

The urban planning profession plays a central role in shaping the built environment and mitigating the environmental, economic, and social impacts from land development. Consequently, planning capacity at the local government, where the review and approval of most land planning activity takes place, is critical for advancing community and

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regional sustainability (Asikainen and Jokinen 2009; Conroy and Berke 2004; Jepson 2004). It is local planners who prepare and defend land use and comprehensive plans that determine how their community should grow. It is local planners who make a case for creating and revising their community's land-use policies and regulations, including zoning ordinances. It is local planners who review development proposals and present their recommendations to accept, revise, or deny to plan commissioners, the public, and municipal and county councils. It is also local planners who often facilitate community deliberations that shape their communities and residential neighborhoods.

This article contributes to the literature on local planning capacity and sustainability planning by investigating residential planning practices in Upper Midwest communities of the United States. The particular contribution of this work is the expansion of the concept of 'planning capacity' – which, in earlier studies, has been conceptualized primarily as the presence of local government planning staff – to include planners' perspectives on sustainability and on the environmental performance of different development patterns and techniques.

2. Sustainability and smart growth planning

Empirical research on sustainability and smart growth planning has attempted to uncover the extent to which land planning agencies engage in sustainability planning and to explain why some communities engage in sustainability planning while others do not. A significant portion of these studies has concentrated on sustainability as a comprehensive plan framework (Conroy and Berke 2004), the incorporation of smart growth principles and policies in comprehensive and land-use plans (Brody, Carrasco, and Highfield 2006; Edwards and Haines 2007; Gurran, Gilbert, and Phibbs 2015; Jepson 2004), and the integration of sustainability and smart growth principles in zoning ordinances (Jepson and Haines 2014; Talen and Knapp 2003). Finding great variability in the degree to which communities integrate smart growth and sustainability principles in their plans and ordinances, these authors emphasize the importance of local planning capacity, as well as community characteristics and land development pressures on sustainability planning. Within this context, we discuss the role of development pressures, other community characteristics, and planning capacity in shaping sustainability planning at the local government level.

2.1. Development pressures

Many environmental management and planning initiatives have resulted from significant threats to critical local and regional resources. For instance, the urban growth boundary concept, a signature feature of the growth management program of the state of Oregon, was developed in response to significant losses of agricultural lands in some of the most fertile areas in the state. Similarly, the state of Florida's growth management program was influenced by rapid population growth and resulting threats to the state's resources, including the Everglades. Facing growth pressures, local governments, just like state governments, may respond with initiatives to protect natural resources and encourage sustainable development. Gurran, Gilbert, and Phibbs (2015), for instance, determined that land development pressures were positively associated with environmental sustainability policies in local plans among Australian communities and suggested that communities were likely responding to these pressures. Likewise, in a study of comprehensive plan quality for ecosystem management, Brody (2003) identified

increased human disturbance, including urban development, as the most significant driver of plan quality in Florida communities.

2.2. Community characteristics

In addition to development pressures, other community characteristics can significantly influence sustainability planning efforts. For instance, communities with sizeable populations and fiscal resources can provide the necessary infrastructure (e.g., transit service) to implement smart growth and other sustainable land development. Supporting this view, Opp, Osgood, and Rugeley (2013) and Lubell, Feiock, and Handy (2009) found city size to play a significant role in the adoption of sustainability policies throughout the USA and California, respectively. Both studies found that sustainability efforts were pursued to a greater extent by larger communities. Portney (2013) and Lubell, Feiock, and Handy (2009) further identified significant positive associations between wealth of the community and sustainability policy adoption. Similarly, communities in metropolitan areas may have access to resources (e.g., workshops, regional coalitions); evidence exists of an association between metropolitan status and sustainability policy adoption (Svara, Watt, and Jang 2013). Higher education level of residents may be associated with greater awareness of the environmental impacts of unsustainable development patterns and concern for the environment, which can result in support for community-based environmental protection and sustainability programs. A positive association has been shown between higher education and sustainability policy adoption (Opp, Osgood, and Rugeley 2013; Svara, Watt, and Jang 2013). Finally, community values toward the environment can be instrumental in getting sustainability and smart growth policies adopted and proposals approved. Stokes *et al.* (2010), for instance, identified community values as the most important driver of biodiversity conservation in comprehensive plans in the Seattle metropolitan area.

2.3. Planning capacity

The International City/County Management Association has recently declared: "Sustainability is a familiar concept to local government professionals, many of whom trace its roots to the values and considerations inherent in the practice of community planning. [Planners] are familiar with approaches to development that weigh long-term impacts as well as near-term benefits" (ICMA 2007, 1). The presence of a local government planning department with professional planners suggests that experienced staff are available to complete necessary tasks related to land development and planning for their communities. These tasks include the assessment and effective communication of the benefits and impacts of alternative development proposals and the preparation and revision of state-of-the-art comprehensive plans and land-use regulations.

Yet local government land-use plans, policies, and institutions vary widely in the United States, particularly across urban-to-rural gradients; some communities may complete land planning activities without a planning department or someone trained in planning, and others may do so without a comprehensive plan or with outdated ordinances. Moreover, planning staff or officials may not possess the necessary knowledge in a particular domain – for example, the ecological impacts of development – and consequently may adopt unsustainable land development policies and practices (Norton 2002). Similarly, planning professionals may not hold strong pro-environmental values or attitudes, making it less likely for them to seek information on environmental

issues and sustainability planning, and ultimately making it less likely for them to engage in sustainability planning (see De Young 1993; Stern 2000). Typically, land planning and development of best practices are implemented unevenly over space and time, reflecting differences in knowledge, skills, and decision-making processes, and resulting in heterogeneous patterns in the physical structure and ecological function – or sustainability – of the resulting built environments.

In prior research, Hawkins (2014a, 2014b) demonstrated that the presence of professional planners on municipal staff in Massachusetts communities was associated with communities' decisions to adopt smart growth and sustainability-related zoning ordinances. Brody, Carrasco, and Highfield (2006) found that planning capacity, conceptualized as the number of staff devoted to writing the community's comprehensive plan, helped explain the adoption of sprawl-reduction planning policies in southern Florida communities. In a nationwide survey of large cities, Jepson (2004) found that planning leadership in municipal sustainability efforts was a significant factor in the adoption of sustainability-related policies. Although Saha and Paterson (2008) did not investigate planning capacity specifically, they found 'lack of knowledgeable staff' to be one of the three most significant barriers to the adoption of sustainability principles, according to respondents who oversaw planning in medium and large US cities.

3. Conceptual framework

Examining the integration of sustainability and smart growth principles into communitywide plans and policies – the framework used in most prior research studies – has important value. Adopted plans and zoning ordinances are essential tools for policy implementation. Yet plans and policies are not always implemented due, for instance, to the lack of public support. Moreover, a proposed development that is inconsistent with the existing zoning ordinance may get approved (i.e., permitted) through a variance or conditional use permit. For that reason, the implementation of sustainable land development and smart growth practices warrants investigation, although conducting this type of study at a regional, statewide, or national scale is generally infeasible, since it is difficult to obtain the necessary data (e.g., building permits, plan commission minutes, and on-the-ground site design, and construction outcomes). Still, local planners can provide information about implementation based on their first-hand knowledge of their jurisdictions. We realize that planners may not have direct knowledge of each recent residential development in their community if they have recently come to their current position in the jurisdiction. However, we believe that individuals overseeing planning activities would be familiar with recent residential development activity in their communities even if they were not directly involved in the permitting of those developments.

In this study, we examine sustainability planning in local government. In our investigation, we use the term 'sustainability' in a narrow sense, focusing primarily on its environmental aspects. We further narrow our focus to the local government review and permitting of sustainable residential developments. Sustainable residential developments are fundamentally different from most residential development within and beyond the urban–rural fringe in the United States. Their impacts on wildlife habitats, prime farmlands, ground and surface water resources, and nonrenewable resources are lower than those of low-density, automobile-dependent residential development patterns (Hansen *et al.* 2005; Johnson 2001).

We add to the literature on planning capacity and sustainability planning by providing evidence of planning action (i.e., permitting activity) and possibly implementation (i.e., construction of sustainable residential developments). We conceptualize planning capacity to include the presence and characteristics of a planning department and the individual overseeing planning activities including his/her environmental values, attitudes, and knowledge. We believe that planners' values, attitudes, and knowledge on the environmental performance of different residential development types, for instance, influence their assessment of development proposals and, ultimately, their approval recommendations to local decision-makers. We also believe that plans and ordinances help communities implement sustainable residential practices; thus, we incorporate the regulatory context into our conceptualization of planning capacity.

We hypothesize that planning capacity is significantly associated with community permitting and implementation of sustainable residential developments and that communities with higher planning capacity are more likely to plan and implement sustainable residential development than those with lower planning capacity. We also hypothesize that communities experiencing significant development pressures and those that are large, affluent, and highly educated are more likely to implement sustainable residential development than those with low or no development pressures and those that are small, and are not affluent or highly educated.

4. Methods

4.1. Study area

In this study, we examine the relationship between planning capacity and environmentally sustainable residential land planning in the state of Wisconsin (USA), where land development is regulated primarily by city, village, or town governments. However, most counties have planning and zoning authority within their unincorporated jurisdictions (i.e., towns). As in the rest of the USA, Wisconsin municipal and county governments do not plan site-specific developments, but rather review and permit developments proposed by land developers. In Wisconsin, a state that lacks strong regional planning authority, local governments have substantial autonomy in shaping the built environment through the land development permitting and approval process.

In Planning for Smart Growth, the APA categorized Wisconsin among the states implementing moderate to substantial statewide reforms (APA 2002). Yet, the state's Comprehensive Planning Law of 1999 does not mandate growth management, adoption of a comprehensive plan, or the promotion of smart growth in comprehensive plans. It does, however, mandate comprehensive plan adoption if a county or municipality wants to administer zoning, subdivision, and official map ordinances, and these ordinances must be consistent with adopted comprehensive plans. The law also required University of Wisconsin – Extension (UWEX) to prepare two model ordinances, one for conservation subdivisions and another for traditional neighborhood developments, which UWEX subsequently prepared (see Ohm 2000; Ohm, LaGro, and Strawser 2001). In addition, the law required all cities and villages with a population of at least 12,500 to adopt traditional neighborhood development ordinances (based on the ordinance prepared by UWEX), but it did not require an enforcement mechanism.

Moreover, other statewide policies work to counter the principles of smart growth and sustainable development in Wisconsin. For instance, state policy changes over the past three decades have encouraged the broad use of advances in on-site wastewater treatment

technology, which have decreased the influence of soil permeability, depth to bedrock, and depth to water table on residential development locational decisions. Consequently, these policies have helped facilitate scattered, low-density residential development in rural landscapes across the state (LaGro 1996, 1998). In addition, in 2011, the state repealed legislation authorizing Regional Transit Authorities that coordinate the planning, development, and operation of regional transit systems.

Following the Comprehensive Planning Law, conservation subdivision design (CSD) principles and implementation strategies were presented at several events organized by the Wisconsin Chapter of APA. Even prior to the Comprehensive Planning Law, the Southeastern Wisconsin Regional Planning Commission promoted conservation subdivisions with its own model ordinance (SEWRPC 1996) and in its regional plans since then. Perhaps as a result of these efforts, Wisconsin is estimated to rank second nationwide in the area of land developed as conservation subdivisions (Milder and Clark 2011).

While a comprehensive study on conservation subdivision implementation exists for one Wisconsin county (see Göçmen 2014), there is only one statewide investigation of sustainability and smart growth planning in Wisconsin. Edwards and Haines (2007) evaluated 30 local comprehensive plans of small communities and found that the smart growth goals most often addressed and articulated included the preservation of open space, farmland, and critical environmental areas, followed by the creation of a range of housing choices and opportunities. The incorporation of smart growth goals and associated policies varied greatly across the plans evaluated, with significant differences between incorporated and unincorporated jurisdictions; towns scored lower than cities and villages on the extent to which their plans emphasized smart growth policies.

4.2. Survey of Wisconsin communities

This research is based on a survey conducted in the summer of 2013 by the lead author and a research assistant. The sampling frame consisted of 72 counties and 174 municipalities (95 cities, 43 villages, and 36 towns) with a population of 5,000 and above. We sent a web-based survey to the directors of the planning departments in each unit of government. In the absence of a planning department, we approached the director of a closely associated department, the administrator, or the clerk, and asked whether they themselves were the most knowledgeable about planning in their jurisdiction; if the answer was no, we asked for the name and contact information of the most knowledgeable individual. We followed up with non-respondents by resending the survey up to three times. One hundred and thirty-eight individuals responded to the survey, a 56% overall response rate. Sixteen of these submitted surveys were deemed invalid; therefore, in our investigation, we used surveys of 122 governments representing 50% of the sampling frame. This total includes 38 counties (53% response rate), 47 cities (49% response rate), 17 villages (40% response rate), and 20 towns (55% response rate).

The survey included questions to ascertain key attributes of the communities and the professionals overseeing planning practices (hereafter termed ‘planners,’ but this category may include zoning administrators, clerks, administrators, engineers, and others):

- Residential planning activities (e.g., permitting of sustainable residential developments in the jurisdiction; barriers experienced in permitting these developments);

- Sustainability-based efforts, goals, and values (e.g., importance of environmental sustainability to the respondent and jurisdiction);
- Planning department characteristics (e.g., presence of a planning department, number of staff, training background of staff);
- Background of the respondent (e.g., position within the agency, degree obtained, familiarity with different certification programs in sustainable neighborhood developments);
- Attitudes about the environmental impacts of low-density, automobile-dependent residential developments;
- Environmental knowledge (e.g., regional benefits of alternative residential development patterns over conventional developments).

Our analysis, which is based on the planners' accounts, focuses on the permitting of five residential development types that reflect sustainability and smart growth principles. These residential developments are as follows:

- *conservation subdivisions* (where residences are clustered in smaller lots and the remainder of the subdivision land is preserved as shared open space);
- *transit-oriented developments* (which are located within walking distance of a transit stop and consists of high-density residential uses mixed with commercial uses);
- *New Urbanist developments* (which incorporate principles of traditional neighborhood design; neighborhoods with a range of housing options, complete streets, and amenities within walking distance, with late nineteenth- and early twentieth-century building design standards);
- *mixed-use developments* (which combine residential development with other uses, such as commercial);
- *infill developments* (development of vacant areas in already developed neighborhoods or suburbs).

We asked the respondents to identify the highest level of community action, for each development type, from the following choices: (1) 'we have not discussed,' (2) 'we have discussed,' (3) 'we have discussed and approved,' (4) 'land preparation complete in one or more developments,' and (5) 'residential units constructed in one or more developments.' We concluded that communities engaged in sustainable residential development planning if they approved (i.e., permitted) these types of development, even if these developments were not yet built at the time of the survey. In our discussion of the findings, 'permitting' also includes any construction in a development (i.e., action levels 4 and 5).[1] Depending on the level of action selected, the respondent was also asked to identify barriers they faced in permitting that development type in their community.

4.3. Contextual variables

For each community included in our study, we used decennial Census data to obtain population and housing information, as well as 2010 American Community Survey data to obtain income and higher education information for the municipalities and counties. For metropolitan status, we used the US Department of Agriculture's categorization of counties on a rural to urban continuum. In addition, we used National Land Cover Data to

calculate the percentage change in agricultural and forested land between 1992 and 2011 for each jurisdiction and the percentage of urbanized area in 1992 for each municipality. Finally, we used a proxy measure for community values from the survey: the importance of environmental sustainability for the jurisdiction.

4.4. Data analysis

In the analysis of sustainability planning, we examined the permitting activity of conservation subdivisions and transit-oriented, New Urbanist, mixed-use, and infill developments. The latter four types embody multiple smart growth principles by creating places that are walkable and accessible by different transportation modes, that have mixed land uses and compact building design, and that preserve open spaces, farmland, and critical environmental resources. Conservation subdivisions partially fulfill one of the smart growth principles: preserving open space, farmland, natural beauty, and critical environmental resources. They often require substantial land area (Göçmen 2014; Milder and Clark 2011) and therefore are more likely to be developed in the rural–urban fringe and in unincorporated areas where undeveloped land is more abundant. Conversely, the latter four smart growth developments, collectively termed 'smart growth developments' in this article, occur primarily within, or in close proximity to, existing urban areas and do not necessarily require large sites.

Partly due to the differences in where conservation subdivisions and smart growth developments are located and the amount of land they require, and partly due to Edwards and Haines' (2007) study findings showing differences between incorporated and unincorporated jurisdictions in planning for smart growth, we tailored our analysis to the local planning context. We limited our analysis of planning activity for smart growth developments to the incorporated jurisdictions of cities and villages, and we limited our analysis of planning activity for conservation subdivisions to unincorporated jurisdictions. Due to the small number of unincorporated towns in our sample, we examined the planning activity for conservation subdivisions in the counties that have planning authority over some or all of the towns within their boundaries.

To determine the significance of planning capacity, we assessed whether local governments with high planning capacity are more likely to engage in sustainability planning (i.e., the permitting of conservation subdivisions and smart growth developments) as compared to agencies with low planning capacity (please see Table 1 for the variables used in this study). In doing so, we used an analysis of differences of proportions in the indicator variables from the survey. In our assessment, we created an index variable for 'staff capacity' as part of planning capacity, which included six variables about the planning department and its staff, and defined high staff capacity for an agency as meeting a minimum of three characteristics of the following: presence of a planning department, planning staff beyond the respondent, staff with planning or environmental science training, and the training and position of the individual overseeing planning activities. To understand how planning capacity might influence local government sustainability planning, we conducted a logistic regression analysis. Because the sample size is small, we employed a step-wise regression, rather than using the complete model of independent variables that we conceptualized earlier. We employed a two-step regression analysis; in the first step, we used the backward elimination method to identify the potentially significant factors, and in the second step, we entered only the significant variables from the first step.

Table 1. Operationalization of the variables used in the study.

Construct	Variable	Measure	Operationalization
Sustainability planning	Environmentally sustainable residential development planning	Permitting or construction of conservation subdivisions	Dichotomous (permitted/constructed = 1, else = 0)
		Permitting or construction of smart growth developments (TOD, NU, mixed use, infill)	Dichotomous (permitted/constructed = 1, else = 0)
Planning capacity	Staff capacity	Presence of a planning department	Dichotomous (present = 1, absent = 0)
		Presence of a senior planner to lead planning activities	Dichotomous (present = 1, absent = 0)
		Presence of planning staff beyond respondent	Dichotomous (present = 1, absent = 0)
		Presence of a planning director with a planning degree	Dichotomous (present = 1, absent = 0)
		Presence of staff with a planning degree	Dichotomous (present = 1, absent = 0)
		Presence of staff with environmental science background	Dichotomous (present = 1, absent = 0)
		Presence of high staff capacity	Dichotomous (present [high, a score of 3 or above based on an index created with the six items above] = 1, absent [low staff capacity] = 0)
		Presence of planning director with AICP certification	Dichotomous (present [AICP] = 1, absent = 0)
	Comprehensive planning efforts	Presence of high engagement in comprehensive planning	Dichotomous (present [has a plan and participated in preparing it] = 1, absent [else] = 0)
	Land-use regulations	Presence of ordinances and regulations that enable CSD or TND	Dichotomous (present = 1, absent = 0)
		Presence of community ordinances and regulations that encourage the implementation of SG principles (used for SG development analysis)	Dichotomous (present [encourages implementation] = 1, absent [hinders implementation, does not impact implementation] = 0)

(*continued*)

Table 1. (*Continued*)

Construct	Variable	Measure	Operationalization
	Environmental knowledge	Presence of knowledge on the importance of features in reducing the environmental impact of residential development	Dichotomous based on an identification of features associated with CSD (small lots, presence of shared OS) and SG (proximity to transit, presence of housing other than SF) in reducing environmental impacts of residential development (present [at least one feature important] = 1, absent [features not important] = 0)
		Presence of sufficient knowledge on the regional benefits of CSD, neotraditional, and compact development over conventional, low-density development*	Dichotomous based on an index (0–9) of benefits of CSD, TND, and compact development over conventional development (present [a score of 5 and above] = 1, absent [a score of below 5] = 0)
		Presence of planning director who is well-informed about ecologically based residential planning	Dichotomous (present [very informed] = 1, absent [not at all informed, somewhat informed] = 0)
		Presence of planning director with high familiarity with ecologically based neighborhood development certifications	Dichotomous (present [familiar with at least one [LEED neighborhood development, sustainable sites, or others]] = 1, absent [not familiar with any certifications] = 0)
	Values	Presence of high importance of environmental sustainability to the jurisdiction	Dichotomous (present [important, very important, extremely important] = 1, absent [not at all important, a little important] = 0)
		Presence of high importance of environmental sustainability to the respondent	Dichotomous (present [important, very important, extremely important] = 1, absent [not at all important, a little important] = 0)

(*continued*)

Table 1. (*Continued*)

Construct	Variable	Measure	Operationalization
	Attitudes	Presence of high concern about the environmental impacts of low-density, conventional development in the jurisdiction	Dichotomous (present [concerned, very concerned, extremely concerned] = 1, absent [not at all concerned, a little concerned] = 0)
		Presence of high concern about the environmental impacts of low-density, conventional development in general	Dichotomous (present [concerned, very concerned, extremely concerned] = 1, absent [not at all concerned, a little concerned] = 0)
Community characteristics	Socio-economic factors	Population	Continuous
		Median household income	Continuous (in thousands)
		Population with higher education	Percentage
		Placement in the urban–rural continuum (based on USDA classification of counties)	Nominal (metro = 1, else = 0)
Development pressures	Pressure on resources	New housing construction (1990−2010)**	Percent increase in housing units (1990 - 2010)
		Change in farmland and forest (1992−2011)***	Change in percent land cover in agricultural and forest land
	Availability of developable land	Urbanized area (1992)****	Percent land cover in urban uses

*We examined regional benefits of CSD, neotraditional, and compact development over conventional development in the following areas: water quality, water quantity, habitat preservation, farmland protection, natural resource protection, energy use for transportation, energy use in buildings, and air quality. Based on empirical findings in the literature, we coded a respondent to have knowledge in the regional benefits if he/she identified water quality benefits of CSD; water quantity, habitat preservation, and natural resource benefits of CSD and compact; farmland preservation and energy use for transportation benefits of compact development.

**Because the boundaries of the majority of the cities and villages in our sample changed in this time frame, we conducted this analysis for counties only.

***Because of the boundary change for the municipalities, we used 1992 boundaries in examining land cover change between 1992 and 2011.

****Because the counties are in charge of planning in rural areas, we did not calculate the percent urban land cover for counties.

In our analysis, sustainability planning variables constitute the dependent variables, and planning capacity, community characteristics, and development pressures variables constitute the independent variables. For each independent variable, we expected the direction of influence to be positive.

5. Findings

5.1. Planning capacity among Wisconsin's municipal and county governments

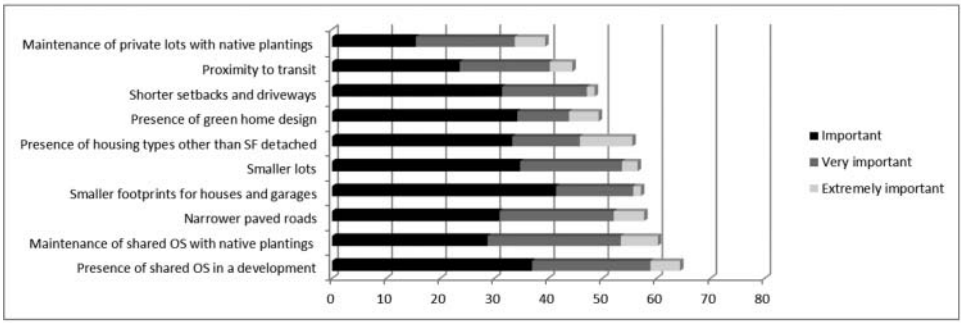
Our survey found planning capacity for residential permitting to vary across the state. Residential permitting in the counties is undertaken primarily by planning departments (53%), followed by zoning departments (39%). County governments' planning and zoning departments vary in size, ranging from one staff member in 13 counties (37%) to 18 staff members in one county. Staff member backgrounds are also varied; in 21 (62%) of the counties, planning and zoning departments do not employ staff with training in planning. The survey also found that in 17 (31%) of the municipalities, residential development is permitted by a planning department; in 20 (41%) of the municipalities, it is permitted by closely related departments of community development or zoning. Like the county governments, these municipal departments vary in the number and background of staff members, ranging from one to eleven members, with 14 (52%) of the units having only one staff member. Furthermore, twelve (32%) of the municipal departments are staffed with individuals who do not have training in planning. In addition, in 14 (28%) of the municipalities, new residential development is not permitted by a planning or closely related department, but rather by municipal administrators or clerks, who also lack formal training in planning. Only one (4%) of the county agencies and 14 (26%) of the municipal agencies have their residential permitting overseen by an American Institute of Certified Planners professional. Based on our six-measure composite index of staff capacity, 16 (42%) of the county governments and 25 (47%) of the municipal governments have high planning capacity. Staff capacity at the county agencies is significantly correlated with community characteristics; higher staff capacity is associated with larger, wealthier, and better educated counties and with metropolitan status. Staff capacity at the municipal agencies is significantly correlated with the metropolitan status of the county where the municipality resides.

In addition, three-quarters of the county planners reported having zoning ordinances and subdivision regulations that enable conservation subdivisions. A similarly large proportion of the municipal planners (80%) reported having zoning ordinances and subdivision regulations enabling traditional neighborhood developments.

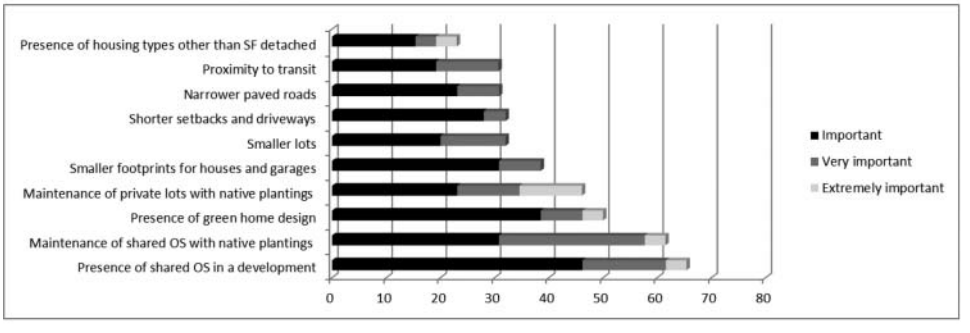
Planner perspectives on the role of design, native vegetation, and location of a development in reducing the environmental impacts of residential development revealed that presence of shared open space in a development was the top attribute, with around two-thirds of the combined sample identifying this feature as important, very important, or extremely important (hereafter 'important'). The majority of the respondents also identified maintenance of shared open spaces with native plantings (as opposed to mown lawn), narrower paved roads, smaller footprints for houses and garages, smaller lots, and housing types other than single-family detached as important in reducing a residential development's environmental impact (Figure 1). They did not, however, identify the other strategies that also contribute to sustainable landscapes.

County planners and municipal planners had different perspectives on the importance of various site design elements in reducing the environmental impacts of residential development. For over 60% of the county planners, two variables related to CSD (presence of shared open space and native plantings in shared open space) were the most important features. For the municipal planners, those two features ranked in the middle for importance. For them, the presence of housing types other than single-family detached homes was the top feature for reducing the environmental impacts of a residential development, whereas for county planners, this housing-related feature was at the very bottom of the list of features.

a. All planners (N = 91)



b. County planners (N = 38)



c. Municipal planners (N = 53)

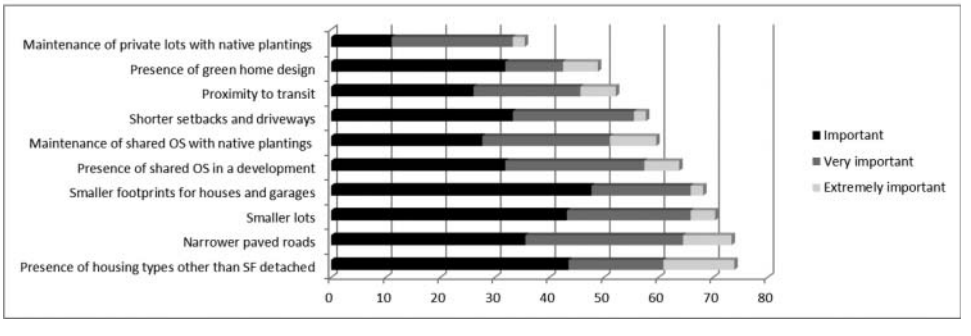
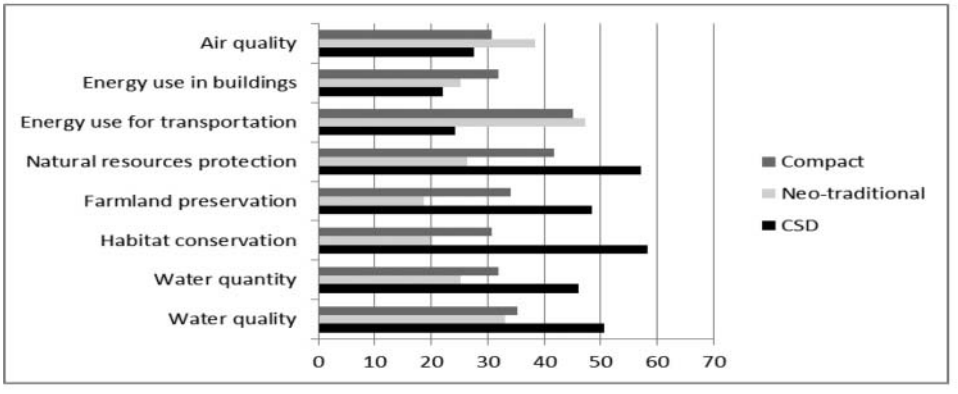


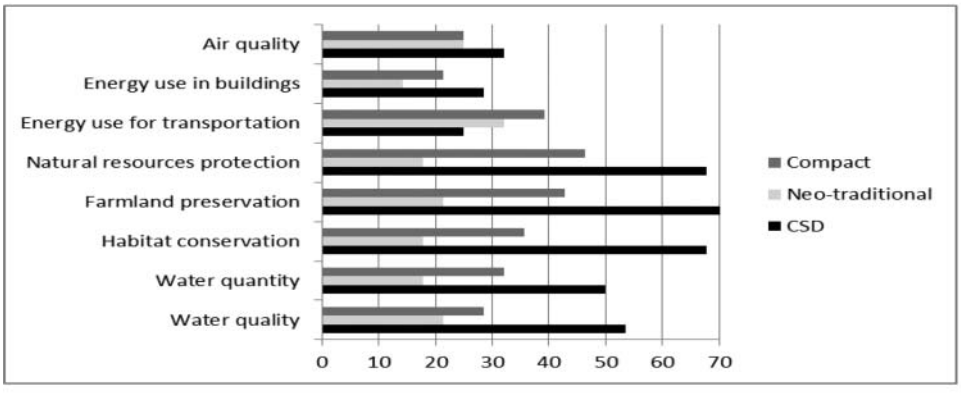
Figure 1. Percentage of planners rating the importance of features that reduce the environmental impacts of residential development. (a) All planners, (b) County planners, (c) Municipal planners.

Planners had differing views on the regional environmental benefits of three alternative development patterns (CSD, neo-traditional development, and compact development) as compared to the conventional, low-density, land use-separated development (Figure 2).[2] About half of the planners surveyed perceived conservation subdivisions as having water-quality and water-quantity benefits, and the majority perceived them as protecting land resources more effectively than conventional suburban and exurban developments, as well as neo-traditional and compact developments. The perceived higher benefits of conservation subdivisions were more pronounced for the county planners. In addition, county planners believed that conventional subdivisions provide more regional benefits in air quality and energy conservation than compact,

a. All planners (N = 91)



b. County planners (N = 38)



c. Municipal planners (N = 53)

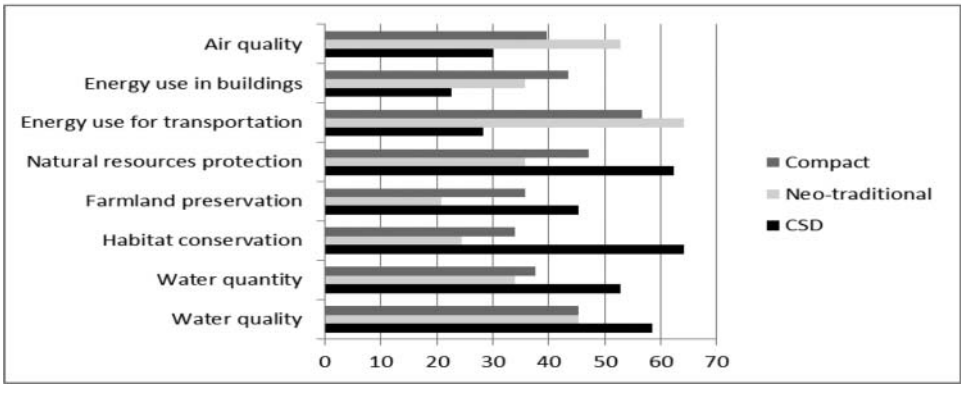


Figure 2. Percentage of planners associating regional environmental benefits with compact development, neo-traditional development, and conservation subdivision design. (a) All planners, (b) County planners, (c) Municipal planners.

neo-traditional, and conservation developments. Municipal planners had a different perspective. They considered conventional developments to be the most beneficial for energy conservation in buildings, and neo-traditional developments the most beneficial for air quality.

5.2. Permitting of sustainable residential developments

Fifteen (54%) county planners reported having permitted conservation subdivisions in their planning jurisdictions. The permitting activity was most often reported in the metro counties (53%), followed by non-metro counties with an urban population greater than 2,500 (33%), and then by non-metro counties that are either completely rural or have fewer than 2,500 urban residents (13%). Forty-one municipal planners (75%) reported having permitted at least one of the four types of smart growth developments. This figure includes 11 (21%) municipalities permitting transit-oriented developments, 16 (30%) permitting New Urbanist developments, 35 (66%) permitting mixed-use developments, and 36 (68%) permitting infill developments. The high prevalence of mixed-use development planning is consistent with Conroy's (2006) findings in other parts of the Midwest USA and with Gurran, Gilbert, and Phibbs' (2015) findings in Australia. Smart growth developments are permitted predominantly in cities (76%) as opposed to villages (24%), and in metro counties (83%) as opposed to non-metro counties with an urban population of 2,500 or more (17%).

5.3. Planning capacity and sustainable residential development planning

Our findings suggest that planning capacity and certain community characteristics are associated with the permitting of sustainable residential development. In the case of conservation subdivision permitting, the most significant differences in proportions and bivariate associations were found in three attributes: the presence and background of planning staff (the composite measure of 'staff capacity'), the jurisdiction's engagement in comprehensive planning, and the resident population's income and education level. Specifically, 79% of the counties with high staff capacity have permitted conservation subdivisions within their planning jurisdiction, whereas this figure is 25% for counties with low staff capacity (Table 2). Less, but still significant, were the planners' perceptions about the importance of CSD-related features in reducing the environmental impacts of residential development. In addition, counties with wealthier, more highly educated residents had a higher propensity to permit conservation subdivisions (Table 3).

In the case of smart growth developments, the most significant differences in proportions and associations were found in four attributes: the oversight of planning activities by a senior planner, the presence of zoning ordinances and subdivision regulations that encourage the implementation of smart growth principles, education of the residents, and planners' concern for the environmental impacts of conventional residential development in their jurisdiction. Specifically, 89% of the municipalities where planning is overseen by a senior planner have permitted smart growth developments, whereas this figure is 65% for municipalities where planning is overseen by other professionals. Furthermore, municipalities were more likely to permit smart growth developments if they had high staff capacity, and planners who were concerned about the environmental impacts of conventional developments or knowledgeable about the environmental benefits of conservation subdivisions, neo-traditional developments, and compact developments (Table 2).

Table 2. Propensity of Wisconsin planning agencies to permit sustainable residential developments (percentage of planners).

	County planners			Municipal planners		
Variable	Present	Absent	*p* value	Present	Absent	*p* value
Planning department	52	33	0.559	94	71	0.056
Senior planner to lead planning activities	69	29	0.028	89	65	0.038
Planning staff beyond respondent	86	39	0.031	93	71	0.084
Planning director with a planning degree	75	40	0.120	85	65	0.120
Staff with a planning degree	73	37	0.061	88	67	0.060
Staff with environmental science background	67	39	0.146	100	73	0.100
High staff capacity	79	25	0.002	88	68	0.083
Planning director with AICP certification	100	48	0.327	86	74	0.394
High engagement in comprehensive planning	82	28	0.003	86	73	0.583
Ordinances and regulations that enable CSD or TND	56	40	0.549	85	60	0.080
Ordinances and regulations that encourage the implementation of SG principles	N.A.	N.A.	N.A.	95	70	0.031
Knowledge on the importance of features in reducing the environmental impact of residential development	65	22	0.041	82	64	0.180
Knowledge on the regional benefits of CSD, neotraditional, and compact development	56	42	0.473	85	63	0.067
Planning director who is well informed about ecologically based residential planning	50	47	0.915	90	70	0.092
Planning director who is familiar with ecologically based neighborhood development certifications	64	41	0.262	87	65	0.066
High importance of environmental sustainability for jurisdiction	57	33	0.329	87	62	0.262
High importance of environmental sustainability for the respondent	50	50	1.000	83	56	0.083
High concern about the environmental impacts of low-density, conventional development in jurisdiction	75	37	0.075	90	63	0.018
High concern about the environmental impacts of low-density, conventional development in general	78	37	0.045	85	71	0.254

Table 3. Correlations between residential permitting activity and variables measuring development pressure and other community characteristics.

Variable	CSD permitting	SG permitting
Population	0.439**	0.110
Household income	0.467***	0.203
Education	0.638***	0.279**
Metro county	0.424*	0.246*
New housing construction	−0.149	N.A.
Change in farmland and forest	0.064	0.091
Urbanized area	N.A.	0.162

Note: Correlation is significant at the 0.1 level (*), 0.05 level (**), and 0.01 level (***).

The survey found that around one-third of the jurisdictions permitted sustainable residential developments after overcoming barriers that included economic constraints (e.g., difficulty financing development, lack of incentives to develop land via these techniques), lack of public support, and developers with limited vision and knowledge of planning best practices. Permitting-process barriers (e.g., longer approval times, additional steps, and higher upfront costs) were the fourth most common type of barrier identified; 12 (41%) respondents indicated that these had been issues in their jurisdictions. Two (7%) municipal respondents suggested that insufficient planning staff knowledge was a barrier to permitting smart growth developments. In general, a higher proportion of planners from high-capacity municipal and county planning agencies reported overcoming barriers to permitting and implementing sustainable residential developments, as compared to planners from low-capacity agencies. Municipalities and counties employed multiple strategies to overcome barriers to sustainable residential development planning. Educating the public was the most common strategy employed, followed by educating plan commissioners and making changes to the permitting process.

The regression analysis showed that staff capacity, planner values, and urbanization levels were significant in explaining the permitting of smart growth developments (Table 4). About 43% of the variation in municipalities' permitting activity of smart growth developments was explained by the composite staff capacity variable, the presence of zoning ordinances and subdivisions regulations enabling traditional neighborhood developments, the importance of sustainability to the respondent, and the extent of urbanization. The most important explanatory variable was the value of

Table 4. Logistic regression for permitting of smart growth developments in municipalities ($n = 46$).

	B	S.E.	Wald	df	Sig.	Exp(*B*)
Staff capacity	0.586	0.352	2.770	1	0.096	1.796
Presence of regulations enabling TND	2.270	1.113	4.161	1	0.041	9.678
Importance of sustainability to the respondent	2.310	1.078	4.589	1	0.032	10.076
Percent urban land cover in 1992	0.039	0.023	2.997	1	0.083	1.040
Constant	−4.424	1.949	5.153	1	0.023	0.012
Nagelkerke $R^2 = 0.432$, model significant at $p < 0.01$						

Note: TND, traditional neighborhood development.

environmental sustainability to the survey respondent; local governments were 10 times more likely to permit smart growth developments if environmental sustainability was important to the individual overseeing planning activities in the jurisdiction. The presence of traditional neighborhood development regulations was similarly significant. Staff capacity trailed these two other planning-capacity variables; municipalities with high staff capacity were nearly twice as likely to permit smart growth developments. Due to the small sample size of qualifying counties ($n = 15$), we were unable to conduct the regression analysis for conservation subdivision permitting.

6. Discussion

Our study adds to the evidence that planning capacity may play a role in shaping land development patterns and planning practices. Local governments in Wisconsin with higher staff capacities are more likely to permit conservation subdivisions and smart growth developments. In addition, staff capacity appears to be one of the four drivers of permitting smart growth developments. This is understandable, since planners in local government are among the most significant promoters of smart growth (Downs 2005). Higher staff capacity represents presence of staff knowledgeable about (or staff that can seek out information on) smart growth planning processes, policies, and regulations, and the presence of staff who can assess and articulate the benefits of smart growth developments as well as educate decision-makers and the public.

The finding that the presence of traditional neighborhood development ordinances helps explain a community's engagement in smart growth planning is also understandable. Enabling zoning ordinances are among the most significant tools for promoting environmentally sustainable land development. In the absence of enabling zoning ordinances, permitting processes can be very cumbersome and developers may not propose sustainable residential development projects (Göçmen 2013; Levine and Inam 2004).

Our study also suggests that environmental values, attitudes, and knowledge may play a role in the permitting of sustainable residential developments. This also makes intuitive sense.[3] Planners with strong environmental values, attitudes, and knowledge will likely recommend, with supporting information, the approval of smart growth and conservation subdivisions if the alternative is large-lot, low-density developments.

Yet, many planners may lack knowledge concerning the environmental impacts of land development and may not understand how spatially dispersed residential development can degrade environmental quality. For instance, reflecting similar views of planners in other regions of the USA (Allen *et al.* 2012; Stokes *et al.* 2010), Wisconsin planners generally rated conservation subdivisions as superior to compact developments for regional land conservation benefits, believing that conservation subdivisions protected natural resources, wildlife habitats, and farmland more than compact developments.[4] While this perception may be true at the site scale, it is not necessarily true at the community or regional scales, which we asked the respondents to consider. Compact development enables the concentration of residences, thereby creating a smaller 'footprint' for the same number of residents. Compact infill and redevelopment in particular can also decrease automobile dependency and leave large areas undisturbed. Several scholars have stressed the negative impacts of low-density urban fringe development on wildlife habitats (Beatley 2000; Berke 2007; Hansen *et al.* 2005) and others have raised doubts about the farmland preservation benefits of CSD (Daniels 1997; Göçmen 2014). Dedicated open space in a development can indeed provide environmental benefits for water and land resources; however, these benefits, such as a reduced volume of stormwater runoff and provision of

habitat for wildlife, are contingent upon the size and configuration of open spaces and the vegetation on them (Brander, Owen, and Potter 2004; Göçmen 2014; Hostetler and Drake 2009). Moreover, unless there are connections to a regional open space network, preserving open spaces in a subdivision creates isolated natural areas, "postage stamps that will eventually be surrounded by development, with questionable long-term ecological viability" (Beatley 2000, 10).

The findings may also reflect the respondents' familiarity with, and consideration of, contextual factors that influence the feasibility of planning practices across the urban-to-rural continuum. For example, proximity to public transit (an important factor in reducing sprawl), which the county planners rated low in reducing environmental impacts of residential development, is generally infeasible in most rural areas with low population densities. Similarly, the low importance given to reducing imperviousness could reflect county planners' consideration that residential development accounts for a relatively small proportion of the rural landscape. The results may also reflect the statewide and nationwide marketing campaigns for CSD in the past two decades.

Our understanding of sustainable residential planning practices would benefit from additional studies of large samples of communities in other states. Larger samples would help overcome the limitations of conducting a step-wise regression as we did in this study. Assessing planners' and plan commissioners' environmental values, attitudes, and knowledge in depth – either through interviews or by incorporating tested survey questions and scales such as the NEP (New Environmental/Ecological Paradigm) scale (Dunlap *et al.* 2000) – could help clarify the role of these factors in sustainability planning. It would also be helpful to investigate actual implementation of conservation subdivisions and smart growth developments, rather than relying on planners' accounts. Such an approach could incorporate information on the scope (e.g., size) of sustainable residential development projects.

7. Conclusions and implications

Increasing planning capacity at the local government level could advance the diffusion of best practices in the design of the built environment. Yet this can be quite challenging. Staff capacity – conceptualized in this paper as the presence of a planning department and the presence, experience, and training background of planning staff – is not simple to change in many communities. For instance, decision-makers in non-metropolitan counties that have small populations, few fiscal resources, and low growth pressures may believe that a planning department and planning staff are unnecessary or unaffordable, and therefore review development proposals on an ad hoc basis. That approach will likely favor conventional developments due to the staff's familiarity with them, the absence of sustainable land development enabling regulations, and incomplete knowledge on environmental impacts of land development.

As planners' attitudes toward environmental sustainability have implications for smart growth and sustainability planning, it seems crucial to instill pro-environmental values and a land ethic among planning staff. The APA's Code of Ethics and the US Planning Accreditation Board's accreditation standards both take normative positions about how planners *should* act. Yet, changing individuals' values is also very difficult (Gardner and Stern 2002). Historically, disasters, such as oil spills, have helped change individuals' attitudes and values towards the environment (Winter 2000). More recently, catastrophic events, including Hurricane Katrina, Superstorm Sandy, and the 2008 Midwestern floods, helped create a greater awareness of environmentally unsustainable

development among the public and urban planners. In the absence of major disasters, education may have limited impact on changing values, but it can still be influential in fostering a land ethic (see Thompson 2004).

Professional organizations, institutions, and regional planning authorities can play important roles in facilitating sustainability planning and building planning capacity. The APA, International City/County Management Association, Cooperative Extension services of land-grant institutions, and non-profit organizations can, for instance, provide practicing planners and local decision-makers with empirical evidence on the costs and benefits associated with different residential development patterns. APA can emphasize continued maintenance education for certified planners on the ecological impacts of land development.[5] In addition, urban planning programs in higher education institutions can ensure that their curricula help future planners understand the linkages between land development practices and environmental sustainability.[6] Regional planning authorities also might improve planning capacity and land-use best practices by advancing peer-to-peer learning, promoting sustainability indicator monitoring, and providing stronger land development guidelines and expertise when needed. Built projects in innovative communities could serve as successful local models for adaptation and implementation in neighboring communities.

In the context of continuing global population growth and climate change, efforts to increase local planning capacity are needed to advance both local and regional transitions to a more sustainable future.

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Notes

1. In light of the recent emphasis on smart growth planning and sustainability and the state's 1999 Comprehensive Planning Law, we asked the respondents to consider residential developments since 2000. Please note that five county planners and 22 municipal planners came to their positions after 2000.
2. We provided the following definitions in our survey: A 'conservation subdivision' is a subdivision where residences are clustered in smaller lots and the remainder of the subdivision land is preserved as shared open space. A 'neo-traditional development' provides a range of housing options, complete streets, and amenities within walking distance. A 'compact development' uses higher densities and aims to concentrate residential development in, or adjacent to, already developed areas.
3. At the same time, planners with strong environmental values may choose to work in communities that are already engaging in, or are interested in, pursuing planning for sustainability.

4. It is possible that planners and decision-makers perceive CSD to be more tangible than compact development and other smart growth approaches.
5. While our results did not show certification of planners to have a significant association with the permitting of conservation subdivisions or smart growth developments, this finding is perhaps due to absence of regional training on the relationship between ecology and land development.
6. Our respondents' perceptions of the environmental benefits of alternative development types did not differ statistically according to whether they were trained in planning.

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