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Historical and Human Dimensions of Nature-Based Planning

Is Time on Our Side?

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CHAPTER OVERVIEW

Globally, substantial differences are apparent in the sophistication of planning for nature and biodiversity conservation. We provide an evolutionary model to explain this variation and then review some of the factors that affect the willingness to impose growth controls in a community. These factors, including affluence, land scarcity, and community age, offer some explanation for the finer-scale differences that can be seen between individual communities. Next, we examine three affluent industrialized geographical regions (Midwest and New England regions of the United States, and nations of northwestern Europe) that at least historically have had a strong agricultural focus but that currently differ in their degree of sophistication in landscape planning generally and in nature-based planning particularly. An evaluation of spatial variation in landscape planning indicated that nations of northwestern Europe were more committed to and sophisticated in their planning efforts than states of the New England region, which in turn were more advanced in terms of planning than states of the central Midwest. A regression analysis suggested that variation in planning across these areas was best explained by community age, providing empirical support for viewing planning from an evolutionary perspective. Land scarcity was of lesser importance. When considering only older areas of comparable age (i.e., European nations), affluence was a significant predictor of planning sophistication, indicating that a certain level of wealth is necessary but not sufficient for the evolution of nature-based planning. We contend that younger communities can learn from the past land use and current landscape planning lessons of more mature communities that developed under roughly similar circumstances. Ecological models may offer communities an "acceleration zone" through which they can speed toward adoption of

more sophisticated planning systems. Evolving more rapidly is critical to a community's chances to avoid the consequences of losing critical natural resources.

KEY WORDS—Affluence, agriculture, economics, Europe, land use, evolution of planning, growth machine theory, landscape planning, midwestern United States, New England, resource scarcity, time since settlement

INTRODUCTION

Our purpose in this chapter is to examine historical, social, and economic attributes that may galvanize change in a community's perspectives on and commitment to landscape planning. An understanding of the factors driving change in commitment to planning systems is important to accelerating the rate at which communities adopt more sophisticated, environmentally sustainable standards.

Globally, differences in the application of nature and biodiversity considerations in landscape plans are apparent at two scales. At a fine scale, differences are apparent among individual communities within a region. Social science theory suggests several factors that are capable of influencing the acceptance of growth controls at the community level (Garkovich 1982; Pratt and Rogers 1986; Cox and Mair 1988; Green *et al.* 1996). Growth controls, the tools through which a planning commission or other regulatory body carries out the goals of the community-developed comprehensive plan, are "designed to limit significantly population growth, housing construction, and/or economic growth below levels that would otherwise be achieved in an unconstrained real estate market" (Landis 1992:490). As local economic conditions and land-use patterns change, so does a community's willingness to plan for biodiversity in the local landscape.

At a broad scale, differences arise between regions and between nations with regard to the willingness to manage for nature, and the degree to which nature is considered in planning. These differences may be influenced by factors that change over time, including differing levels of population density, resource scarcity (e.g., land availability), economic influence, and land ethic, as well as political ideology and technological innovation.

Because of the time-dependence of many of these factors, age of a community may itself be an important variable in explaining differences on a broad scale, at least among industrialized, affluent nations (Figure 13-1). Communities starting from a common point in terms of planning sophistication are capable of following numerous trajectories over time (Figure 13-1),

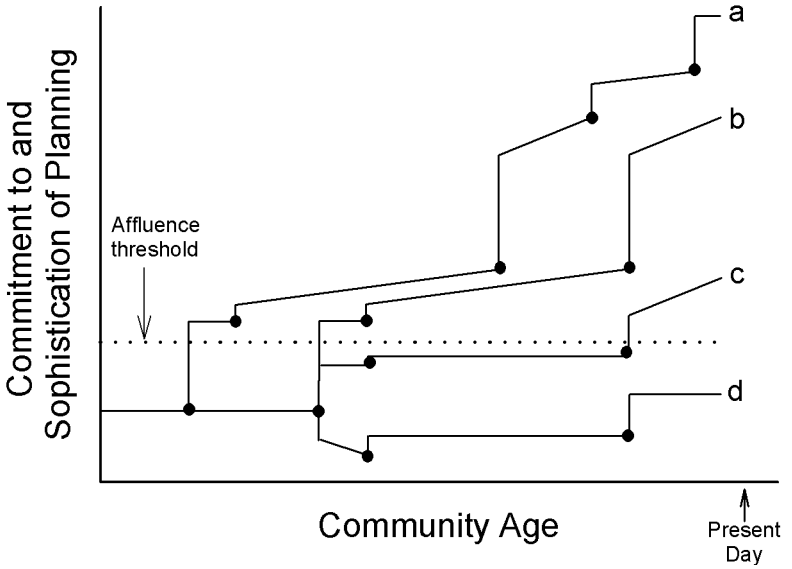

Figure 13-1. A model of the evolution of nature-based planning, illustrating how spatial differences in planning sophistication can reflect a community's age and the accumulation of historical events. Initially, all communities are assumed to start with no or rudimentary planning guidelines. Transitional periods, represented by nodes, occur periodically during a community's history, reflecting events that can rapidly influence planning. Transitions may be driven by external changes (e.g., political or technological transformation) or changes at a more local scale. Periods between transitions are characterized by relatively little change in planning. Four hypothetical communities are depicted, each with a different evolutionary trajectory. Community *a* took advantage of an early transition (e.g., a technological innovation) to attain a level of affluence necessary for planning to occur (the "affluence threshold"). Despite this wealth, no advances in planning were forthcoming at first. Eventually, though, additional transitional events and gradual improvements during intervening periods lead to a sophisticated planning system. Community *b* experienced a delay before being able to take advantage of the initial transitional period (as may occur due to lags in diffusion of technological innovations). Despite a trajectory that subsequently was identical to community *a*, the delay continues to be reflected in a lower level of planning sophistication in the present. Community *c* followed the same schedule for transitional events as *b*, but *c* translated transitional events into "progress" at only 1/3 of the level for communities *a* and *b*, perhaps due to inherent limitations associated with economic growth (e.g., resource availability and transportation constraints). As a consequence, *c* took much longer to clear the affluence threshold necessary for meaningful planning to be considered. Finally, community *d* failed to exceed the affluence threshold, signifying a fundamental distinction in its response to transitional events such as could occur because of political systems. Two predictions arising from this model are that: (1) communities belonging to a lineage such as *a* will exhibit a positive relationship between planning sophistication and community age; (2) variation in planning sophistication will increase with community age.

resulting in different "lineages." To the extent that nations of differing age can be characterized by a single lineage, a prediction of the evolutionary model of planning is that among countries from the same "lineage," older communities generally will manage their landscapes more pro-actively and evolve attitudes, policies, and legal structures that favor protection and management of natural resources and biodiversity as integral parts of their spatial planning (Figure 13-1, lineages *a*, *b*, and *c*). An exception to this general prediction is important to note; lineages that fail to surpass a lower threshold of affluence are unlikely to increase measurably in planning sophistication over time (Figure 13-1, lineage *d*). A second prediction of the evolutionary model is that lineages should diverge over time, leading to greater variation in levels of planning sophistication among older communities, when planning systems are compared across lineages (Figure 13-1).

In this chapter, we test the first prediction of the evolutionary planning model by comparing three industrialized agricultural regions that have developed for different lengths of time; we ask whether the level of sophistication in incorporating protection of biodiversity into landscape planning has increased over time. We also test the second prediction by examining patterns of variation in planning for older communities that likely stem from different lineages. Results from our admittedly limited comparison may prove useful in projecting how landscapes could evolve in areas that have developed for shorter periods of time. Indeed, our results may have important implications for regions that are still maturing and do not suffer from land scarcity. If younger communities can "learn" from the growth trajectories of older communities, they may be able to comprehend the benefits of implementing more progressive and nature-conscious planning techniques. Earlier implementation of proactive land management would move younger communities forward along the planning sophistication continuum (Figure 13-1), enabling a more rapid maturation while avoiding much of the decline in abundance and diversity of natural resources that accompanied the "aging" of older communities.

PUBLIC WILLINGNESS TO INCORPORATE NATURE INTO LAND-USE PLANNING

Communities around the world show differences in how they regard and accommodate nature and biodiversity into their landscapes and land-use planning systems. These differences not only exist at a fine scale when comparing

one neighboring community to another, but are also apparent at a regional or national scale. How a community views and relates to the biodiversity, or natural capital, within and surrounding it may dictate the importance and prominence biodiversity will receive in landscape planning. As societies developed agriculture and industrialized, "their relationships with nature changed" (Curry and McGuire 2002:41). As industrialization occurred and transportation systems developed enabling commerce, reliance on local natural resources became less necessary. If local resources were degraded or depleted, the community could still survive by importing the needed natural resources from elsewhere.

In the late 1960s and 1970s an environmental awareness began to emerge in developed nations, characterized in the United States by enactment of landmark legislation such as the National Environmental Policy Act (1969), the Clean Air Act (1970), the Federal Water Pollution Control Act, now known as the Clean Water Act (1972), and the Endangered Species Act (1973) (Cortner and Moote 1999). The emphasis of these laws was more on regulation, created in response to this new public sentiment, and less on proactive management of resources. However, the desire to protect the environment was heightened (Cortner and Moote 1999). Over the next 30 years, in the climate of this heightened environmental awareness, communities have exhibited different strategies regarding the trade-offs between growth and biodiversity (Bollens 1992). Some communities have viewed growth as an opportunity for economic gains and considered all other concerns as secondary. Other communities have capitalized on the natural capital that exists around them and have sought economic development opportunities compatible with the aesthetic and environmental goals the community holds dear (Daniels 1999).

Below, we examine factors that can influence the willingness to impose growth controls as a means to protect desired features within a community, including nature and biodiversity. The evolutionary changes in willingness to protect these attributes of a community as it matures also are considered in the context of three brief case histories.

Fine-Scale Differences: Community Willingness to Control Growth and Protect Nature

Several theory-based factors influencing citizen support of local growth controls have been examined in the literature. One basic premise is that citizens who are dissatisfied with their community are more likely to support local growth controls (Baldassare and Wilson 1996). The growth machine theory (Logan and Molotch 1987), the local dependency thesis (Cox and Mair 1988), and the population growth perspective (Garkovich 1982) predict

some characteristics that will influence an individual's view and support for local growth controls to protect or to provide for their individual way of life. Some characteristics are indicative of an individual's personal views and motivations that influence their support for local growth controls, and the inclusion of nature and biodiversity in planning. These characteristics are useful in examining a community as a whole and may predict whether a community may be supportive of controlling land use. However, these characteristics are tied to perceptions and values of the individuals within the community and will be independent of land-use decisions made in the community. That is, as land-use changes are made, the individual views or personal values will not change.

The growth machine theory (Logan and Molotch 1987; Pfeffer and Lapping 1994; Green *et al.* 1996) predicts differences in support depending on whether an individual relates to the land through exchange values or use values. Individuals may purchase a good for its use value, something which will be used, and not for its exchange value (Flora 2000). Those individuals who derive most of their benefits from exchange values are less likely to support land-use controls because they do not want to limit their ability to make money from their property or the exchange and development of land. Those that derive most of their benefits from use values are more likely to support land-use controls.

Since some individuals gain both use and exchange values from their property, the local dependency thesis (LDT) (Cox and Mair 1988) gives some guidance as to which value will be dominant in support of land-use controls. LDT predicts that those with dependence on the local area (e.g., own a local place of business, work in the building trade, depend on local factories and industry) are less likely to support local growth controls. Those that can move anywhere and are not dependent on the local area place more emphasis on use values and are more supportive of land-use controls. The predictions of the LDT have been supported by others (Albrecht *et al.* 1986; Bollens 1990). Community affluence (Nelson 1977; Hamilton 1979; Rudel 1984; Pratt and Rogers 1986) and the population size of the community of residence and/or personal preference for community size (Van Liere and Dunlap 1980; Connerly 1986) may also be important factors influencing an individual's support of land-use controls.

Other characteristics related to how individuals perceive their community are dependent on land-use changes that occur within the community. The population growth perspective (Garkovich 1982; Rudel 1984; Pratt and Rogers 1986) predicts that land-use controls are more likely to be imposed in areas with high population growth. The underlying premise is that high rates of growth begin to negatively affect the values that residents hold dear in their community. This often may result from the increased scarcity of

resources or amenities that residents value, therefore motivating them to seek land-use controls to protect these values. Research has shown that residents who are dissatisfied with their communities or have negative community perceptions seek and support local growth controls (Johnston 1980; Gottdiener and Neiman 1981; Anglin 1990; Bollens 1990; Baldassare 1992). "Negative community perceptions are the most significant and consistent predictors of citizen preferences for slowing down growth and development in their local areas" (Baldassare and Wilson 1996:461) and can be measured by several indicators:

1. perceptions of local growth rates (Connerly 1986; Baldassare and Wilson 1996);
2. overall quality of life ratings (Baldassare and Protash 1982; Bollens 1990; Baldassare and Wilson 1996);
3. residents' values placed on the environment (Dowall 1980; Gottidiener and Neiman 1981; Neiman and Loverage 1981; Connerly and Frank 1986) and the extent to which citizens perceive a common fate between themselves and wildlife (Liu *et al.* 1997).

Broad-Scale Differences: Stages of Physical and Cultural Development of Landscapes

Globally, differences can be seen in how communities conduct land-use planning (Cullingworth 1994; Marshall 1998) and regard and protect nature generally, and biodiversity specifically, within their landscapes (Jongman 1994). Obvious differences exist between industrialized and nonindustrialized nations due in part to the differences in wealth and dependence on local resources (e.g., Fodor 1998). In the United States, economic and social class transformations led to a condition where "land and people increasingly came to be extricated from community" (Curry and McGuire 2002:78). However, financially secure communities can afford to show more concern about the negative aspects of growth than struggling communities (Lewis and Albrecht 1977).

Important differences also are apparent between and even within industrialized nations. In the following section, we provide some details of these differences for three industrialized regions, two clusters of states within the United States and a collection of nations in Europe, with an emphasis on northwestern Europe. Specifically, we describe the general planning processes and provisions for biodiversity that are made in each region. We then conduct a more formal comparison of the states and nations under consideration, thereby testing the importance of time dependence and other factors in explaining variation in planning sophistication (Figure 13-1).

Geographical Comparisons of Planning

Central Midwestern United States

The central midwestern landscape is relatively flat and characterized by fertile, deep soils. Historically, the region was characterized by deciduous forest to the east and tallgrass prairie to the west. Today, most states are predominantly in agricultural production (44.0%–70.3%) with smaller portions in forested cover (6.1%–26.8%) (Table 13-1, United States Census Bureau 2001*b*).

The primary form of governance that developed in the central Midwest (what we define as the states of Ohio, Indiana, Illinois, and Iowa) was at the county level, in contrast to the emphasis on town government in New England states (Kelly and Becker 2000, *see page 226*). Law enforcement, land-use planning, taxes, school systems, and road systems are managed at this level. Within counties, municipalities may exist that have their own jurisdictions for government, roads, law enforcement, taxes, schools, land-use planning, etc. One source of contention between county government and local municipalities is the fringe areas between these jurisdictions (Daniels 1999). We define fringe areas as the area(s) on the border between municipal jurisdiction and county jurisdiction. In most instances, this will be the area around existing municipal boundaries, where new development is occurring, in which both the county and municipalities impose considerations for planning. These areas present the greatest challenge to land-use planning because there are competing interests, and the boundaries continually change as communities grow. Some counties have formed area plan commissions that have jurisdiction over both areas (the county and municipal jurisdictions) to plan at a more comprehensive level within the county boundaries (Lindsey and Palmer 2000).

When the central Midwest was surveyed, it was done by the Public Land Survey System, which was developed in 1785 as a system for land partitioning or subdividing (DeMers 2000). This was used on public lands that had not been surveyed by the Metes and Bounds method. The Public Land Survey System, whose main purpose was to record land ownerships, divided the land into square mile blocks (sections) and grouped every 36 square miles into townships (DeMers 2000). Within these 36 square miles, each square mile is a section. This type of surveying was utilized due to the fact that the lands were publicly held, and was made easier due to the relative flatness of the landscape that posed minimal amount of natural obstructions to movement. In rural areas, roads generally followed section lines. Rural community centers were usually located along rail lines or rivers, which facilitated the transportation of produce and goods to larger points of distribution. Today, townships generally have one major function "As civil corporations

TABLE 13-1.
Land cover (%), gross domestic product per capita ($), population density (people per km^2), and land value ($ per ha of agricultural land) in regions of the United States and Europe.

	Planning Score	*% Crop*	*% Forest*	*% in Protected Areas*	*GDP per capita ($)*	*Density (km^2)*	*Land value ($)*
Central Midwest							
Illinois	1	66.6	10.5	2.7	32,259	87.3	6,523
Indiana	1	57.9	16.3	3.5	27,011	66.2	6,400
Iowa	1	70.3	6.1	1.2	26,723	20.5	4,892
Ohio	1	44.0	26.8	3.1	28,400	108.3	6,672
Average	1	59.7	14.9	2.6	28,598	70.6	6,122
New England							
Connecticut	3–4	6.3	55.0	6.1	40,640	274.6	6,944
Maine	4	2.0	84.4	5.3	25,623	16.1	3,459
Massachusetts	4	5.2	51.4	6.0	37,992	316.4	17,791
New Hampshire	3	2.3	66.2	16.1	33,332	53.8	6,425
Rhode Island	4	2.7	47.6	1.5	29,685	391.9	18,038
Vermont	4	9.9	67.4	7.9	26,901	25.7	4,695
Average	3.8	4.7	62.0	7.2	32,362	179.8	9,559
North, West Europe							
Belgium	5	25.4	22.2	22.4	22,630	342.6	
France	5	35.5	27.9	4.0	22,176	110.2	3,675
Germany	6	34.7	30.7	25.8	23,283	239.1	
Netherlands	7	27.7	11.1	15.0	23,019	471.1	45,655
United Kingdom	6	26.6	10.7	24.6	24,631	245.0	11,361
Average	5.8	30.0	16.8	16.5	23,148	281.6	20,230
South, East Europe							
Hungary	2	54.6	19.9	8.4	4,640	111.0	870
Italy	4	37.6	34.0	8.1	18,547	198.0	
Poland	2–4?	47.2	30.6	26.0	4,121	128.5	890
Romania	1–2	42.7	28.0	4.8	1,470	98.8	250
Spain	4	38.4	28.8	6.8	14,315	80.8	17,640
Average	3.0	44.1	22.4	10.8	8,619	123.4	4,912

Note: *Data sources*: International Bank for Reconstruction and Development (2001), National Wilderness Institute (1995), Office of the Secretary of Defense (2001), U.S. Census Bureau (2000), U.S. Department of Agriculture (2001), plus additional references in text.

for the administration of poor relief, assessment of taxable property, and related functions" (Indiana Chamber of Commerce 2001:217). Originally townships served as school districts, but this function was lost by many townships in the late 1960s when education systems were reorganized and reduced in number.

Political ideology throughout the central Midwest is typically considered conservative, and property-rights issues are of fundamental importance to many residents. Nearly all land in the central Midwest is under private ownership, ranging from 97.8%–99.5% (United States Census Bureau 2001*b*). By comparison, the total amount of land that is privately held in the United States is estimated to be only 70% (Gillham 2002). There is a strong resistance to regulations and restrictions on private lands. Rather, an emphasis is placed on voluntary, incentive-laden approaches to land management (Office of Commissioner of Agriculture 1997).

Two enabling acts emerged from the Department of Commerce in the 1920s that formed the foundation of planning in many states: the Standard Zoning Enabling Act of 1926 and the Standard City Planning Enabling Act (SCPEA) of 1928 (DeGrove and Stroud 1987). All states have accepted some version of the 1926 Act, and most have adopted some portions of the 1928 statute (Kelly and Becker 2000). All four central midwestern states have planning laws that have few or no changes from this 1920s legislation (Meck 2002). Two of the four states, Ohio and Indiana, have conditionally mandatory planning in place. In these two states, once a planning commission is created, county, city or village planning is mandatory (Meck 2002). In the other two states, Illinois and Iowa, a local plan is optional (Meck 2002). No midwestern state has a statewide planning framework with which local communities must comply; therefore, in all four of these states the strength of the state's role is considered weak (Meck 2002). Specific requirements in the plans detailing land use, agriculture, forest land, or open-space preservation are optional in plans for Illinois and Iowa, and although mandatory for Indiana and Ohio, when planning commissions have been established, the level of detail is minimal (Meck 2002). None of these states require substantial provisions for environmental features (i.e., biodiversity or natural resource considerations) within local land-use plans. No state requires multi-county planning that considers environmental or biodiversity features (Meck 2002). Although most states have voluntary provisions for regional planning commissions that may encompass multi-county areas, their focus is primarily on transportation planning and economic development. Although regional planning commissions and local conservancy districts have the ability to be the vehicle for multi-jurisdictional nature-based planning, they typically are not used for this purpose. Broader policy provisions for nature or biodiversity are not evident at any state level throughout this region.

The former paragraph is not intended to paint a completely bleak picture of the state of planning in communities of the central Midwest. In fact, numerous communities have taken note of the issues, and political efforts to revamp the planning system are underway. For example, in Ohio, a new law, "Clean Ohio," (1991) allocates funds to brownfield revitalization and conservation projects, and reports such as "A Smart Growth Agenda for Ohio" (1998) promote new and innovative planning techniques that incorporate natural resource goals (American Planning Association 2002). The Indiana Land Resources Council, created in 1999, aids governments in addressing land-use issues (American Planning Association 2002). In Illinois, the Illinois Growth Task Force aims to develop statewide objectives for land-use, housing, and transportation. Several bills have been introduced in the legislature, offering evidence of progress, but most have not yet been adopted (American Planning Association 2002).

Development patterns in the central Midwest historically were characterized by low-density residential development in rural areas with a collection of small towns scattered throughout the county. The dominant land use in rural areas was agriculture, and houses located on the rural landscape usually were associated with the farms that supported them. The towns usually were located along transportation and distribution points. They typically contained a grain elevator, churches, a grocery store, and the other associated services needed to support the surrounding farms. During the 1960s–1980s, some residential encroachment in the rural areas occurred. This development was primarily concentrated along roads and consisted of single-family homes located on small acreages.

From the mid 1980s to the present day, urban sprawl has increased and has become more apparent (Gillham 2002). This has occurred even though population percent change during the last 10-year census period was well below the national average of 14.5%, with values of 4.7% (Ohio), 5.4% (Iowa), 8.6% (Illinois), and 9.7% (Indiana) (United States Census Bureau 2001*b*). The rate of residential development in rural areas also has increased. Development is occurring as subdivisions that are no longer located only along previously existing roads or near existing infrastructure. In many areas, new access roads have been built and houses are being clustered in the heart of what was previously open-space land. Although the clustering of homes into subdivisions uses less land area, the placement of these subdivisions in more interior portions of the landscape increases fragmentation and may negatively affect biodiversity (Knight and Mitchell 1997).

One phrase coined to describe this style of development is "leap-frog" development (Gillham 2002). Newly constructed subdivisions are no longer confined to areas adjacent to existing population centers. Consequently, considerable gaps often exist between existing municipal boundaries and

new subdivisions. Likewise, geographical gaps exist between the existing infrastructure (sewers, water, school, roads, etc.) and the new developments that require or could take advantage of this existing infrastructure. Residential developments in these rural areas rely on onsite sewage treatment systems (primarily septic systems) and onsite wells. As densities of these residences increase and as septic systems mature, so does the need for utilities, schools, and other such services. Issues related to leap-frog development, including the need to extend a community's infrastructure to support outlying development and the associated tax increases to support these extensions, are often the issues that renew local interest in growth controls and land-use planning.

New England States (Northeastern United States)

Before European settlement, New England (including the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) was heavily forested, principally by deciduous forest in the south and mixed forest in the north. Southern New England had been nearly completely deforested by the mid-1800s, to make way for agriculture. However, agriculture on the rocky soils was unproductive, and most farms were abandoned. Today, the New England states are once again predominantly forested, averaging 62% forest cover on nonfederal lands (Table 13-1). The forests are virtually all second-growth stands that have reasserted themselves since the height of the agricultural era. In contrast to the central Midwest, cropland is a minor component of the landscape today and averages 4.7% for the six New England states (U.S. Census Bureau 2001).

Early settlements in New England were predominantly clustered along the coast and the large rivers, which were used for transportation, fishing, drinking water, and irrigation of crops. As the settlements took hold and land was cleared, the population spread out into the fertile river valley areas and began intensively farming the land. Early New England communities often followed a rough plan, with communal buildings and homesteads clustered around the characteristic village green; this plan served both in defensive purposes and in cementing the communal life of the village or town. The "neotraditional," or "new urbanist," patterns of development promoted by smart growth advocates are largely based on this traditional New England village pattern. Town and city boundaries evolved and changed over a long period of time but, in general, more were marked more often by natural features such as rivers, streams, and ridges rather than surveyed lines.

During this early period much of the land was held in common ownership, and governance was at the town or settlement level. Many of America's ideas of self-governance can be traced back to the organization of New

England villages. For instance, the Connecticut Fundamental Orders of 1639 described a government based on the will of the people and is largely believed to be the first written constitution of a democratic government and a precursor of the United States Constitution (Connecticut State Library).

Because of their early settlement (which was before a federal government, let alone large federal park programs), land in most New England states today is largely privately owned. Only Vermont and New Hampshire have significant federal land. The remaining four New England states rank 45th (Massachusetts), 46th (Maine), 49th (Connecticut) and 50th (Rhode Island) in the percentage of land in the state owned by the federal government (National Wilderness Institute 1995).

The primary form of government in New England is municipal, or town-level, government. Connecticut and Rhode Island are the only two states in America to have no form of county government whatsoever, and Massachusetts has virtually eliminated county government as well. The three northern New England states have counties, but in general most services are provided at the local level. Many areas of New England have regional planning agencies or regional councils of government, but these agencies generally are without adequate funding and statutory power to supercede local planning.

Compared to other regions of the country, New England has relatively little unincorporated land, with most of the land area (other than in Maine) part of an incorporated town or city. Land-use and environmental planning, zoning, and other issues are decided at the local level by boards and commissions comprised of volunteers who are either elected or appointed. Local leaders, whether mayors in the cities or selectmen or town councils in the smaller towns, are also elected, and many decisions are made by "town meeting," rather than by administrative processes or formal votes.

To the casual observer, the typical, attenuated sprawl pattern of development is not as evident in the New England landscape as in other parts of the United States. Currently, New England is not experiencing the explosive growth of other parts of the country. In the period from 1990 to 2001, all six states fell below the national average of 14.5% growth, with every state but New Hampshire well below 10% (U.S. Census Bureau 2001). It is our opinion that attenuated sprawl in New England is due partly to a strongly upheld tradition of the village style of development, partly due to advances in environmental laws, but perhaps mostly due to the effects of scale. With a smaller land area, a longer period of settlement, and slower population growth than in the rest of the country, growth in New England often translates to new development at the small subdivision level, rather than at the level of massive subdivisions or whole communities. However, this is not to say that poor planning is absent in the region. Sprawl is an

increasingly debated issue in New England, especially along the coast, where development continues to intensify; of the six states, only Vermont does not have a sea coast.

Because population growth is not great compared to the rest of the country, the effects of sprawl in New England can be clearly distinguished from those of simple growth. For example, between 1975 and 1995 the state of Maine spent $727 million on new school construction and renovations, even though the number of elementary and secondary school students in the state declined by 27,000 between 1970 and 1995 (American Planning Association 2002).

Several New England states were among the first to pass enabling legislation on planning and zoning. Connecticut passed a statute allowing municipalities to establish planning commissions in 1917 and followed with a similar statute enabling local zoning in 1925. However, updating and reform of these laws is "across the board," and in some cases, such as in Connecticut and Massachusetts, early adoption of local planning and zoning has created entrenched procedures that have been difficult to revise (American Planning Association 2002). For instance, Connecticut communities must have a comprehensive plan of conservation and development, but there is no required link to zoning. At present, four of Connecticut's 169 towns still do not have zoning. Massachusetts has recently attempted, unsuccessfully, to require local master plans and links between those plans and zoning regulations.

Nonetheless, most New England states have passed, or attempted, some form of major growth-management legislation in the past 3 years, and New England boasts several progressive statewide environmental planning programs that are considered to be leaders in the country. For instance, Vermont passed a landmark development-review law in 1969. Vermont Act 250 creates a state environmental board and district environmental commissions and sets 10 criteria for the environmental review of substantial residential or commercial/industrial development projects, the final criterion being compliance with municipal plans. An excerpt from the original 1969 Findings section of the Act demonstrates how progressive Vermont was in enacting this law:

> Whereas, it is necessary to regulate and control the utilization and usages of lands and the environment to insure that, hereafter, the only usages which will be permitted are not unduly detrimental to the environment, will promote the general welfare through orderly growth and development and are suitable to the demands and needs of the people of this state (State of Vermont).

Rhode Island's Comprehensive Planning and Land Use Regulation Act of 1988 is generally considered one of the country's best state planning laws

(American Planning Association 2002). Under the Act, every city and town is required to prepare and adopt a local comprehensive plan containing nine mandatory elements, including land use, open space, and natural resources. A separate Zoning Enabling Act requires consistency between local zoning ordinances and comprehensive plans. All comprehensive plans and subsequent amendments are required to be submitted to the state for review and approval and must be in compliance with the Comprehensive Planning and Land Use Regulation Act, the State Guide Plan, and state agency policies and programs (Reason Public Policy Institute).

In addition to these initiatives, there is considerable interest in open space preservation in New England. According to the National Land Trust Census conducted in 2000 by the Land Trust Alliance, the Northeast region (New England plus New York) had by far the largest number of land trust organizations of any region (497) and had protected the largest number of acres of open space (1,735,971 acres, or 702,822 ha). Massachusetts, Maine, Connecticut, and New Hampshire were all in the list of the 10 states with the largest number of land trusts. These Figures are not only due to the limited and urbanizing landscape of New England, but due to the recent provision of state programs assisting land protection. Connecticut, Rhode Island, Massachusetts, and New Hampshire have all passed legislation in recent years to provide funding for local open-space preservation (American Planning Association 2002).

European Nations, with Emphasis on Northwestern Europe

Governmental structures vary dramatically among European countries, so it is not surprising that planning processes vary considerably as well. Land planning began over 100 years ago (Langevelde 1994), perhaps earlier. Numerous descriptions of contemporary European planning have been published (e.g., Cullingworth 1994; Langevelde 1994; Bromley 1997; Marshall 1998; Schwartz 1998; Faludi 2002). Here, we provide only a comparative thumbnail sketch that stresses regional differences and similarities, as well as an overview of arguably the most progressive planning system, that of the Netherlands (Bromley 1997:265).

Planning varies considerably among European nations in terms of local, provincial, and national levels of control, attitudes, and coordination. In Britain planning is essentially top down; central government control is apparent. For instance, "structure plans" crafted at the local level require the approval of the secretary of state (Cullingworth 1994). In Spain, on the other hand, regulation of land use is strongest at the municipality level, with relatively weak provincial or national control, at least in some areas (Marshall 1998). France is somewhat intermediate in its distribution of power for planning purposes; a local plan (*plans d'occupation des sols*) is

required for development, with areas outside of the local plan under control of national regulation (*in* Cullingworth 1994).

In such countries as Germany (referring here to the former Federal Republic of Germany), the Netherlands, Belgium, and the United Kingdom, the notion of planning for the greater public good and with attainment of multiple objectives in mind, including nature and biodiversity, appears to be strongly established (Baines and Jones 1994; Jongman 1994; Kleyer 1994; Langevelde 1994; Starfinger and Sukopp 1994; Bromley 1997; Santos 1998). In other countries, especially those in eastern Europe, multi-objective planning for sustainable development in harmony with the environment has been hindered by their restructuring to a market economy (Fodor 1998). In Romania, for instance, national statutes with environmental provisions (e.g., clearing or development of wooded areas) hold little sway in local villages where planning concerns are subservient to improvement of living standards (A. Moisuc, personal communication). This is not to say that citizens of eastern European countries view multi-objective planning as undesirable. In Poland, the intensification of agriculture faces resistance because of a national sentiment against adverse impacts on biodiversity and environmental quality (Ragland and Kukula 1995). Differences in attitudes toward land-use controls among eastern European countries may continue to expand if transitions to a free-market economy continue to occur at different rates (Lerman 2001; Wilson and Klages 2001).

Coordination of planning organizationally is a key feature for attainment of multi-objective, large-scale goals. Integration of planning efforts across agencies within countries has been variable, even in countries with strong records of environmental planning. For instance, coordination of agricultural and water management officials has been limited in England (Schwartz 1998). An analysis of physical, environmental, and water-management planning systems in the Netherlands identified a need for more coherent policies to facilitate coordination, and merger or increased cooperation of planning groups at the provincial and municipal level, respectively (Watson 1998).

Coordination also is essential for multijurisdictional planning, and a detailed example of multi-objective, multijurisdictional planning is presented later in this volume by van Mansfeld (Chapter 15). The European Union recognized over a decade ago the need for planning to occur across national boundaries, both for development and environmental objectives (Jansen and Hetsen 1991; Jongman 1994). In 1999, the European Spatial Development Perspective (ESDP) was adopted after greater than 10 years of debate (European Commission 1999). The ESDP addresses economic competitiveness for the European Union within the context of social and environmental constraints (Faludi 2002) and paves the way for transnational planning (Doucet 2002).

Fragmentation of natural areas due to agriculture has elicited an initiative to establish an ecological network of protected areas across Europe. Driven in large part by public sentiment for conservation of rare and endangered species, the European Habitat Directive of 1992 led to the establishment of the Natura 2000 ecological network (European Commission 1999:72–73). However, national commitments to protected areas differ greatly, ranging from 4.0%–24.6% in nature, landscape, or international protection (Table 13-1; Jongman 1994; Ragland and Kukula 1995; United Nations Environment Programme). A greater level of protection of land is observed in northern and western Europe (Table 13-1). We examined whether protection was related to the percent of each nation in agriculture, which may index the degree of fragmentation. Although the average percentage of farmland in southern and eastern European nations is 44.1%, or 1.5 times greater than the average coverage of 30.0% in northern and western Europe (Table 13-1), there was no relation between agriculture and percentage of land in protected areas ($r = -0.35, n = 10, P = 0.32$). Poland, one of the most intensively agricultural nations we considered, has a long history of nature protection (United Nations Environment Programme 1997).

The Netherlands may provide one of the best examples of a country that has placed great emphasis on nature-based planning and the concept of ecological infrastructure (Van Lier and Cook 1994). Therefore, we will describe this system in more detail. In its 1990 National Nature Policy Plan (NNPP), the Dutch government chose to improve the biodiversity of the country by creating an ecological infrastructure with three actions: (1) establishment of large nature units, (2) nature development on former agricultural land, (3) connecting the large units with corridors or connectivity zones (Lammers 1994). A large budget was reserved for purchasing ground, developing new natural areas, and for making "ecoducts" (wildlife bridges or tunnels) under/over main highways that dissected natural areas. Detailed plans subsequently were devised for each region within the Netherlands and currently are in the implementation stage with a time horizon for completion by 2018. The general goal of the NNPP is to bring the level of biodiversity in the Netherlands eventually back to the level in reference ecosystems in other countries with less intensive agriculture and less fragmentation or to the level of ca. 1900, before the industrialization of agriculture.

Part of the NNPP is a directive on compensation and mitigation. Whenever a natural value is destroyed, the offending party must compensate for this loss elsewhere. For example, when trees are logged to make room for housing or infrastructure development, new trees have to be planted elsewhere. Mitigation measures must be taken whenever compensation cannot completely make up for the lost values, as in cases where nature areas are dissected by roads or railroads. In these cases, ecoducts are

constructed as mitigating measures because habitat fragmentation is one of the main biodiversity threats in the Netherlands. Consequently, any major landscape plan typically is accompanied by an elaborate mitigation and compensation plan for the most important species occurring in the area. Experts must authorize these plans before acceptance.

Comments and Comparisons on Planning

What are we to conclude from these descriptions of planning in different states and countries? The commitment to landscape planning generally and nature-based planning in particular appears to be weakest in the agricultural United States and strongest in northwestern Europe. The central Midwest is characterized by a dominant agricultural influence, an emphasis on local control of land use, weak influence of state government, relatively little emphasis on natural-resource protection, and practically no regional planning efforts for natural resources or biodiversity. Private property rights are strongly supported, and land has been viewed principally as a replaceable commodity from which profits are to be derived by the owner rather than an irreplaceable trust to be preserved and managed (Cullingworth 1994).

New England is in many ways more progressive than other regions of the United States regarding planning, presumably because it was settled earlier, incorporated earlier, and convinced of the need for planning earlier. However, much remains to be done there if biodiversity, water quality, and other natural resources are to be preserved, and the major challenges are a direct result of the history of the landscape and its settlement. Land-use controls are created, implemented, and enforced at the most local level possible, and federal and state governments will never have all the resources or authority needed to replace this system. Federal and state governments must find ways to assist, catalyze, prod, and cajole local officials to not only do a better job in their community, but to work with their neighbors toward more rational land use and growth-management controls (*cf.* Cullingworth 1994).

Northwestern Europe generally, and the Netherlands in particular, exhibit landscape planning that is broader in scope, more ambitious, and more sophisticated than in the two regions of the United States that we examined. Integration of multiple objectives into plans is fairly commonplace, and a connected hierarchy of municipal, provincial, and national regulations often is evident. Improvements must be made in coordination of planning efforts among agencies. The initiatives of the European Union to enhance planning across national boundaries are noteworthy. These and other efforts (*see* van Mansfeld–Chapter 15) should serve as models for interstate planning efforts in the United States.

Testing Hypotheses to Explain Spatial Variation in Planning

Above, we have described some of the differences that occur spatially in terms of commitment to land-use planning, especially with respect to nature conservation. Here we attempt to quantify these differences and examine patterns of association with potential explanatory variables. We readily acknowledge the large margin for error associated with attempts to assign a single score to states with respect to planning, but we believe that the heuristic advantages outweigh the technical difficulties.

We assigned scores to each state on a 7-point scale, from least to greatest importance of nature protection (Table 13-1). At the most rudimentary level, a score of 0 was assigned if no land-use planning was evident. At the next level a score of 1 was assigned if planning at the local level was not required by statute but was allowed or even encouraged by provincial, state, or national government. A score of 2 was assigned if local land-use planning was mandated by statute but without specification or enforcement of minimum standards. A score of 3 was assigned if provincial, state, or national statutes required minimum local standards unrelated to the environment. A score of 4 was assigned if minimum local standards for nature protection were in place (e.g., open-space provisions, set backs, conservation commissions). A score of 5 was assigned if land-use planning occurred commonly at a multijurisdictional level, thereby recognizing the interrelatedness of communities in terms of impacts of land-use decisions. A score of 6 was assigned if land-use plans were required to consider biodiversity directly (e.g., no net habitat loss or habitat mitigation requirements). Finally, a score of 7 was assigned if the preceding standards had been met and, in addition, planning for nature conservation and biodiversity was conducted at large spatial scales and across political boundaries.

The Role of Wealth

The most affluent states occur in the New England region of the United States, with the poorest occurring in eastern Europe (Table 13-1). Relatively little variation in per capita gross domestic product (GDP) is evident within the United States. In contrast, large disparities in wealth exist among European nations, roughly divided into north and south. Although all share an agrarian history, cultural and political differences have resulted in quite different economic trajectories for northwest versus southeast European nations. In the Northwest, industrial capitalism began in the early 1800s, resulting in the epoch of modern growth. The transition phase from agrarianism to industrialization was delayed by as much as 60–120 years to the south and east (Fei and Ranis 1997:7), with eastern Europe experiencing further constraints on development and accumulation of wealth due to a centrally controlled social market economy from 1945–1989 (Fodor 1998).

A linear regression of planning score against per capita GDP revealed no relationship when all sites were considered ($r^2 = 0.00, 1, 18\ d.f., P = 0.91$). Likewise, no relationship between wealth and planning sophistication existed within the United States ($r^2 = 0.01, 1, 8\ d.f., P = 0.79$). However, a strong positive association was evident for European nations ($r^2 = 0.86, 1, 8\ d.f., P < 0.001$). These findings support the notion that a threshold level of affluence is necessary for the evolution of nature-based landscape planning (Figure 13-1). This also suggests that affluence is not by itself sufficient for the evolution of nature-based planning, as evidenced by the low planning scores for affluent states in the United States. To avoid further confounding associated with economic disparities, all subsequent analyses were restricted to the 10 states from the United States and the 5 north and west European nations of Table 13-1.

The Role of Resource Scarcity

Support exists for the proposition that "communities control population growth to avoid adverse fiscal and environmental impacts and maintain the social and economic character of the community" (Dowall 1980:414). In addition, scarcity of natural resources has been suggested as a factor that influences a society's willingness to control growth or land use. For example, "land use and landscape planning in the Netherlands is characterized by scarcity of land" and the demand on land has resulted in "landscape planning in the Netherlands [that] reflects several social, economic and political developments and a change in the perception of land" (Langevelde 1994:30).

We used population density as a surrogate measure for scarcity to test whether scarcity explains changes that can be seen in the levels of sophistication for nature-based planning. Our premise was simple: if population density is high, it may affect quality of life or environmental quality in an area. In addition, if population density or resource demand is high enough for resource scarcity to result, one would expect communities to increase their willingness to protect these resources. A reasonably direct measure of scarcity is the average land value of farmland (i.e., land potentially available for development). The reasoning behind this conclusion is simple: economics stipulate that price should articulate the relative abundance of supply of a resource in relation to the demand for it (Tietenberg 1992). Thus, if the public's demand for undeveloped lands is greater than the existing supply, land prices should rise. Therefore, price is an indicator of scarcity of open lands and the resources they provide relative to demand from the community. Because we did not have access to land prices for some European countries, we used population density as a surrogate of land scarcity. We believe that this is reasonable, because the correlation between the two variables was

highly significant when measured using the 13 sites for which we had data ($r = 0.835$, $P < 0.001$). Regression of planning scores on population density for the 15 most affluent states resulted in a significant positive association (Figure 13-2a; $r^2 = 0.40$, 1, 13 *d.f.*, $P = 0.01$), suggesting that increases in land scarcity can lead to increased commitment to landscape planning, consistent with expectations. In New England, the relative scarcity of agricultural land, coupled with the lack of publicly owned land, translates to fairly high land values. The average value per hectare of farm real estate in the New England states is $9,559 ($3868.3 per acre) (United States Department of Agriculture 2001). Agricultural land values range between $3,459–$18,038 per hectare in these six states, showing the range of differences between a sparsely populated state like Maine (16.1 people per km^2) to a densely populated state like Rhode Island (391.9 people per km^2), respectively (Table 3-1). In the central Midwest, land prices are only 64% of those in New England, on average, corresponding to a density that averages only 39% of that found in New England. The Netherlands exceeded all states in our sample in both land prices and density (Table 13-1).

The Role of Time

Although population density and land scarcity can be important in explaining differences between individual communities in affluent societies (as discussed in the previous section), they may be less instructive in predicting where a region may fall along the nature-based planning continuum. Instead, we have hypothesized that communities experience an evolution in their outlook on land use and landscape planning as they mature. Dates of "settlement" for Europe are difficult to determine; humans have occupied and altered landscapes in Europe for millenia, clearing forests for small-scale agriculture in the early Neolithic (Frenzel *et al.* 1992). For simplicity, we chose to calibrate our timeline from 1400, the beginning of the epoch of mercantile agrarianism (Fei and Ranis 1997).

Our results support the first prediction of the model of planning evolution. For the 15 most affluent states, linear regression demonstrated a strong relationship between planning scores and elapsed time since settlement (Figure 13-2b; $r^2 = 0.88$, 1, 13 *d.f.*, $P < 0.001$). The 15 states in our analysis mimic closely the evolutionary trajectory characterized by lineage *a* in Figure 13-1. Although it is much more recently settled than Europe, the New England region has been "settled" longer than most other regions of the United States. European settlements began to dot the Massachusetts and Connecticut landscape in the early 1600s, where they joined what is believed to be one of the densest concentrations of native Americans in North America. Because of the long period of settlement and the small land area, New England is relatively thickly settled, especially in the south. The

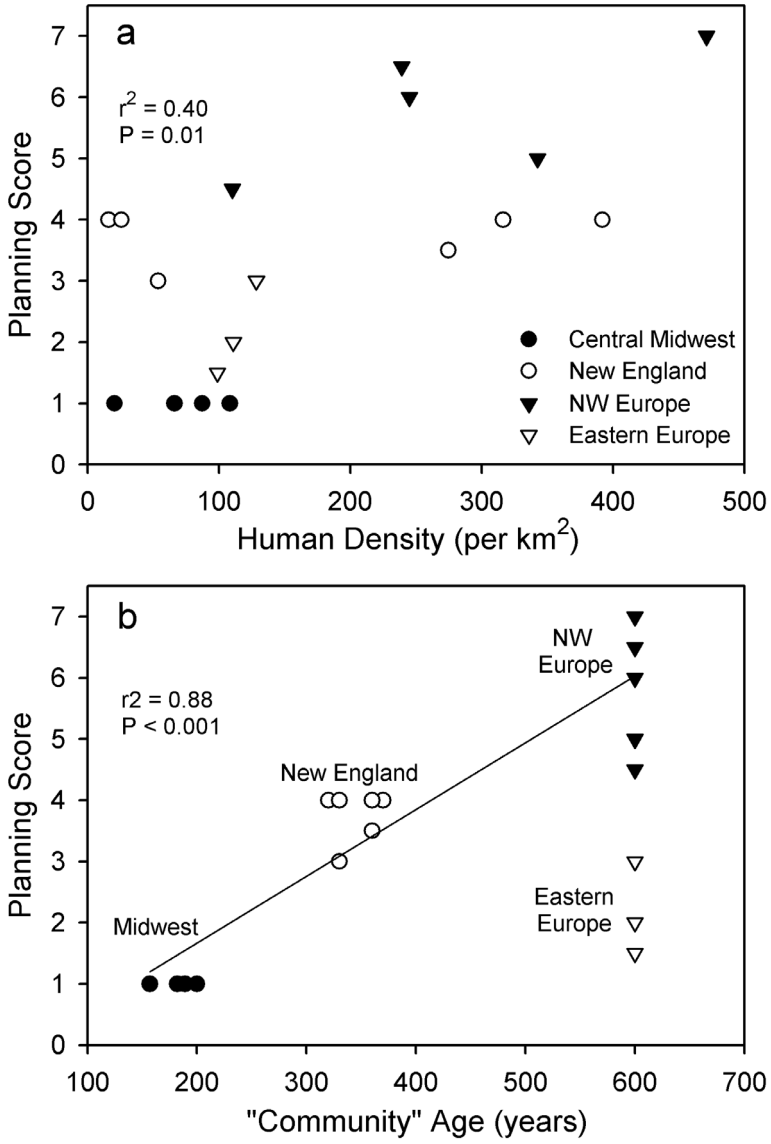

Figure 13-2. Differences in the level of importance given to landscape planning, especially consideration of nature, by regions that vary in terms of (a) human population density (individuals per km^2) and (b) "community" age (roughly, elapsed time in years since settlement and establishment of agriculture). The planning continuum is partitioned into eight stages, from least to greatest commitment to nature-based planning. Details of the planning score are provided in the text. The line in panel b is the least-squares regression for the 15 "communities" considered in the analysis as members of a single lineage (see "a" in Figure 13-1).

three southern New England states (Connecticut, Rhode Island, and Massachusetts) have population densities 7–10 times that of the United States average, whereas the three northern states (Vermont, New Hampshire, and Maine) are close to or below the national average (U.S. Census Bureau 2001). The central midwestern states were granted statehood less than 200 years ago. Ohio was the first central midwestern state, receiving statehood in 1803; Iowa was the most recent addition, in 1846 (Federal Consumer Information Center). Intensive settlement of this area began in the early 1800s. As individuals migrated westward, those states farther west experienced influx (Cayton and Onuf 1990). For example, Ohio's population rose from approximately 45,365 to 230,760 between 1800 and 1810, whereas Indiana and Illinois increased from 24,520 and 12,282 to 343,031 and 157,445, respectively (Cayton and Onuf 1990).

The second prediction of the model of planning evolution also was supported; namely, older communities (European nations) exhibited considerably more variation in levels of planning sophistication than did communities (states) at younger ages. We contend that such an increase in variation occurs because of the accumulation of historical contingencies affecting transitions and hence trajectories in community planning systems.

Obviously, there are a multitude of variables that can play a role in influencing a community's willingness to protect nature, many of which overlap (B. Miller *et al.*–Chapter 14). Nonetheless, we believe that recognizing the contribution of the variable "time since settlement" offers the hope that as communities grow and mature, their struggles of how to balance environmental resources with economic growth also will evolve (Figure 13-1).

ECOLOGICAL MODELS AS ACCELERATORS OF A COMMUNITY'S EVOLUTION IN NATURE-BASED PLANNING

Communities at any point along the planning sophistication continuum characterized in Figure 13-1 can expect to encounter regular challenges in incorporating the protection of nature into their landscapes. By placing communities in a historical context, leaders can gain an awareness of the natural trajectory their community is following and make comparisons with communities further along on this trajectory (due to their longer time periods to cope with these challenges). Such comparisons may provide guidance and examples of how to proceed.

Of course, the use of ecological models to inform local land-use decisions is not possible until communities begin to value the broader features of biodiversity in their landscape. This point seems likely to occur in the more mature stages of a community's evolution (Figures 13-1, 13-2b). The

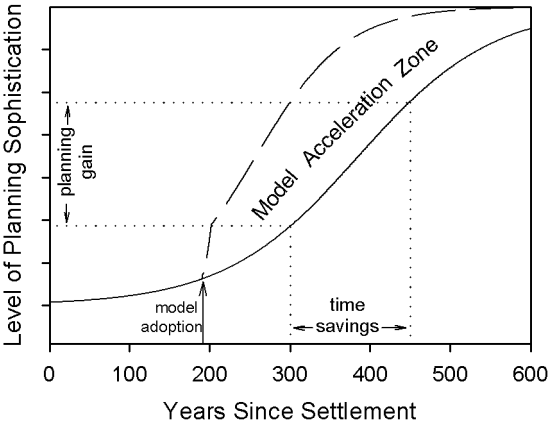

Figure 13-3. Hypothetical effect of model-based planning tools on the rate at which communities adopt more complex, sophisticated, and environmentally sensitive land-use planning. The historical trajectory of land-use planning (solid line) is obtained from a study of older communities with similar affluence levels (i.e, of the same lineage). An objective of model-based planning tools is to accelerate the evolutionary progression of planning in a community, resulting in greater savings of biodiversity and environmental integrity than if the historical rates of development and planning had been allowed to repeat themselves. The dashed line represents the trajectory resulting from adoption of model-based planning by a 200-year-old community, which was assumed to increase the rate of progress along the planning continuum by 50% over a 10-year period. A logistic form of "growth" in planning sophistication was assumed. Predicted changes 100 years after adoption are a level of planning sophistication double the level obtained for communities remaining on the historical trajectory, or a time savings of about 150 years, in planning terms.

United States is younger and appears to lag behind many European nations in nature-based planning efforts. The question, then, is: Can ecological models help communities in the United States advance along the planning continuum at a faster pace than might naturally evolve over time (Figure 13-3)?

We have no definitive answer to this question, but we are optimistic. For one thing, public concern over nature and biodiversity is increasing. The 2002 Biodiversity Survey revealed that 26% of the American public felt that the loss of place in nature to development was an extremely serious problem, ahead of water pollution (22%) and air pollution (22%) (Belden *et al.* 2002). Ecological models may be one key to heightening of public awareness regarding the threats that poor planning poses to nature. Models also can serve to assess alternative planning scenarios. Both of these traits function to accelerate the rate at which a community progresses along the planning sophistication continuum. By speeding up the progression, a community's leaders can avoid the consequences of losing critical resources

while the normal course of planning sophistication evolves, and therefore stand a better chance of maintaining or enhancing biodiversity.

It is clear that ecological models can help communities make informed decisions that will protect ecological resources. By being pro-active, communities can use model projections to predict the impacts of their land-use decisions and thus avoid repeating mistakes made by older communities at a comparable point in their history. For example, suppose that a 200-year-old community in the central Midwest adopts models as a key infrastructure in its planning process. If models are phased in over 10 years and lead to a 50% increase in the rate at which landscape planning evolves, the resulting savings is depicted in Figure 13-3 as a model acceleration zone. The model acceleration zone represents the savings in time and the gain in planning sophistication that accrue as a result of using models. In the hypothetical example of Figure 13-3, the savings to the community 100 years after phasing in of models would be considerable. Specifically, the community's level of planning sophistication would be double the level it would have achieved in the same period of time without planning. Put another way, without models the community would have been 450 years old before reaching the level of planning sophistication achieved at 300 years of age by adopting models.

We believe that the use of model projections to accelerate a community's rate of planning evolution is preferable to making mistakes and then seeking solutions to errors caused by pursuing short-term goals.

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