ENGAGING THE FUTURE

Forecasts, Scenarios, Plans, and Projects

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DELIBERATING ABOUT THE FUTURE

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Richard E. Klosterman

The planning profession's methodological foundations are in question. The combined forces of academic theorizing and political expediency have made public participation "the cry of the age" (Campbell and Marshall 2000, 321), as private citizens, elected officials, and planners are increasingly abandoning the ideal of neutral professional expertise for a new emphasis on public involvement. On the other hand, more technically oriented practitioners and academics continue to rely on the methods and models that are based solidly on the technocratic ideal of value-neutral science.[1]

In academia, the inherently political nature of planning, the importance of informal communication, and the need for combining technical competence with political sophistication have occupied the core of planning theory courses since the 1970s (Klosterman 1981; 1992). However, these lessons have been largely neglected in planning curricula, which all too often treat analytic methods as value-neutral objective techniques of scientific analysis. This image of value-neutral technical competence is reflected in professional practice by the continued reliance on sophisticated analytical techniques and increasingly complex computer-based models that portray planners' forecasts and analyses in dry images of technocratic expertise.

The sophistication of planners' analyses and forecasts is, however, often more apparent than real. The core assumptions that underlie a forecast (e.g., whether past growth rates will continue, increase, or decrease) play a much larger role in determining the forecast outcomes than the sophistication of the tools used to prepare them. Other equally important choices must be made in the selection of data, the application of computational procedures, and the analysis, presentation, and distribution of results. These choices are inherently political because they determine not only the analysis results but also the perception of problems and the identification of solutions, helping determine who gets what, when, and how (Klosterman 1987, 444; Wachs 1982). Recognizing that forecasts are both politically influential and difficult, if not impossible, to evaluate, planners—and their clients—can all too easily claim to be carrying out a value-neutral process of forecasting, while adjusting the underlying assumptions to produce their preferred outcomes (Wachs 2001, 370–371).

PRINCIPLES FOR DELIBERATIVE FORECASTING

A realistic assessment of forecasting must begin by recognizing that planners' information and knowledge are limited, their data and models often contain large amounts of error, and their forecasts are almost always wrong.[2] More importantly, it must acknowledge that the future is impossible to predict—particularly for small areas and long time periods. As a result, planners should abandon the unrealistic goal of preparing exact predictions of an unknowable future. Instead they should prepare a range of forecast scenarios describing a range of possible futures.

Recognizing that there is no way to evaluate a forecast until the forecast date arrives, planners must recognize that accuracy cannot be the proper criterion for evaluating forecasts. Instead, planning forecasts should be evaluated with respect to their ability to inform the policy-making process, facilitate community understanding, and prepare the public to deal with an uncertain future. Judged on these grounds, good forecasts will incorporate as many different kinds of information from as many perspectives as possible and help reduce the influence of expedient or self-serving viewpoints and overly optimistic—or pessimistic—thinking (Skaburskis 1995, 194).

Planners must also acknowledge that their forecasts are ultimately dependent on their underlying assumptions, and thus planners should consciously adopt the "What if?" metaphor popularized by electronic spreadsheets. That is, they must explicitly acknowledge that the results of their analyses only indicate what would happen if the underlying assumptions were correct. This suggests that planning models should explicitly state their underlying assumptions concerning future trends and alternative policy choices. These assumptions should be easily modified and the effects of alternative assumptions and policy choices should be easily identified.

In addition, planners must recognize that they have no special knowledge about the future and that sophisticated projection models and methods will probably be no more accurate than simpler ones (Skaburskis 1995; Smith 1997; Wachs 1989). They must also acknowledge that their models will only be useful in a policy context if policy makers and the public understand and trust them. As a result, planners should attempt to develop models that are as simple—rather than as complex—as possible. While the model's detailed computational procedures will generally be too involved for nonexperts to understand, their underlying structure, assumptions, and limitations should be as explicit and clear as possible.

Finally, planners' analyses, methods, and models must be documented fully so that policy makers, the public, and other experts can understand them. Planning forecasts and the models that are their bases all too often fail to describe the data, computational procedures, and assumptions on which they are based. As a result, elected officials and the public are forced to rely on the undocumented professional expertise of the often unknown individuals who prepared them. Only by making these foundations explicit and open can properly designed and documented models and methods allow policy makers, the public, and other experts to evaluate adequately the policy analyses and recommendations they receive.

On this model, public policy making would not be based on the assumed expertise of professionals or the presumably objective analysis of technical experts. Instead, it would be based on explicitly political processes of deliberative modeling in which community members use mutually agreed-upon models, techniques, and data to examine policy questions from their own, perhaps fundamentally different, perspectives (Klosterman 1987, 444–448; Wachs 2001, 371–372). By helping reveal the possible outcomes, different assumptions, and actions, a new generation of computer tools may thus help provide the technical foundations for community-based processes of collective design, collaborative planning, and consensus building that attempt to achieve collective goals and deal with common concerns (Klosterman 1997, 51).

IMPLEMENTING THE FORECASTING PRINCIPLES

This chapter describes an attempt to incorporate these ideals into an operational planning support system (PSS) named What if?™[3] As its name suggests, What if?™ does not attempt to predict a future as if we could get it right. Instead, it is an explicitly policy-oriented planning tool that can be used to determine *what* would happen *if* clearly defined policy choices are made and assumptions concerning the future prove to be correct. Policy choices that can be considered in the model include the staged expansion of public infrastructure, the implementation of alternative land use plans or zoning ordinances, and the establishment of farmland or open space protection programs. Assumptions about the future that can be considered in the model include future population and employment trends, household characteristics, and development densities.

What if?™ is a relatively simple, rule-based model that does not attempt to duplicate the complex spatial interaction and market clearing processes that shape the urban fabric (Klosterman and Pettit 2005). Instead, it incorporates a set of explicit decision rules for determining the relative suitability of different locations, projecting future land use demands, and allocating the projected demands to suitable sites. The model is a stand-alone product that adapts to the geographic information systems (GIS) data for any area and can be used to project the population, housing, and employment for census enumeration areas, political jurisdictions, school districts, traffic analysis zones, and other user-defined areas. It has been applied in the United States at the township, county, and regional levels (see, e.g., Klosterman et al. 2002; 2006) and internationally (see, e.g., Kweon and Kim 2002; Pettit 2005).

What if?™ includes four major components—Current, Suitability, Demand, and Allocation. The Current component allows the user to view maps showing the GIS layers that are used in the analysis and reports listing current land use, population, housing, and employment information for the study area and its subareas. The Suitability component considers the supply of land by allowing the user to specify: (1) the importance of different factors in determining the relative suitability of different locations for accommodating future land use demands; and (2) public policies that limit the amount of developable land. The Demand component considers the demand for land by allowing the user to prepare scenarios projecting the amount of land that will be required to accommodate future population and employment growth. The final component, Allocation, jointly considers supply and demand by allowing the user to create Allocation scenarios that project future land use, population, and employment patterns by allocating the projected land use demands (as determined by a Demand scenario) to the most suitable locations (as determined by a Suitability scenario). The Allocation scenarios can also incorporate public policies such as the implementation of a land use or open space preservation plan or the staged expansion of public infrastructure.

The role that What if?™ Suitability, Demand, and Allocation scenarios can play in deliberative planning practice will be illustrated with two examples: Waupaca County, Wisconsin, and Dublin, Ohio.

Suitability Scenarios

In the spring of 2003, Waupaca County, Wisconsin, received a state planning grant to support the preparation of a countywide comprehensive plan and 33 local plans. The plan-preparation process included representatives from each local community, the county's economic development director, planning specialists from the University of Wisconsin–Stevens Point Center for Land Use Education, the University of Wisconsin Extension Community Resource Development Educator, and a consulting firm. Working closely with the county's professional staff, the group used What if?™ and GIS data from the county land information officer to create more than 250 Suitability scenarios for the county and 33 municipalities. The scenarios were created at fifteen public meetings, conducted over a six-month period, involving hundreds of participants.

The process of creating Suitability scenarios engaged the local community-planning commissions more concretely in planning for their communities than at any previous point in the process. Questions such as What does it mean for development if we protect farmland? had previously been abstract because they lacked a solid connection to the landscape, and there was little information on the implications of alternative choices. The process of creating the What if?™ Suitability maps encouraged people to think realistically about their goals and how to achieve them. By preserving some areas and opening other areas to development, the planning commission members could readily see the benefits—and the costs—of preserving farmland and the implications these choices would have on future development patterns.

The Suitability analysis process was based on maps that had been reviewed and corrected by the local planning commissioners. The process of reviewing and correcting the maps helped the commissioners become more familiar with their communities and created a sense of ownership in the data on which the Suitability decisions were based. The geography expressed in the maps provided a shared foundation for understanding the local landscape and the implications of implementing alternative actions. Perhaps most importantly, the Suitability maps were developed through a consistent and open process of decision making in public meetings involving the local planning commissions. This meant that the resulting Suitability maps—and the decisions on which they were based—were defensible and transparent. For example, if asked why particular areas were or were not available for development, the commissioners could point to the What if?™ Suitability maps and say, "We allowed development to occur here and not over there because we prefer to protect prime farmlands and expressed this in a policy to do so, and we believe that developers are more likely to develop here than there because of steep topography and access to public services."

The What if?™ Suitability scenarios can thus consider the assumed behavior of developers, community preferences about the future, and policies expressing these community preferences. In deliberative practice, it is important to be clear about which of these three factors is incorporated in a particular Suitability scenario. For example, figure 10.1 shows the Suitability map for low-density residential development in the town of Union, Wisconsin, under a scenario that assumes no public policies are implemented to limit future development.[4] The areas shown in green are assumed to be suitable for residential development from the perspective of developers. In figures 10.1 through 10.4, areas in darker green are assumed to be more suitable than areas shown in lighter green. Areas in grey are currently developed, and areas shown in white are water bodies or have high slopes, which prohibit residential development. This scenario simulates the behavior of developers considering only the ability of alternative sites to accommodate future growth, unconstrained by community preferences or public policies for directing that growth. Under this scenario, more than 20,000 acres of land are available to accommodate future residential growth.

Three alternative scenarios consider both the assumed behavior of developers and the effect of alternative public policies for guiding development. Figure 10.2 shows the low-density residential Suitability map for a scenario that assumes the town implements a farmland-preservation policy that prohibits development in areas with prime agricultural soils or within a quarter mile of a dairy farm. Under this scenario, only 12,300 acres are available for residential development, and large portions of the town will be protected from development, as the map indicates.

FIGURE 10.1
Residential Suitability for the Town of Union, Wisconsin: No Controls Scenario

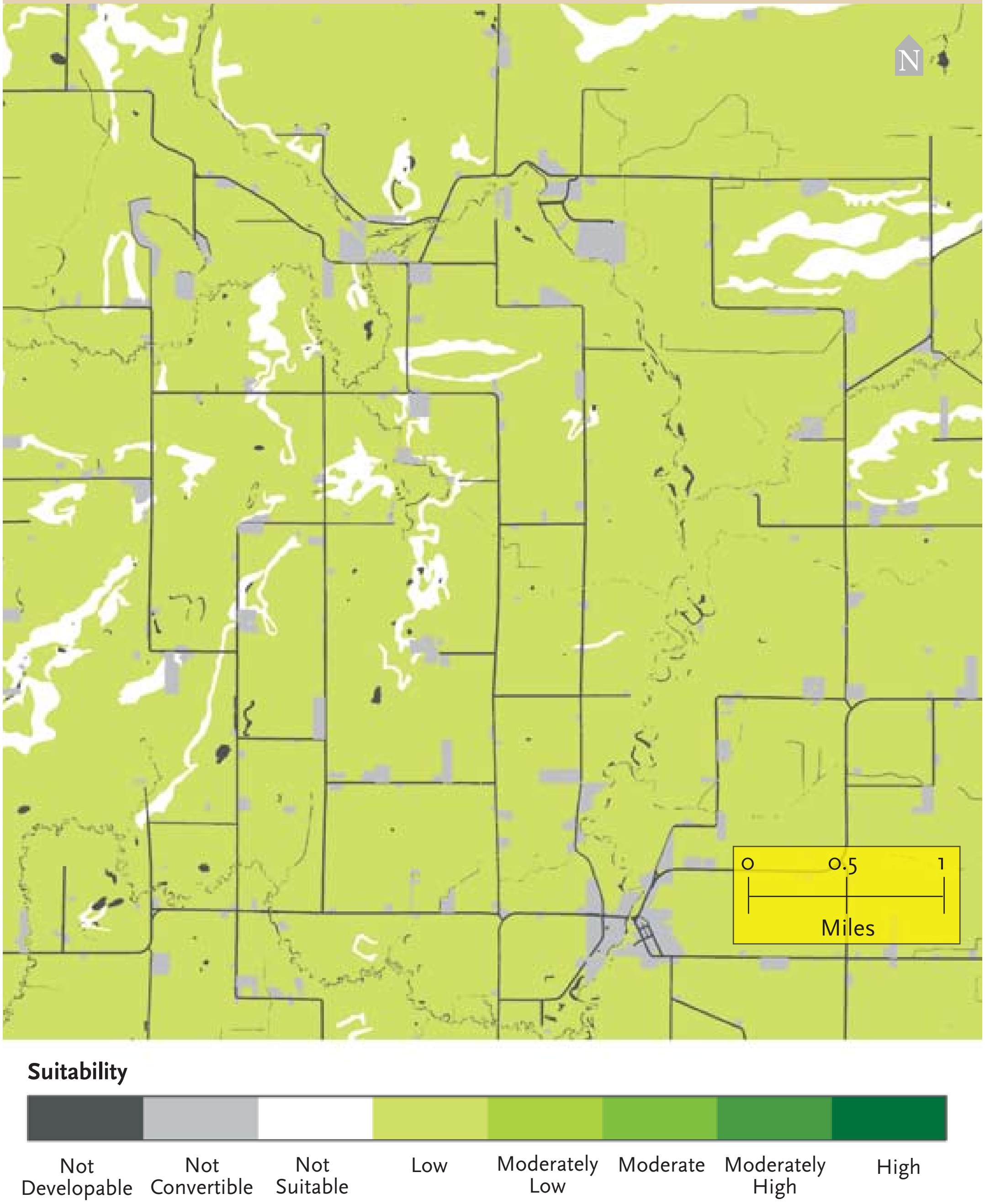
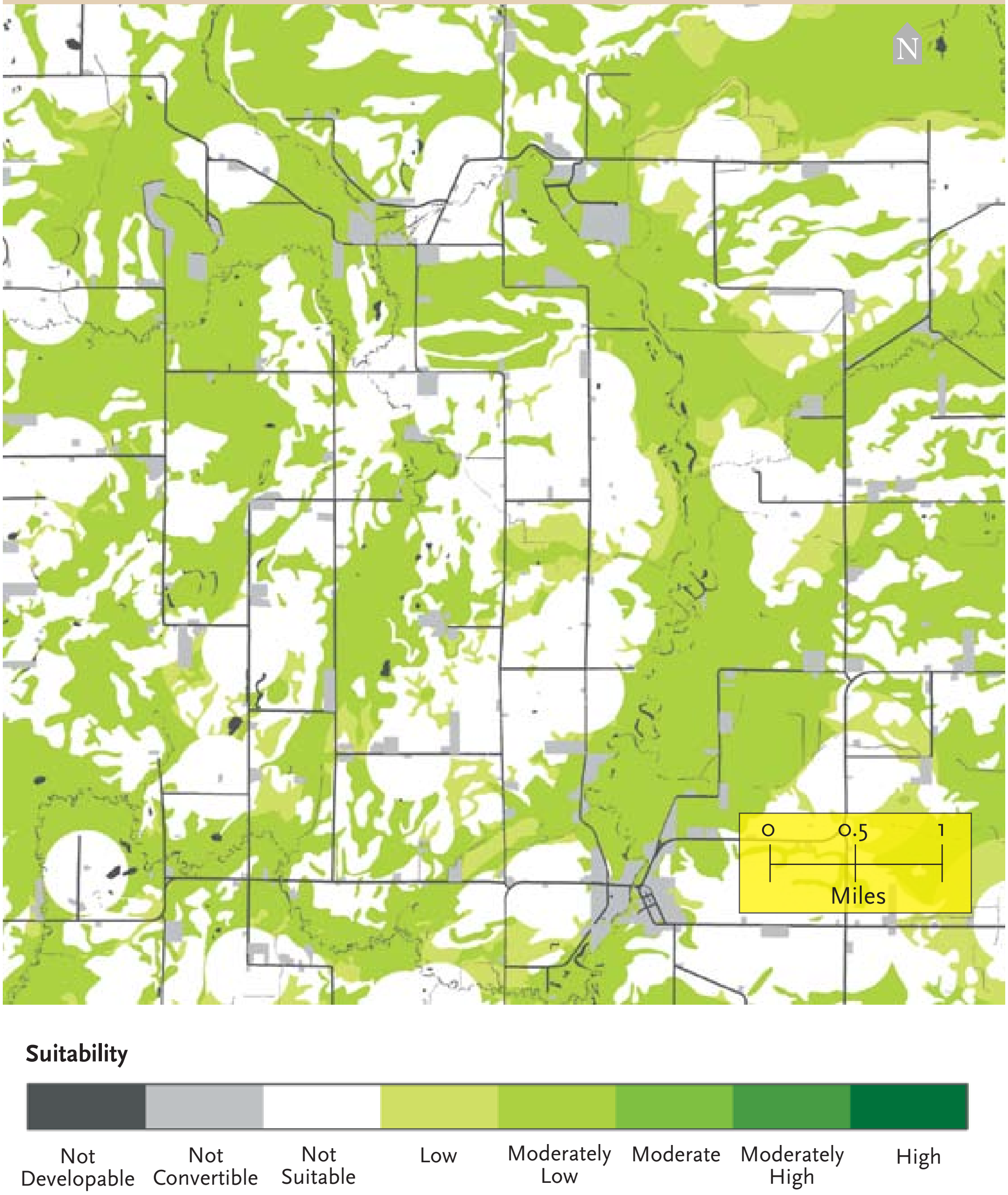


Figure 10.3 shows the low-density residential Suitability map for a scenario that assumed that the town implements an environmental protection policy that prohibits development in wetlands or within 100 feet of rivers and streams, wetlands, and managed forestry areas. The total quantity of land that is available for

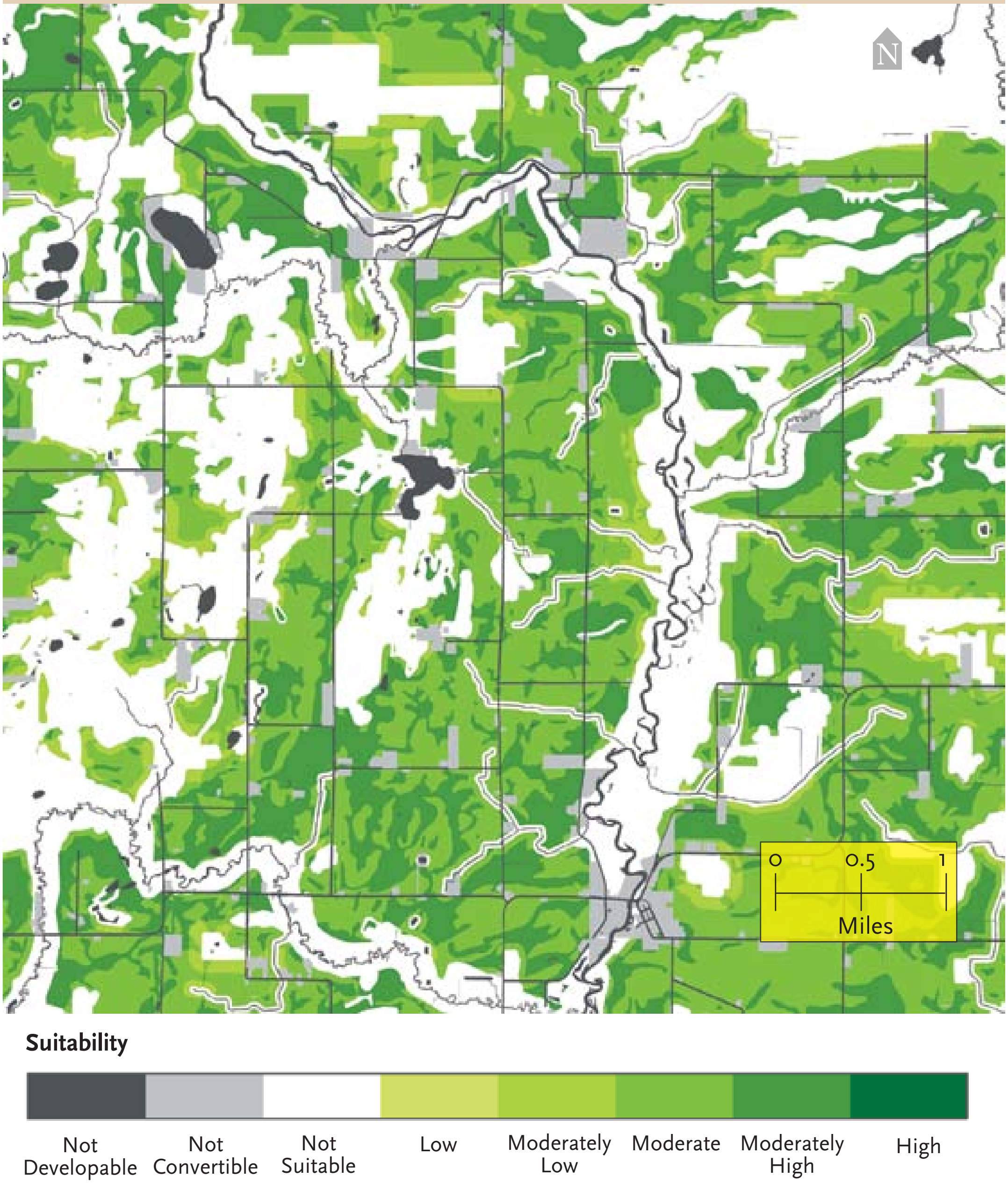
FIGURE 10.2
Residential Suitability for the Town of Union: Farmland Protection Scenario



residential development is nearly identical to the farmland-preservation scenario, but the location of developable land is substantially different.

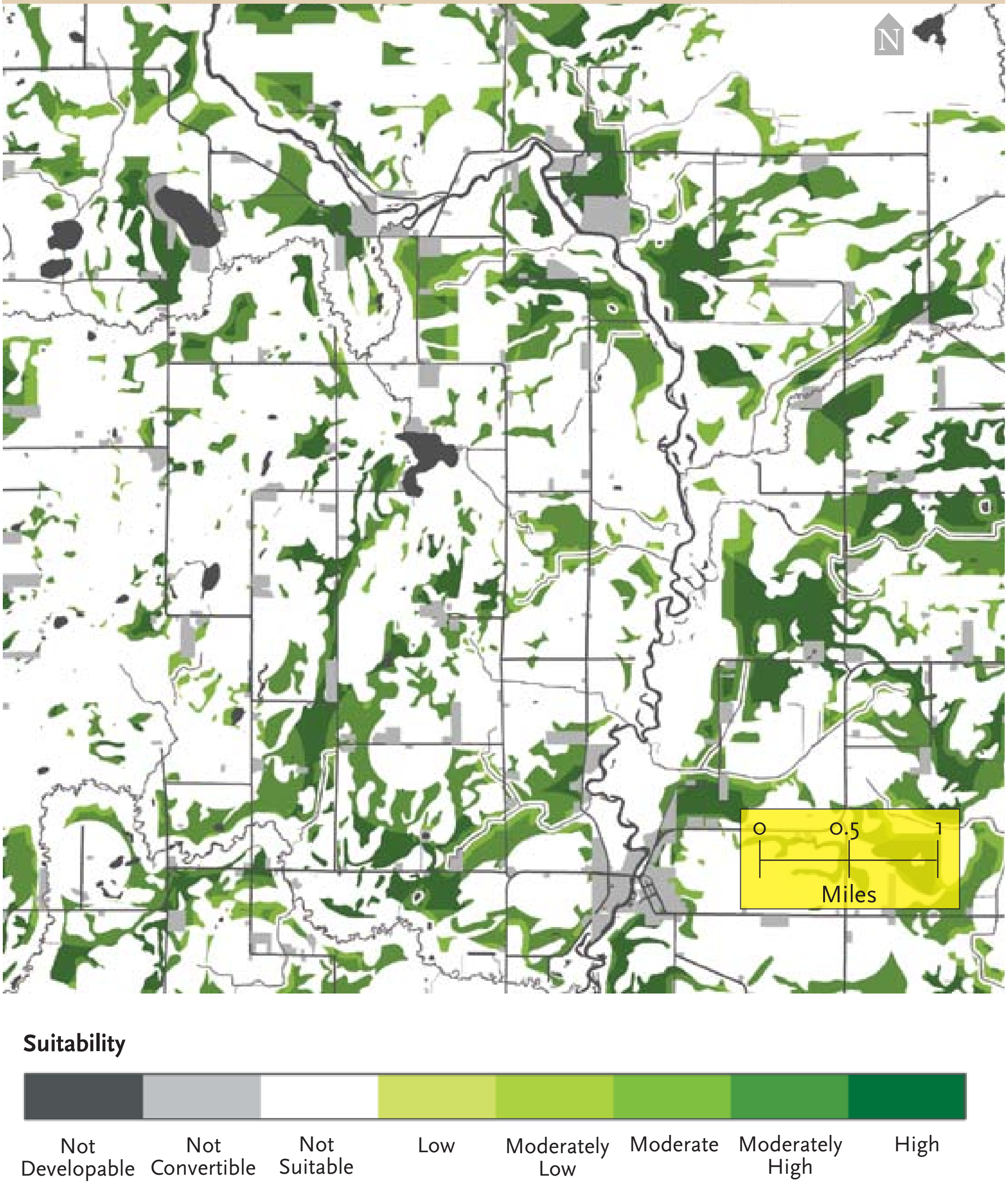
Figure 10.4 shows the low-density residential Suitability map for a scenario that assumed that the town implements both the farmland preservation and environmental protection policies. Under this scenario, only 5,400 acres are available

FIGURE 10.3
Residential Suitability for the Town of Union: Environmental Protection Scenario



for development, severely limiting the town's ability to accommodate future residential development. Together, the four scenarios reflect the assumed behavior of land developers and demonstrate clearly the trade-offs between the community's desires to accommodate future growth, preserve prime agricultural land, and protect the environment.

FIGURE 10.4
Residential Suitability for the Town of Union:
Farmland Protection and Environmental Protection Scenario



Demand Scenarios

The role What if?™ can play in considering the future demand for land can be considered by examining Dublin, Ohio, a rapidly growing community northwest of Columbus.[5] The city's population was less than 4,000 in 1980, quadrupled by 1990, and nearly doubled again to reach 31,400 by 2000. As a result, the community's residents are worried that this growth will continue and, if it does, the community may have difficulties dealing with the implications of this growth.

A conservative projection of past growth trends suggests that the city's population and employment will grow by only 14 percent in the next 25 years. Assuming that the community's housing mix and the residential and employment-related land use densities do not change, this will create a demand for roughly 2,100 more acres of residential land and 300 more acres of land for employment-related land uses. A moderate growth projection assumes that the city's population will grow by 52 percent and its employment will grow by 29 percent, requiring 4,680 acres of additional residential land and 630 acres of additional employment-related land.

A high projection of past growth trends suggests that the community's population will nearly double over the next 25 years and its employment will increase by 63 percent. Again, assuming that the community's housing mix and land use densities do not change, 7,700 additional acres of residential land and 1,400 acres of employment-related land would be required to accommodate the anticipated growth. To put this in perspective, if the high growth trends are observed, the quantity of land devoted to residential uses will more than double and the amount of land devoted to employment-related uses will increase by roughly 50 percent in 25 years.

What if?™ recognizes that future population growth is not the only factor that must be considered in creating scenarios for future land use demands. The demand for residential land is also dependent on the average household size and the average housing density. That is, if the average household size (persons per household) continues to decline (as it has over the last few decades), the number of housing units will increase more rapidly than the population, increasing the demand for land. Similarly, if the average household density (housing units per acre) decreases, as it has in most suburban areas, the demand for land will increase more rapidly than the population.

The amount of land required to accommodate future employment growth is likewise dependent not only on projected employment growth but also on future employment densities (employees per acre). The demand for land is also dependent on public policies concerning the quantity of land to be devoted to recreational and other public uses and set aside for open space preservation or agricultural protection uses. These factors can easily be considered in What if?™ by modifying future development densities and by specifying the amount of land to be protected from development or reserved for parks and recreation and other local land uses. The Demand scenarios incorporate assumptions about both the behavior of individuals, such as changes in the average household size, and public policies, such as the permitted development densities, that convert the projected population and employment trends into the equivalent land use demands. As was true for the Suitability scenarios, it is important to be clear about the behavioral assumptions and public policies that are expressed in a particular Demand scenario.

Allocation Scenarios

What if?™ projects future land use, population, and employment patterns for up to five projection years (for example, 5, 10, 15, 20, and 25 years) by allocating the projected land use demands—as specified by a Demand scenario—to different locations on the basis of their relative suitability, as defined by a Suitability scenario. An Allocation scenario adds two kinds of rules to the Suitability and Demand scenarios on which it is based. It sets the order in which land will be allocated to each use at each projection year, such as assigning commercial demand before residential demand. It also allows the availability of developable land to be modified in successive projection years to account for the staged expansion of infrastructure, such as extending sewer and water service or building new major roads and freeway interchanges at particular times.

An Allocation scenario can thus incorporate the public policies expressed in a Suitability scenario and other policies for implementing land use plans or zoning restrictions and for extending infrastructure. It can also include the assumptions concerning the behavior of developers expressed in a Suitability scenario (concerning, for example, the desirability of developing sites with different natural features). It can also incorporate assumptions about the behavior of developers in the form of assumed growth patterns, such as a GIS layer that numbers buffers around currently developed areas in increasing order by their distance from urban concentrations. The model can then use the growth pattern values in conjunction with the suitability of different locations to specify the order in which different areas will be developed.

For example, a user could assume that developers are more concerned with sites' natural features than with their accessibility and order the development of land parcels first by their Suitability scores and then by their growth pattern scores. Conversely, a user may assume that developers value nearby sites more than they value the sites' natural features and specify that the allocation is guided first by the growth pattern scores and then by the Suitability scores. The second option may also express a desire for—or a public policy of—encouraging compact development. Here again it is important to clearly identify the behavioral, community preference, and policy assumptions that generate the projected development patterns for a particular Allocation scenario.

Consider, for example, an Allocation scenario that assumes (1) the suitabilities defined by a preservation Suitability scenario; (2) the projected demands for the high-growth Demand scenario; and (3) public policies requiring new industrial development to be located in areas that are zoned industrial and have sewer service in a given year as specified by a 2030 Plan Allocation scenario. To allocate the projected industrial demand in the first projection year, the model (1) selects all of the land use polygons that are vacant or can be converted to industrial uses as defined by the preservation Suitability scenario; (2) selects all of the polygons in this set that are zoned industrial and have sewer service in the first projection year as specified by the 2030 Plan Allocation scenario; (3) rank orders these polygons in decreasing order of their Suitability scores for industrial use as computed for the preservation Suitability scenario; (4) determines the projected demand for industrial land in the first projection year as computed by the high-growth Demand scenario; (5) converts the land use for the polygon with the highest industrial Suitability score to industrial use and deducts the polygon's area from the projected industrial demand for industrial land; and (6) converts the use for the developable polygons with progressively lower industrial Suitability scores to industrial use and deducts the areas for these polygons from the projected industrial demand.

The process continues until the demands for all land uses in the first projection year have been satisfied. The model then repeats this process to allocate the projected demand for all land uses in the remaining projection years. The process stops when all of the demand has been allocated for all of the projection years or the model runs out of land, meaning that there is not enough suitable land to satisfy the projected demand in a given year. If this happens, the model issues a warning statement, and the user must modify the model assumptions to increase the supply of suitable land or reduce the demand for land.

For example, figure 10.5 shows the current land uses for Dublin, Ohio. The western half of the city is still vacant or devoted to agricultural uses (shown in green). The city's commercial and industrial areas (shown in purple and red) are concentrated near the circumferential road around Columbus that cuts through the lower right-hand corner of the city and along the interstate highway that leads to the northwest. The residential areas (shown in yellow) are located in the center of the city and inside the circumferential road.

Figure 10.6 shows the projected land uses in 2030 under a scenario that assumes the high population and employment projections and no effort to protect agricultural land or environmentally sensitive land. As the map shows, under these assumptions the vacant land in the western and southern parts of the city has been converted largely to residential uses, and industrial and commercial uses are scattered throughout the southern part of the city. This scenario suggests that the city's rural character (shown in figure 10.5) will be lost if the community continues to grow rapidly and nothing is done to protect its vacant and agricultural lands.

Figure 10.7 shows the projected land uses in 2030 under a scenario that assumes the medium population and employment projections and no efforts to protect agricultural land or environmentally sensitive land. As the map shows, there is much less residential development under these assumptions than there is under the high-growth scenario, but large portions of the vacant land in the western part of the city have still been converted to residential and employment-related uses, severely reducing the area's rural character.

Figure 10.8 shows the projected land uses in 2030 under a scenario that assumes the medium population and employment projections and the implementation of an open space preservation plan that does not allow development in the western quarter of the study area. As the map shows, under these assumptions the vacant land in the western part of the city is preserved; residential development

FIGURE 10.5
Current Land Uses: Dublin, Ohio, 2005

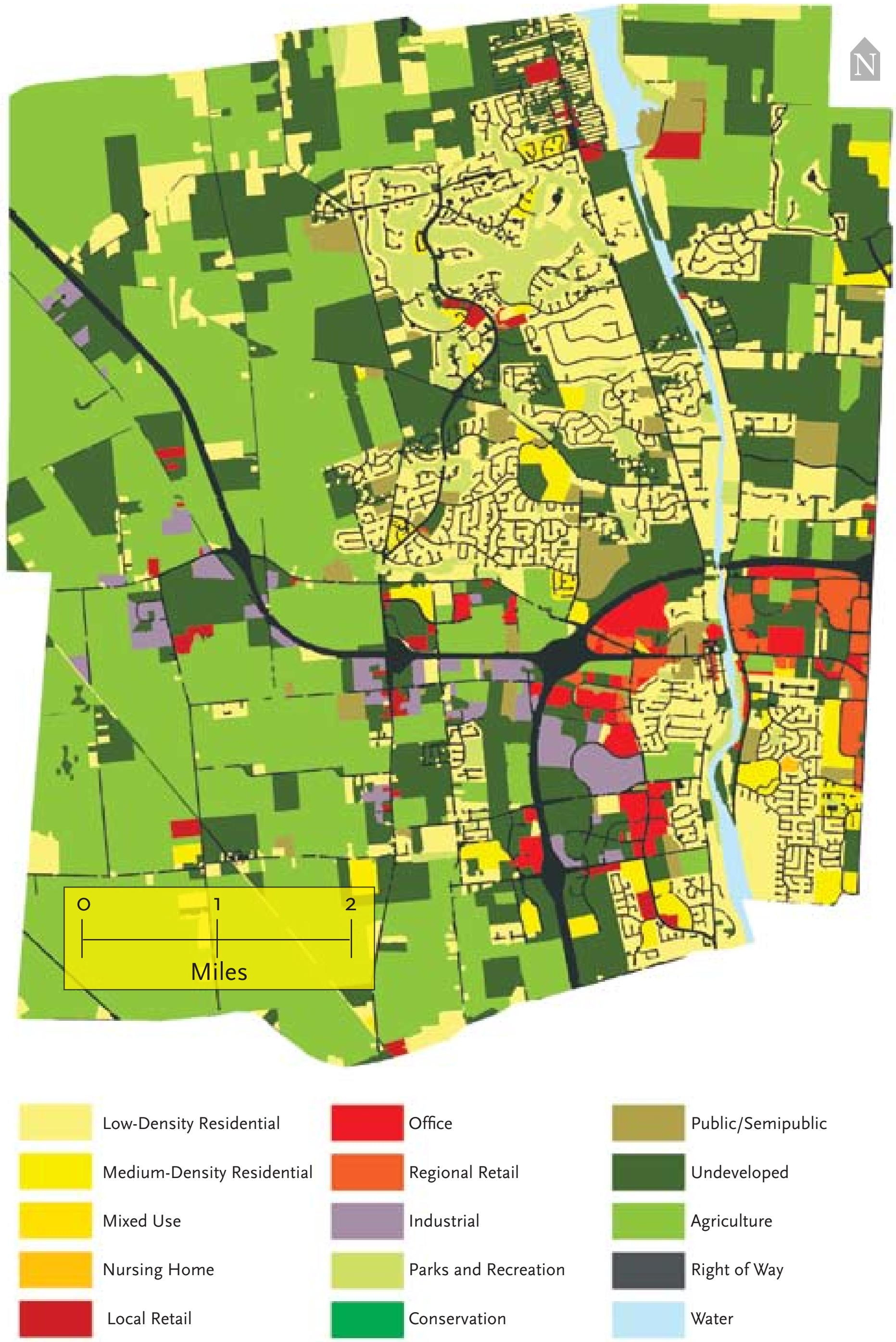


FIGURE 10.6
2030 Dublin Land Uses: High Growth with No Controls Scenario

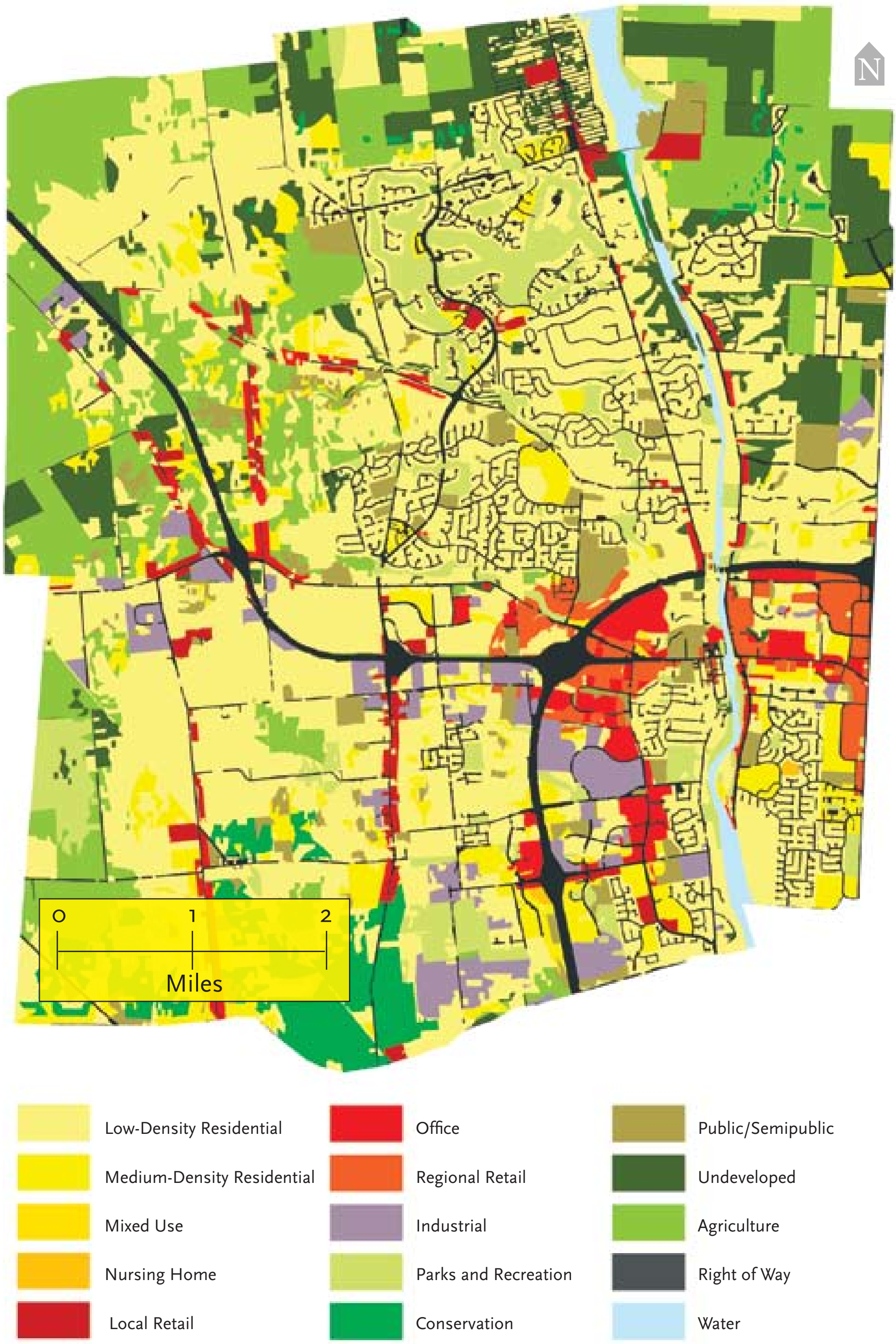


FIGURE 10.7
2030 Dublin Land Uses: Medium Growth with No Controls Scenario

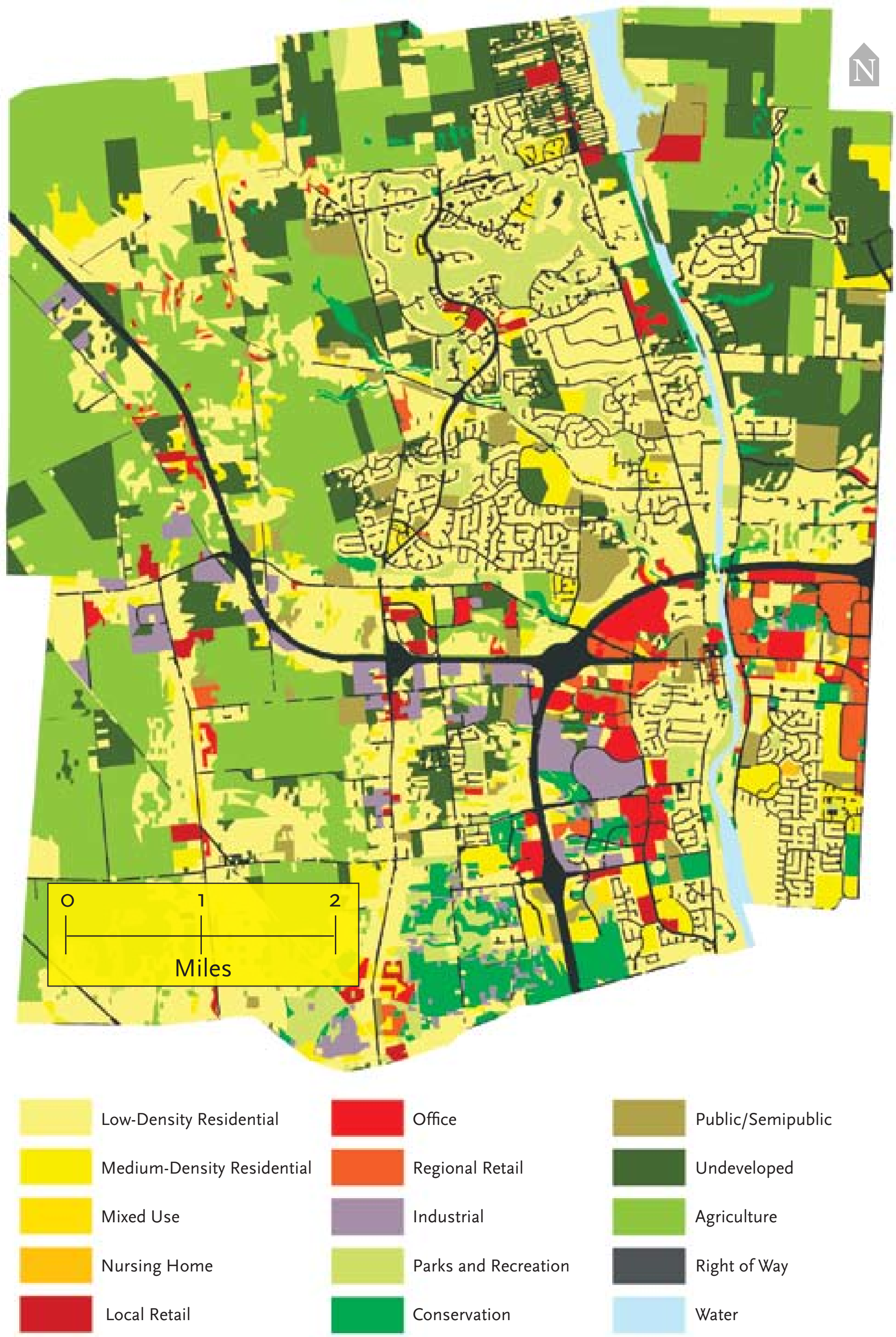
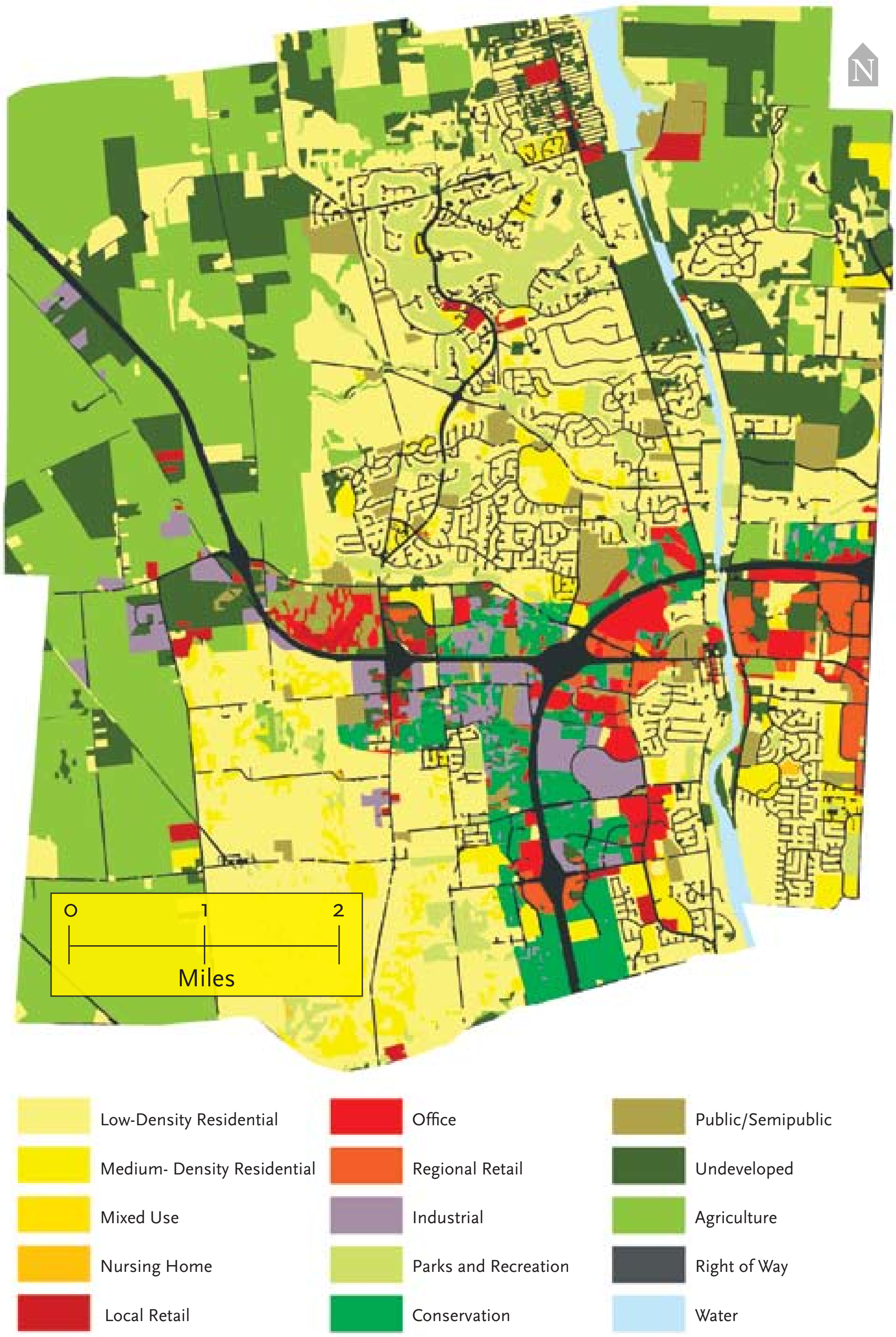


FIGURE 10.8
2030 Dublin Land Uses: Medium Growth and Open Space Preservation Plan Scenario



is concentrated in the central parts of the city; and new employment-related uses are located near the expressway. It is important to note that the projected land use demands for this scenario are identical to those for the no-growth scenario shown in figure 10.7. The open space preservation plan accommodates the same amount of growth; it is just concentrated in the central part of the city, preserving the area's agricultural character. Unfortunately, the preservation plan does not provide enough land to accommodate the high-growth Demand scenario; this growth can only be accommodated by sacrificing the city's vacant and agricultural land or by substantially increasing its residential densities.

Figures 10.9, 10.10, and 10.11 show the changes over time in the land uses, population, and employment for the moderate-growth with no growth controls scenario shown in figure 10.7 for Dublin's 11 traffic analysis zones (TAZs). Figure 10.9 shows that the rapid residential growth in the southwestern part of the study area continues throughout the 25-year projection period. In contrast, the residential growth in the northwestern part of the city occurs largely after 2025. Figures 10.10 and 10.11 show that the city's population and employment growth over the 25-year projection period occurs almost exclusively in the western part of the city and that the residential population growth is much more dramatic than the employment growth.

CONCLUSIONS

Unlike more theoretically sophisticated—and complex—models, What if?™ does not include measures of spatial interaction, represent the interlinked markets for land, labor, and infrastructure, or explicitly model the behavior of households, businesses, and developers. The model does not pursue theoretical sophistication for its own sake or attempt to find one correct projection of an unknowable future. Instead, it has been designed to provide an understandable, transparent, adaptable, and fully operational model, which helps a community understand its present, consider its future, and evaluate alternative policies for achieving its collective goals. It also provides a useful framework for framing—and determining the implications of—assumptions about the behavior of developers, community preferences about a desired future, and public policies for achieving those preferences that underlie different conceptions of an area's future. In this way, it attempts to implement the forecasting goals outlined by Terry Moore (chapter 2) and extend the deliberative forecasting described by Andrew Isserman (chapter 9) to the subcounty level.

The model's procedures for balancing the supply of and demand for land by determining the relative suitability of different locations, projecting the demand for land, and allocating the projected demand to the most suitable sites subject to public policies for directing growth can be readily understood by planners, elected officials, and the public. The model's simplicity is reflected in its flexible and rather modest data requirements: GIS layers describing an area's current land uses, natural features, administrative boundaries, and growth-management policies and information on its current and projected population and employment trends. This allows the model to be used to project up to 50 different land uses and an area's

FIGURE 10.9
Low-Density Residential Land for Dublin Traffic Analysis Zones, 2005–2030: Medium Growth with No Growth Controls

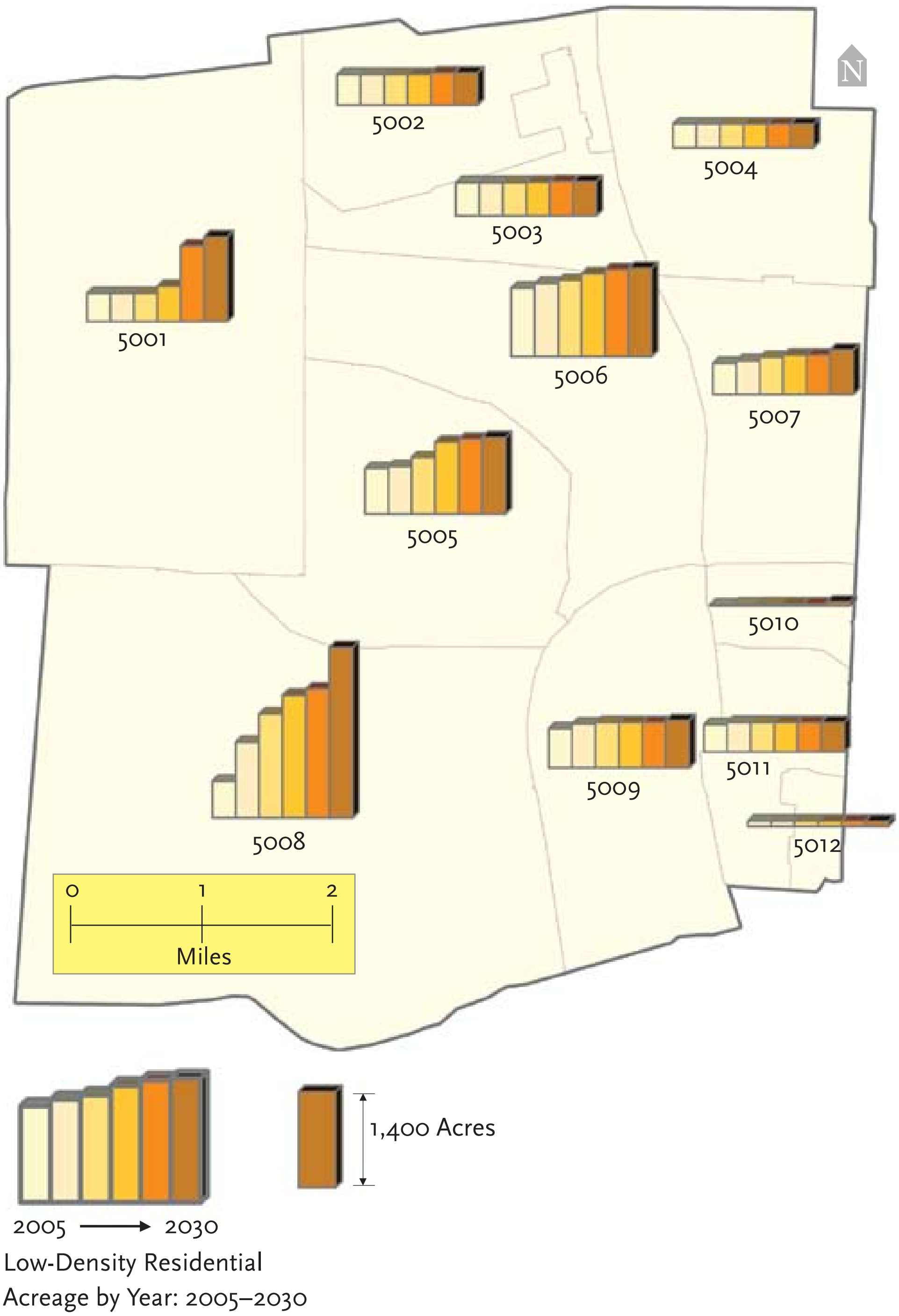
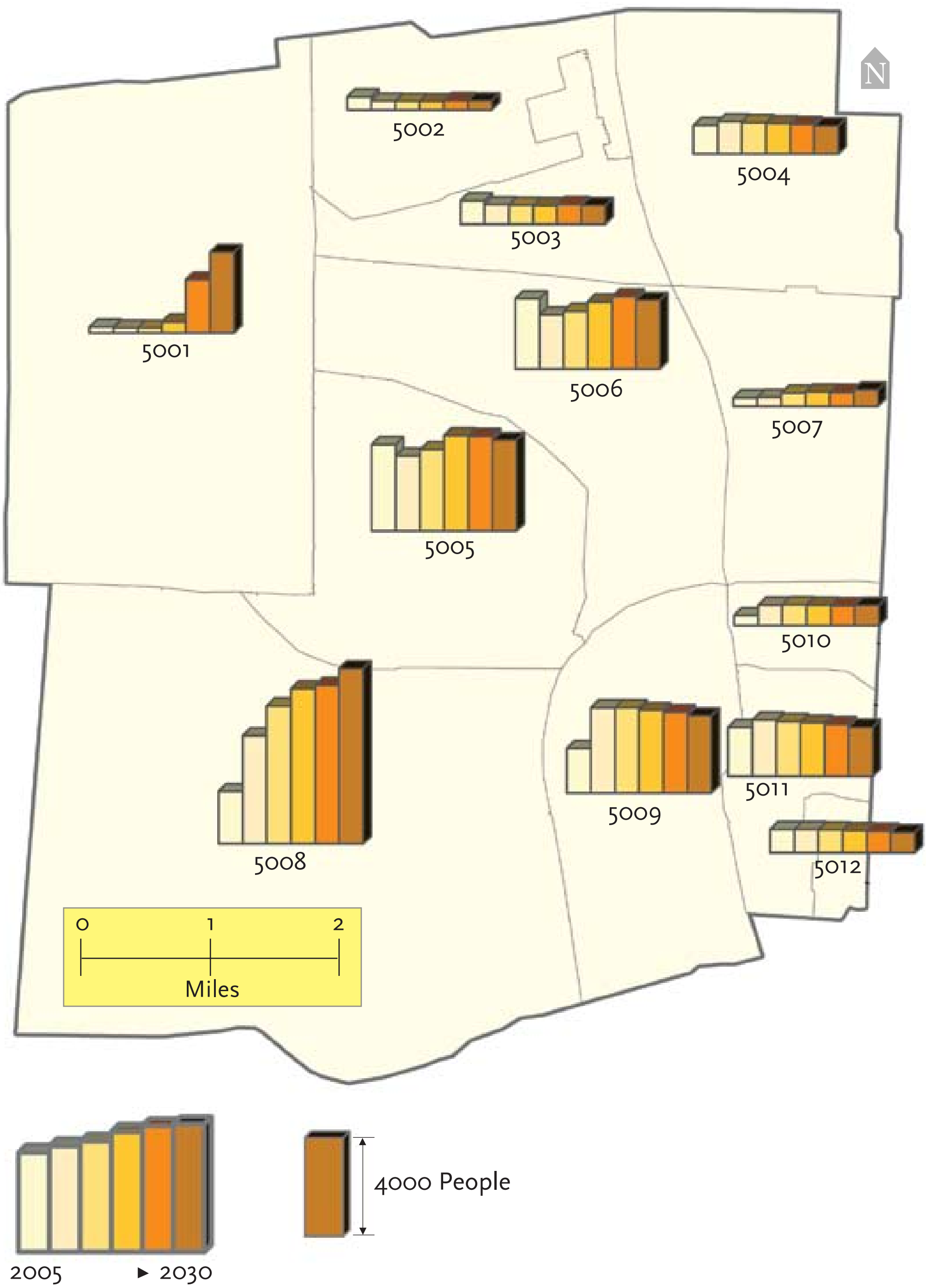
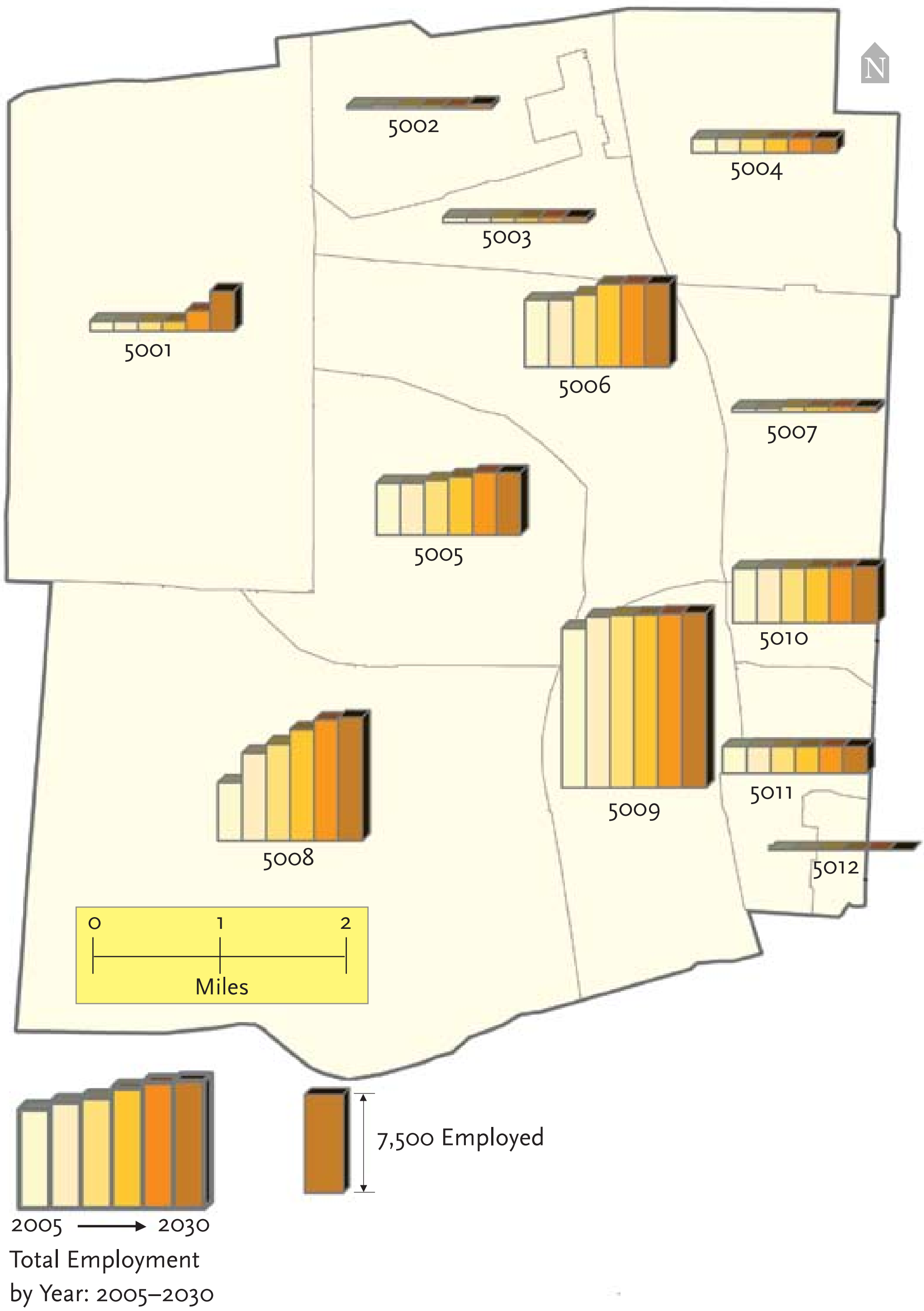


FIGURE 10.10
Total Population for Dublin Traffic Analysis Zones, 2005–2030:
Medium Growth with No Growth Controls



by Year: 2005–2030

FIGURE 10.11
Total Employment for Dublin Traffic Analysis Zones, 2005–2030: Medium Growth with No Growth Controls



future residential population, housing units, and households. It can also be used with commercially available data for the United States to project the employment by place of work for two-digit NAICS (North American Industrial Classification System) sectors. These projections can be prepared for subcounty areas such as TAZs, political jurisdictions, and taxation districts, providing the information needed for transportation planning and fiscal-impact studies. However, it can also be used in areas with limited spatially related information.

Like the LEAM model described by Deal and Pallathucheril (chapter 11), What if?™ is an example of a new generation of computer tools that attempts to use the dramatic improvements in computing power and the availability of spatially related data to support community-based processes of deliberative decision making, collaborative planning, and consensus building. However, tools like this are not enough. Planning practitioners and academics must be willing to apply them in practice, providing the practical experience and financial support needed to refine and improve them. Until that happens, computer technology's potential for supporting community-based deliberative forecasting may never be realized.

ENDNOTES

1. The mismatch between planning education and practice is revealed clearly in a study (Kaufman and Simons 1995), which found that the "supply" of methods offered by 43 methods courses matched the "demand" for methods expressed by 106 planning practitioners for only one-quarter of the 53 methods considered. Methods for which supply exceeded demand, i.e., methods that were more heavily taught than practitioners felt was necessary, included the projection techniques and statistical methods that underlie the applied science model. Methods for which demand exceeded supply, i.e., the methods not taught as often as practitioners believed they should be, included forecasting, scenario construction, and impact analysis.

2. Many of the points in the remainder of this section were first outlined in Klosterman (1987, 446–448).

3. For a more complete description of the model see (Klosterman 1999; 2001) and the What if?™ Web site www.What-if-PSS.com.

4. Towns in Wisconsin are similar to townships in other states. The entire area of the state is partitioned into towns, and thus towns include rural as well as urban areas.

5. The information provided in the next two sections is illustrative and only approximates the situation in Dublin, Ohio.