# Planning Lessons from Three U.S. New Towns of the 1960s and 1970s

## *Irvine, Columbia, and The Woodlands*

Ann Forsyth

This article examines three "new communities" developed since the 1960s and planned as a response to early criticisms of urban sprawl: Irvine, California; Columbia, Maryland; and The Woodlands, Texas. Conceived as alternatives to sprawl, the developments used a number of techniques now proposed by proponents of smart growth. They also represent a best-case scenario for private-sector development: They had big land areas, rich developers, cutting-edge professionals, and visions that were maintained. However, problems with automobile dependence and housing affordability indicate limits to these innovations.

**Forsyth** is a professor, Dayton Hudson Chair of Urban Design, and the director of the Design Center for American Urban Landscape at the University of Minnesota, Twin Cities. She is also the author of *Constructing Suburbs: Competing Voices in a Debate Over Urban Growth* (Gordon and Breach/Routledge, 1999).

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In the U.S., early post-World War II suburbs were the focus of criticism. Books such as Riesman's *The Lonely Crowd* of 1950, Whyte's *The Organization Man* of 1956, and even Friedan's *The Feminine Mystique* of 1963 criticized suburbs as sites of monotony, conformity, and isolation. By the late 1960s and early 1970s, suburbs were also criticized for ecological damage, excessive energy use, high infrastructure costs, housing exclusion, and loss of open space.

From the late 1950s through the 1970s, parts of the development industry and the planning profession both responded to and elaborated on these criticisms. They proposed building approximately 150 large master-planned developments or "new communities" throughout the United States, related to the new towns programs then active in Europe (American Institute of Architects, 1968; Ewing, 1991; U.S. Postal Service [USPS], 1973). Ranging in projected population from about 10,000 to 500,000, the best of these new communities were planned to be phased, coordinated, socially balanced, environmentally aware, and economically efficient. By avoiding many of the problems of unplanned incremental growth—or sprawl—they imagined both improving urban areas and creating a product that would sell.

As current debates about sprawl heat up in the U.S., these long-running experiments in better suburban development take on new salience. How have some of the new communities stood the test of time? Are they still viable alternatives or are they now part of the problem? Did the innovative suburban planning and design techniques used in these developments achieve the intended results even when successfully implemented? Much

contemporary research on suburban development focuses on metropolitan growth or site-level planning, so analyzing these large-scale new communities can bridge these two scales.

This article examines three of these new communities planned in the 1960s and early 1970s—Irvine, California; Columbia, Maryland; and The Woodlands, Texas. These three new towns have been evaluated as some of the best of their kind. As very good examples of the work of highly competent professionals, they show a kind of limit case of what it is possible to do in the private market at a large scale over a long time period.

Out of 15 planned new communities in their pioneering study funded by the National Science Foundation, entitled *New Communities USA*, Burby and Weiss (1976) listed Columbia; Reston, Virginia; and Irvine in that order as having the greatest adherence to the new community concept. They were satellite new towns rather than merely packaged suburbs like the Levittowns. In the longer term, Reston ended up having a more fragmented planning process due to financial difficulties. The Woodlands was not inhabited at the time of the Burby and Weiss research. However, it was the only new community guaranteed under the U.S. government's Title VII new town program that did not fail financially and, as I describe below, it is one of the most significant examples of implemented ecology-based planning from the 1970s. A number of important environmental design professionals worked on planning and design in these developments in both major and minor roles, including Ian McHarg, Herbert Gans, Kevin Lynch, William Pereira, Frank Gehry, Ann Spirn, and Peter Walker. Overall, these communities were pioneers of a number of planning and design techniques that are still admired by the planning profession and considered best practices in the smart growth movement. These include open space protection, jobs/housing balance, and mixed-use design.

All three case study developments are still under construction—although Columbia's residential section will be completed soon—but they can now offer the lessons of several decades of consistent, cutting-edge suburban design and planning from the private sector. The three were commercially successful, which meant that they sold their innovative planning over a period of decades. While all had difficult financial times, they did not go bankrupt, the companies had relatively few owners, and those owners were for the most part committed to planning and design, so they had unusually consistent and long-term approaches to development.

All three developments are very large, with final populations of 100,000 to over 400,000 and land areas from 14,000 acres to nearly 100,000 acres, including large amounts of open space and significant employment areas. This size has been important because it has meant that they have had to confront difficult issues such as habitat protection or affordable housing that smaller developments could avoid. These large developments have taken a long time to complete, which has meant that the later phases have had to deal with issues of democratic participation by those who had moved in earlier, raising ongoing questions about vision and professional expertise. By the late 1990s, all had more jobs than households, and even in the early 1990s Garreau (1991) listed all three as having edge cities or emerging edge cities. While constrained by having to sell in the market, they were big enough to create, at least partially, new kinds of property markets in their regions and to push the boundaries of accepted development practices.

Overall, these developments offer mixed lessons about implementing alternative patterns of development. The context in which they were developed certainly allowed experimentation with design and planning. All mix uses and income groups (although to varying degrees) and provide employment for residents. They have paid great attention to the design of public areas with extensive landscaping, varied cultural facilities, thoughtfully laid out neighborhood centers, an absence of strip commercial development, and extensive bicycle and pedestrian path systems. While fairly affluent, all have many rental options, including government-sponsored affordable housing. All have a variety of housing types, with only The Woodlands dominated by detached houses. They have nurtured arts, education, and faith-based activities, and Irvine and Columbia in particular have significant ethnic diversity. All have preserved large areas of open space, including areas of natural habitat. The U.S. Environmental Protection Agency (EPA) and the Smart Growth Network define *smart growth* as having dimensions of mixed land use, compact building design, a variety of housing types, walkable neighborhoods, distinctive identities and sense of place, open space preservation, connection to existing communities, transportation choice, efficiency, and collaborative planning (EPA, 2001). New Urbanism has similar aims (Leccese & McCormick, 2000). The developments demonstrate all of these principles except connection to existing communities and collaborative planning, and even these have been incorporated to some extent.

However, even with these strategies successfully implemented and thoughtfully modified, they have not achieved all their desired outcomes. That is, problems with the developments cannot be blamed on discontinuous planning or flawed implementation. Such problems are important because these strategies are still considered today to be cutting edge. For example, while

designed for the automobile, all aimed to reduce automobile use somewhat. As is explained below, this has not occurred for work trips and probably not for other trips either. Similarly, while they each have about 5 to 6% of their housing stock in affordable housing programs, market-rate affordability has been difficult to achieve using merely differences in housing size and type (as is suggested by New Urbanists). Only as they age are some older market-rate units becoming truly affordable.

These developments evoke strong reactions. While I chose them because they are good examples, not everyone likes them. Many urbanists consider them to be irrelevant to the most important urban problems—those of center cities. Irvine is often accused of being purely a real estate venture, with monotonous architecture and no social concern. In contrast, Columbia is characterized as far too utopian and having an illegible urban design that has weathered badly. Finally, The Woodlands is portrayed as a conservative copy of Columbia, with a declining commitment to ecology. All are seen as automobile dependent. These are harsh criticisms, often reflecting a partial or outdated view of the developments or an idealized standard, but on some dimensions these criticisms are correct. This makes it all the more important to examine these exemplary developments, because they show the limit of what will sell in the U.S., even with supportive developers. As such they demonstrate the realistic potential of a number of current approaches to limiting sprawl and indicate where more government intervention is needed.

This analysis is based on a variety of data sources. The article draws on over 140 interviews conducted with people involved in the development of these new communities, as well as residents, civic leaders, or activists in the new communities or their regions. This included about a dozen people who had worked on more than one of the new communities. In addition, 26 relevant oral history interviews were available across the three sites, although I also interviewed 18 of the same people.[1] The article also draws on census and other government data, development and community archives,[2] local histories, physical observations of the sites, existing resident sample surveys, GIS data, density information from developers, and analyses of maps and aerial photographs. None of the new communities is incorporated as a single municipality—Irvine falls in several, and the other two are unincorporated—making these analyses more of a challenge.

This article is in four parts. First, it gives a brief history of each development, starting with Irvine, as it was the first to be planned. It then examines research on these developments showing comparatively little analysis since the 1970s. Next, it evaluates the developments in terms of the critiques of suburban growth, comparing the three case study sites with examples of smart growth and New Urbanist projects. The article shows that overall, the developments do a very good job of avoiding weaknesses and maintaining benefits of sprawl. In conclusion, I argue that while they are very good examples of private-sector development, these new communities are not perfect. The weaknesses of these exemplary projects raise tough questions about whether the received wisdom about techniques of good urban development can achieve the outcomes that planners imagine.

## The Cases

### *Irvine, California*

Irvine is based on the historic Irvine Ranch in California's Orange County, and has been developed by The Irvine Company[3] (TIC; see Figure 1). Only halfway through its development, by 2000 Irvine housed about 200,000 people, with 143,072 within the core area in the City of Irvine. The new community was first outlined by architect-planner William Pereira in 1960 as a college town of 100,000 people on 10,000 acres, anchored by the University of California campus that had been proposed in the late 1950s. The campus was the focus for Pereira's southern sector master plan, covering the coastal 30,000 acres of the Ranch and approved by the county in 1964. By 1970, an in-house team had expanded the plan to house about half a million people across well over 53,000 acres of the 93,000-acre Irvine Ranch.[4]

The core concept for Irvine breaks the development into three parts. A coastal section was planned to be developed at low densities and as extensions to Newport Beach. Over the years, the extent of this part of the development has been reduced as habitat and coastal access issues have become more important. The central valley between UC Irvine and the Santiago Foothills is the core area and is mostly contained in the City of Irvine. The northern hills areas will have little development due to many site constraints. A spine of commercial and industrial development runs down the central valley area. Throughout, I use *Irvine* to indicate the new town development, and *City of Irvine* to indicate the municipality that takes up only part of the development area.

Irvine ranked number two among master-planned communities in 2000 in terms of home sales, at 2,377 units[5] ("Master-planned communities," 2001). It has become a center for the Asian population of Orange County: In 2000, the population of the City of Irvine was 32% Asian and 57% non-Hispanic White. Its business parks now form one of the largest business districts in California. Like the developers of the other case study communities, The Irvine Company courted industries,

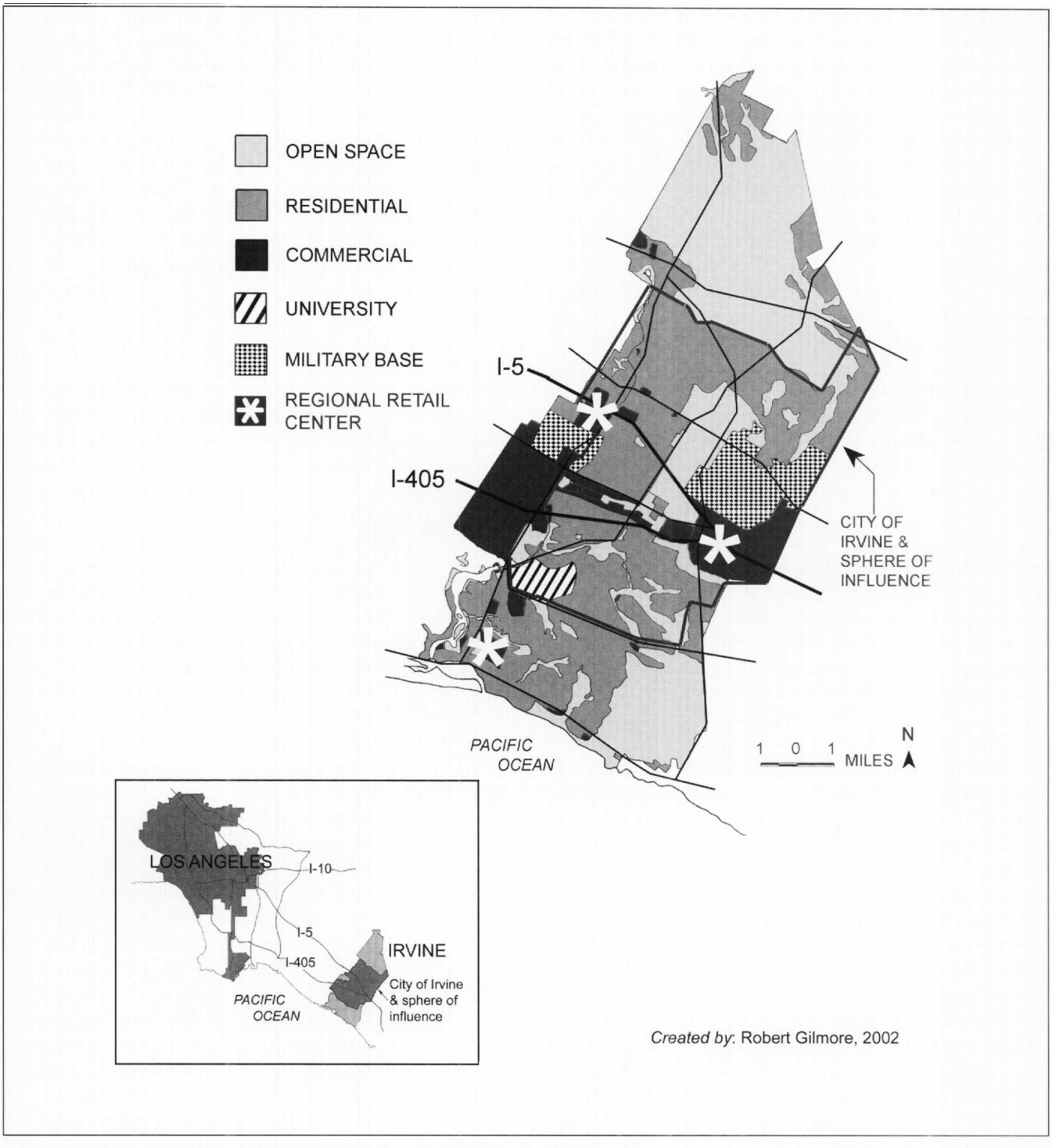


**FIGURE 1. Irvine, California, location and master plan, c. 1990s.**

particularly in the technology field. Its business parks became, in the words of an interviewee, "one of the great successes of real estate history." It has an innovative and large-scale habitat protection program, and has pushed the envelope of suburban design, particularly in terms of attached housing and landscaping of the suburban public realm. In 2000, *Ladies Home Journal* named the City of Irvine as the top city in the U.S. for women—based on its low crime rate and other quality-of-life features, although it dropped to fourth place in 2001 ("Best Cities," 2001).

### *Columbia, Maryland*

Columbia, located in Maryland between Baltimore and Washington, DC (see Figure 2), is the best known of the new communities among planners, engaging numerous experts and generating more research interest than the other developments. It is organized into a town center and nine villages, each with a mixed-use village center. Its residential component will be largely completed in the early 2000s, with a population near 100,000. Columbia is best known for having made very significant early attempts at economic and racial integration, maintaining a population that has been about one fifth African American throughout its history. Its increasing Asian population meant that by 2000 it was 64% non-Hispanic White. It was approved at the county level in 1965, the year that the county schools were desegregated, and it opened in 1967, the same year in which Maryland made interracial marriages legal.

One innovative part of Columbia's planning process was having a core team of 14 outside experts and staff from The Rouse Company work through the social planning of the area. They met fairly often for about 6 months from November 1963 to the middle of 1964 (Michael, 1996; Tennenbaum, 1996). This sociological focus reflected Rouse's disillusionment with the then popular architectural and physical approach of planning. He thought that approach was inhumane—and he wanted urban development to promote human growth and values such as lifelong learning, civic participation, and the mixing of diverse populations. Rouse, who held deep Christian beliefs, also saw Columbia as a way to help inner-city areas. It could provide opportunities for diverse people to leave obsolete urban areas and also create a model for in turn revitalizing the older cities (J. Rouse, 1963; L. Rouse, 1977). Columbia was also the most self-conscious of the developments about its place in the history of planning and development. A staff member, Wallace Hamilton, was employed on the initial social planning work group writing a history that was never published (Bloom, 2001; Breckenfeld, 1971; Hamilton, 1964; Hoppenfeld, 1971; Tennenbaum, 1996).

### *The Woodlands, Texas*

The Woodlands, north of Houston, Texas, opened in 1974 and had a population of over 55,000 in April 2000. Until the late 1990s, its developer was oil and gas magnate George Mitchell. In the 1960s he bought several tracts of land and prepared a preliminary master plan for a fairly standard residential and light industrial development. However, he was attracted by new federal programs, Title IV and Title VII, that could provide loan guarantees for new town development. Eventually The Woodlands was the only one of 13 projects selected for these programs that actually paid back its loans and is on the path to completion (two more developments were approved but did not receive guarantees; Morgan & King, 1987; U.S. Department of Housing and Urban Development [HUD], 1984).

Looking for a firm to do the final Title VII proposal, Mitchell read Ian McHarg's *Design with Nature*, published a year before in 1969. Tremendously inspired, Mitchell had McHarg work with William Pereira on the master plan (Middleton, 1997; Morgan & King, 1987; Sutton & McHarg, 1975). The development is designed to protect water systems, allowing aquifer recharge and limiting runoff. It combines this emphasis on hydrology with a striking aesthetic that uses woods to mask and buffer development. The editorial notes by McHarg and Fritz Steiner in a collection of McHarg's writings claim that "The Woodlands is one of McHarg's most influential projects. It is the best example of ecologically based new town planning in the United States during the 1970s" (McHarg, 1998, p. 325). In the early 1970s Mitchell also recruited over a dozen professionals who had worked on Columbia as well as several who had worked on Irvine or the UC Irvine campus.

Initially planned for 150,000 people on about 15,000 acres, the land area of The Woodlands has expanded to over 25,000 acres (see Figure 3). The current population target is not clear, although growth is very rapid at present under new owners, with home sales of 1,679 units or about 4,700 new residents in 2000 ("Master-planned communities," 2001). Like Columbia, The Woodlands is unincorporated but lies in a county with particularly low levels of services that have not been increased. While it is in the extraterritorial jurisdiction of Houston, part of a regional vision for the development, it has not yet been annexed. Many typical local government service functions are supplied by one of the largest private nonprofit governments in the U.S.

The three case study developments represent a best-case scenario for comprehensive private-sector development: They had big land areas, rich developers, cutting-edge professionals, and visions that were maintained. Their developers and planners struggled to distinguish

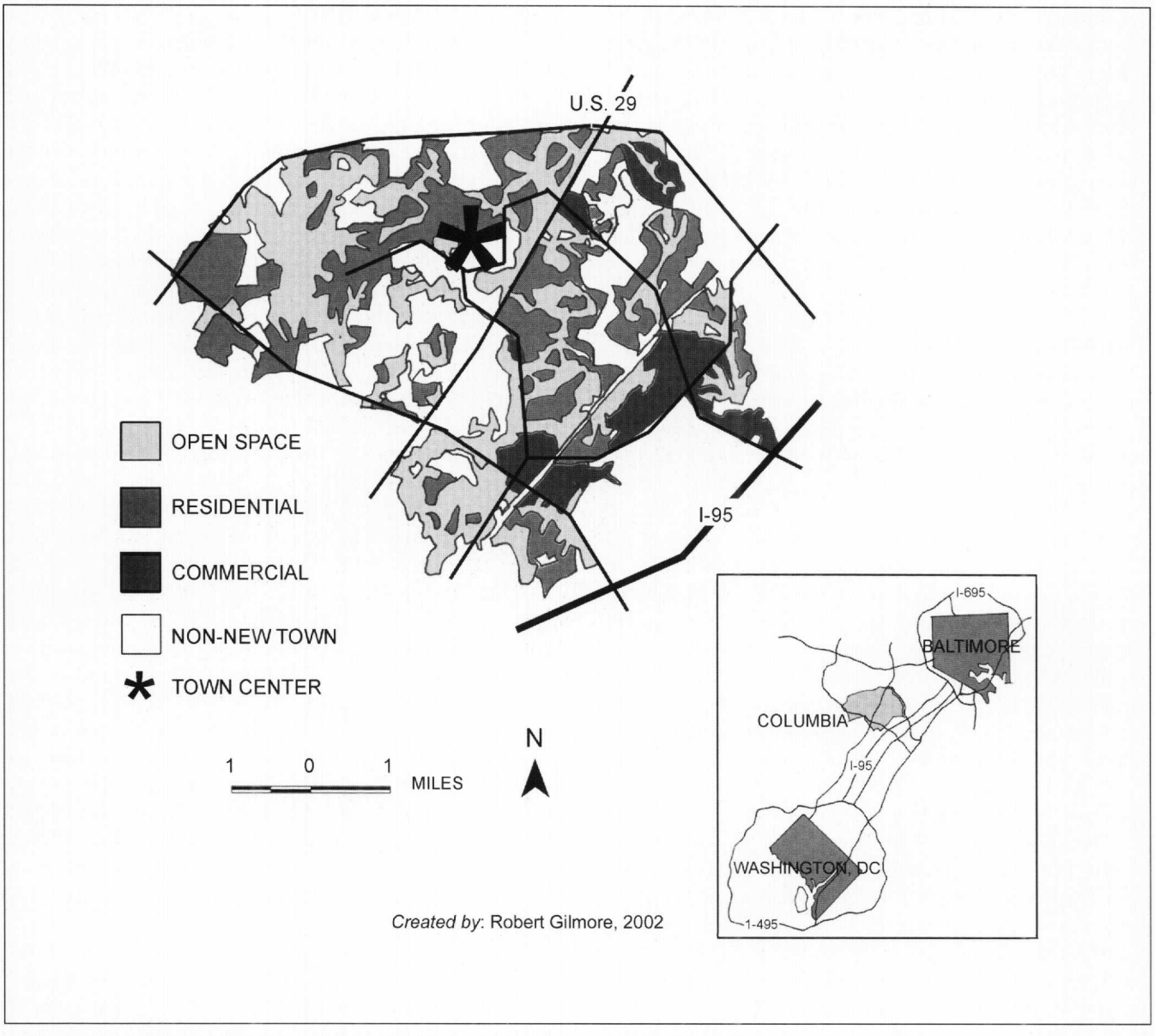


**FIGURE 2. Columbia, Maryland, location and master plan, c. 1970s.**

them from more incremental development in their surrounding regions, hoping planning would both give them a market edge and make them better places in the long run. They were, in fact, a second generation of large-scale postwar developments, learning from the mistakes of earlier postwar "packaged suburbs" such as Park Forest, Illinois, and the Levittowns[6] (Gans, 1967; Whyte, 1956).

These three developments shared many of the same professional networks. James Rouse (developer of Columbia), George Mitchell (developer of The Woodlands), and key planners and executives from Irvine such as Ray Watson (planner and later president of TIC) were all active in public debates about growth. Watson had graduated from UC Berkeley in the same class as Bill Finley, senior development director for Columbia, and was later on the board of Mitchell Energy. George Mitchell attended intensive education programs for new community developers run by Rouse at the Urban Life Center in Columbia. There were even more connections among consultants and staff. The urban design similarities among the developments are no accident.

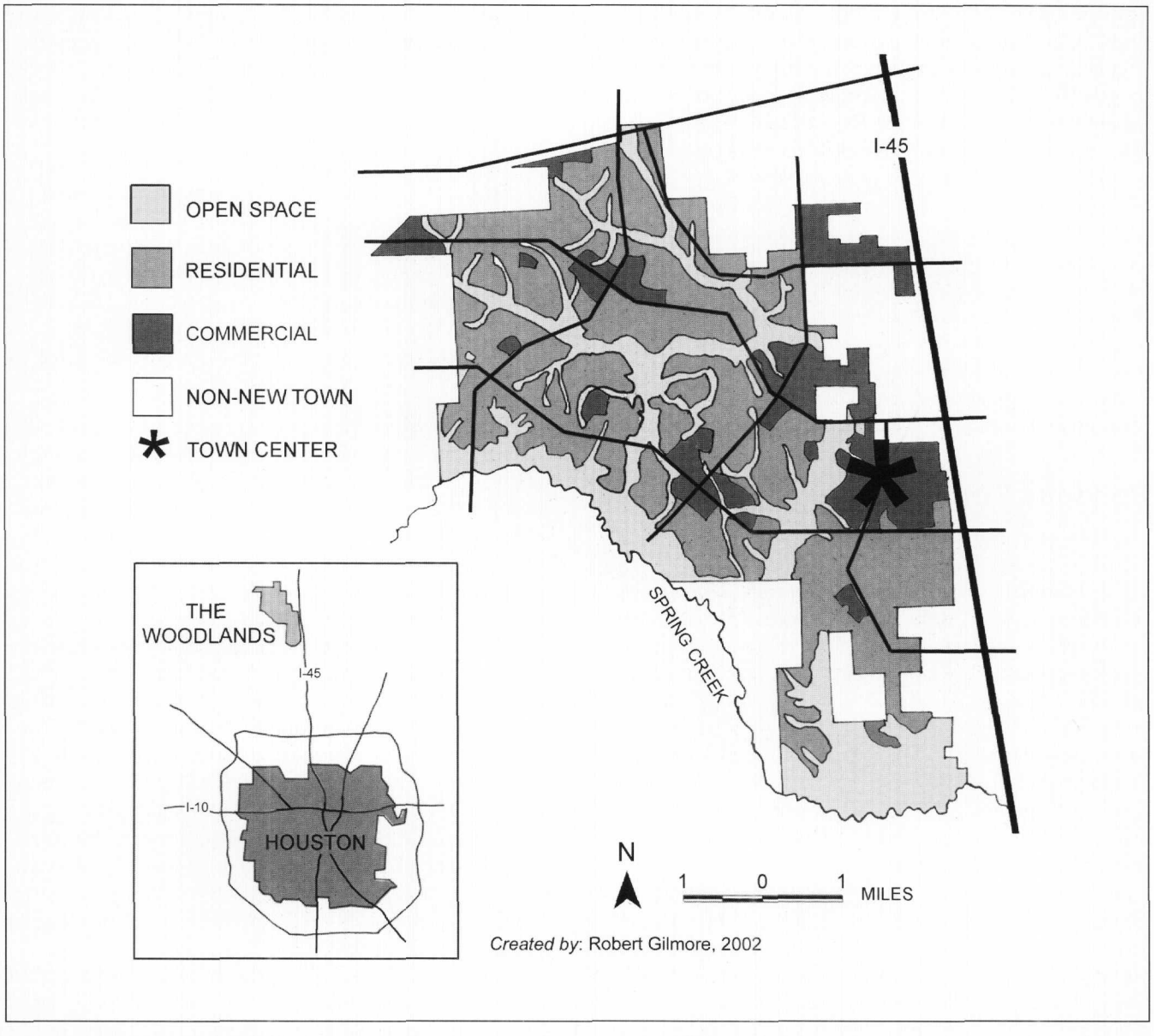


**FIGURE 3. The Woodlands, Texas, location and master plan, c. 1970s.**

All are conceptually similar in their basic urban structure, organized around "villages" with shopping and schools close to employment areas. The "village" idea is a very common one in new community development. In these three developments it variously draws on Perry's (1924) neighborhood unit idea, Lynch's (1960) district concept, and a general nostalgia for small towns. It should be noted here that the terminology is a bit confusing. In these three new communities, *villages* range from 2,000 to over 26,000 residents, although their populations are generally in the range of 10,000 to 15,000. They are thus comparable to the classic *neighborhood unit* that was originally envisaged as having 3,000 to 10,000 residents depending on location and social characteristics (Perry, 1929, p. 53). However, new community villages are often themselves divided into *neighborhoods*, which have a looser meaning than Perry's neighborhood units and are generally quite small.

The new communities were sites for experimentation. Columbia and The Woodlands started with stronger initial visions, but Irvine's large size gave it an unparalleled capacity to learn from its own earlier devel-

opment and respond to changing circumstances. In interviews, planners and designers professionally active in the early decades of all three developments talked at length about being given a landscape where they could dream dreams and then see their dreams built—and in this they hoped to create models for a better world.

The case study developments also had a particular advantage that allowed them to achieve what I call indirect regional planning and to innovate more. Specifically, they were approved at the county level or did not need overall approval. Counties had both a wider view than individual municipalities and at the same time often more flexible development standards. In general, given the professionalism of the developers, this seems to have had a positive effect on planning innovation, although some residents would have liked more control.

## Previous Research

New communities were intensively studied in the 1970s. There are literally hundreds of theoretical analyses and empirically based articles, books, reports, and conference papers on the topic from that period. In the 1970s, HUD included what was eventually called the New Community Development Corporation but even in the 1960s had an extensive new town publications program. Also in the 1970s the Urban Land Institute, an organization of development professionals, created a New Communities Council, and the American Institute of Architects sponsored conferences on new towns. A team of researchers at the University of North Carolina conducted a series of evaluations of new communities funded by the National Science Foundation. They interviewed 5511 residents, surveyed another 974 youth, and interviewed 577 professionals working in 15 private planned developments, 2 others with federal support, and 19 less planned suburban areas. They published an overview volume, seven monographs, and numerous papers on issues such as quality of life, schools, economic integration, transportation, and recreation[7] (Burby & Weiss, 1976). Later a number of authors discussed the financial failure of 12 of the 13 developments in the HUD Title VII program, a program that underwrote loans to new town developers (Evans & Rodwin, 1979; HUD, 1984).

The University of North Carolina studies pointed out that new communities were difficult to develop, and more incremental growth was less prone to visible financial failure. However, comparing the two development types, the researchers found some overall benefits from planning. New communities had strengths in "(1) better land use planning and access to community facilities; (2) reduction of automobile travel; (3) superior recreational facilities; (4) enhanced community livability; and (5) improved living environments for low- and moderate-income households, blacks, and the elderly" (Burby & Weiss, 1976, p. 7). Weiss and Burby (1976) listed many areas in which

> . . . few overall differences were found includ[ing]: evaluations of housing and neighborhood livability; residents' social perspectives, rates of participation in neighboring, community organizations, and community politics, and satisfaction with various life domains and with life as a whole; the provision of some community services; and the organization and operation of community governance. (p. xiii)

When these evaluations were conducted, the new communities were relatively undeveloped. For example, when the University of North Carolina group studied them in the early 1970s, Irvine's population was well under 50,000 and Columbia's was about 24,000. It was not possible to evaluate The Woodlands because its first residents did not move in until 1974, and the interviews were conducted in 1973.

Compared with the huge volume of literature in the 1970s, these large-scale new communities have received relatively little subsequent attention. The developments certainly have been mentioned in a variety of works from Spirn's (1984) *The Granite Garden* to Davis' (1990) *The City of Quartz* and Garreau's (1991) *Edge City*. However, only a small number of books, doctoral dissertations, and collections of memoirs have examined these developments as their major focus (e.g., Brower, 1994; Burkhardt, 1981; Kane, 1996; Kutchin 1998; Morgan & King, 1987; Nishimaki, 2001; Tennenbaum, 1996; see also Rocca, 1996; Schiesl, 1991).

Particularly useful are works that have *compared* two or more of the case study developments discussed in this article. Historian Nicholas Bloom (2001) drew on 19 interviews and archival materials to describe the key planning visions and subsequent resident life in Reston, Columbia, and Irvine, focusing on civic activism, community life, economic and racial mix, feminism, and cultural activity. An article by Cervero (1995) analyzed commute trips in 9 planned developments from the U.S. and 34 from Europe, including all three case study developments. Landscape architects Girling and Helphand (1994) included all three among the16 specific cases highlighted in their illustrated historical survey of designed suburban open space in the U.S. This work was based on published sources supplemented with site visits to several communities and three firms. Ewing (1991) mentions the three in his overview of 58 planned communities in the U.S. While important, this work is com-

paratively sparse given both the early interest in new towns and recent popular attention paid to suburban development.

## Evaluation

New community developments can be evaluated from a number of perspectives, including their original planning, design, and development intentions; broader public concerns about efficiency, equity, aesthetics, and the environment; and the perspectives of those living in them decades after they opened. However, many of the concerns of these three perspectives—intentions, the public interest, and the residents—are quite similar. This basic similarity is reflected in the literatures critiquing sprawl or suburban growth and those proposing alternatives to it, including checklists of good design and planning.[8] The literature on sustainability indicators also has some parallel concerns although not entirely focused on urban development (Sustainable Seattle, 1998).

From this literature and particularly helpful summaries in Burchell et al. (1998) and Ewing (1996), I distilled a number of features and effects attributed to suburban growth or sprawl. Features are characteristics of sprawl, and effects are problems caused by the features. Appendix Table A-1 presents a comparison of these features and effects for the three case study developments. The features and effects are listed in the second column, organized in relation to three general themes of urban design, environment, and coordination. These create implicit and explicit criteria for evaluating development. The division into features and effects gets around some conceptual confusion within these critiques between characteristics of sprawl and problems caused by sprawl (Galster et al., 2000). The horizontal axis lists a number of dimensions of these features and effects, and evaluates the three case study developments according to each feature and effect. Column 2 of the table shows that many features and effects are measurements of, or create problems and benefits in, several dimensions. Negative effects of suburban growth often accrue to society at large, and benefits generally flow to the household or individual, so the same feature or effect can have both costs and benefits.

While much research on sprawl focuses on a metropolitan level of analysis and a limited number of indicators, this article evaluates significant submetropolitan case study communities on a number of characteristics. Many people studying Irvine focus on the City of Irvine—which is only the central two thirds of the development. I have also followed this practice in the assessments using census data. This has some logic, as the approximate City area was conceptualized as a coherent unit, with other parts of the development seen as extensions of other municipalities. Columbia has very significant out-parcel areas within its boundaries that while not part of the plan are nevertheless part of the urban fabric and the Census Designated Place.

Table 1 compares key aspects of the developments with two projects considered to be exemplary in the smart growth and New Urbanist movement. The first is Duany Plater-Zyberk's Kentlands development, the most complete nonresort New Urbanist development in the U.S., which will build out at about 5,000 residents on 356 acres. The second is the Stapleton Airport Reuse Project proposal, featured in Calthorpe and Fulton's (2000) *The Regional City*. At 4,700 acres, Stapleton is one of the largest and most dense of the New Urbanist project proposals to date and has the added benefit of being an infill rather than a greenfield site, with significant employment. For comparison, Celebration, Florida, has a current population of about 3,500 and will build out at 12,000 to 15,000 residents on 4,900 acres with a 4,700-acre green belt (Celebration, 2001). This article also refers to other exemplary smart growth standards such as Maryland's Priority Funding Area criteria (Maryland Office of Planning, 1997). This emphasis on smart growth at the project level is offered as a contribution to a literature that tends to focus on very broad trends.

Some proponents of New Urbanism and one of the referees for this article argue that those who judge the movement from its partially implemented products rather than its stated aims "elevat[e] mishaps at the expense of undermining the legitimacy of its stated principles" (Talen, 2000, p. 321). This is a reasonable caution for the significant work of the New Urbanists on regional planning and regulatory reform—processes that will take years to see implemented. However, at the project level, New Urbanists themselves criticize other developments in terms of their practice. Further, the developments that I selected for comparison are those that the New Urbanists themselves praise or promote, and I avoided projects that have received more mixed reviews within the movement. Due to scale differences, where relevant I take the new community village, rather than the whole development, as the most appropriate comparison. I have also compared the projected final figures for the New Urbanist developments with both incomplete and completed components of the case study developments, in all cases giving the New Urbanist developments the benefit of the doubt. Finally, New Urbanist projects, like the case study new communities, are competing for sales in the contemporary suburban market. This makes them a more realistic comparison than prewar suburbs that were developed in a different context.

**TABLE 1. Basic data on case study developments compared with two New Urbanist projects.**

| | Case study developments | | | New Urbanist developments | |
|---|---|---|---|---|---|
| | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[c] | Kentlands, MD | Stapleton, CO Airport |
| **General features** | | | | | |
| Developer | The Irvine Company (TIC). Majority owned by the James Irvine Foundation until 1977; a consortium including Donald Bren until 1983; since 1983 by Donald Bren | James Rouse Company affiliates, with early backing from Connecticut General Insurance (CIGNA) | George Mitchell of Mitchell Energy and Development; sold in late 1990s to Crescent Operating, Inc and Morgan Stanley | Joseph Alfandre | Proposal only; initial planning by Stapleton Development Corporation and Forest City |
| Metro area/state | Orange County, CA | Baltimore, MD/ Washington, DC | Houston, TX | Washington, DC | Denver, CO |
| Proposed population in early plans | Over 400,000 (1970 TIC and 1973 City of Irvine plans) | 110,000 | 150,000 (1972 HUD Project Agreement) | 5,000 | 28,800–38,400 (calculated from 12,000 housing units) |
| Population (2000 census) | 143,072 in City, more in nearby areas adding to 200,000 | 88,254 (2000 census); 88,370 (Rouse Company, 1999) | 55,649 | 5,000 (estimate) | None |
| Households (2000 census) | 51,119 | 34,199 | 19,881 | 1,600 (estimate) | None |
| Approximate total size (acres) | Originally 93,000; 29,376 in City of Irvine; 29,758 in census 2000 | 14,272 (Rouse Company, n.d.); 17,705 in CDP in 2000 | Originally 17,000 acres, by 2000, 27,000; 15,284 in CDP | 356 | 4,700 |
| Starting date | 1959 UCI campus study; 1964 Southern Sector Plan approved (W. Pereira); 1970 overall plan | 1962 first land bought; 1965 Plan approved by Howard County; 1967 first projects completed | 1964 first land bought; 1971 HUD approved Pereira/ McHarg Plan; 1974 first buildings occupied | 1989 with planned build out in 1997 | Proposal only |
| **Density** | | | | | |
| Housing units | 53,711 (2000 census) | 35,281 (2000 census); 32,629 (Rouse Company, 1999) | 21,014 (2000 census) | 1,600 (estimate) | 12,000 (proposal only) |

**TABLE 1. (continued)**

| | Case study developments | | | New Urbanist developments | |
|---|---|---|---|---|---|
| | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[c] | Kentlands, MD | Stapleton, CO Airport |
| City-level population density (persons/acre, c. 2000) | 4.8 for census area | 6.2 using Rouse Company definition; 5.0 for CDP | 3.6 for CDP | Not available[d] | 6.13–7.66 calculated from dwelling units at build out[e] |
| City-level dwelling density (housing units/acre) | 1.8 for census area | 2.3 using Rouse Company definition, 2.0 for CDP | 1.4 for CDP | Too small to include all the functions | 2.6 (at build out |
| Village population density (persons/acre) | Table 2 shows data for 11 typical villages, ranging from 5.2 to 16.0 with an average of 11.5 | Not available | Table 2 shows data for 5 villages, ranging from 3.3 to 6.2 with an average of 4.6 | 11.5–15.3, calculated from 4.8 units/acre in Southworth (1997) | Not available |
| Village dwelling density (housing units/acre) | Table 2 shows data for 11 villages, ranging from 2.1 to 6.7, average of 4.6 | Not available | Table 2 shows data for 8 villages, ranging from 1.3 to 2.7, average of 1.8 | 4.8 | Not available |
| Proportion detached, single-family housing (1990 census) | 39% | 39% | 74% | Not enough constructed | Not available |
| Jobs/acre | 5.7 | 4.7 | 0.9 | 2.6 | Not available |
| **Environment** | | | | | |
| Parks and open space % (whole development) | Over half of the ranch, about 50,000 acres | 38% public open space (about 5,360 acres) | 16 % for villages and town center at build out (see Table 2) | About 28%, 100 acres is public open space | 23% open space |
| **Employment and use mix** | | | | | |
| Edge city (Garreau 1991) | 1.5 full and 1 emerging | 1 | 1 emerging | 1, if counted as part of Gaithersburg area | Not applicable |
| Employment[f] | 168,000 (City of Irvine, 2002), TIC claims another 40,000 on the Ranch | 66,500 (Rouse Company, 1999) | 24,700 (The Woodlands Operating Company, 2000) | 400,000 sq. ft. of retail | Up to 10 million sq. ft. of offices |
| **Socioeconomic issues (census data)** | | | | | |
| Poverty rate (1990) | 6%; 3% for those over 65 | 3%; 11% for those over 65 | 6%; 19% for those over 65 | Not available[d] | Not applicable |

**TABLE 1. (continued)**

| | Case study developments | | | New Urbanist developments | |
|---|---|---|---|---|---|
| | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[c] | Kentlands, MD | Stapleton, CO Airport |
| **Socioeconomic issues (census data)** | | | | | |
| Median household income (1990) | $56,307 | $55,419 | $50,929 | Not available[d] | Not applicable |
| Owner occupation (2000) | 60% | 66% | 79% | Not available[d] | Not applicable |
| Median value owner-occupied units; monthly rent (1990) | $294,700; $913 | $150,500; $652 | $101,800; $430 | | |
| Age of residents (2000) | 23% under 18, 7% 65+ | 26% under 18, 7% 65+ | 32% under 18, 8% 65+ | | |
| Household composition (2000) | 67% family households, 54% married couple families | 68% family households, 53% married couple families | 78% family house holds, 69% married couple families | | |
| Ethnic composition (2000) | 61% White, 2% African American, 32% Asian alone or in combination; 7% Hispanic/ Latino | 67% White, 23% African American, 8% Asian alone or in combination; 4% Hispanic/ Latino | 92% White, 2% African American, 3% Asian alone or in combination; 7% Hispanic/ Latino | | |

*Sources:* Irvine: City of Irvine (2000, 2002); Irvine Company (2001, 2002); U.S. Census Bureau (1990, 2000)
Columbia: Rouse Company (1999, n.d.): U.S. Census Bureau (1990, 2000)
The Woodlands: The Woodlands Operating Company (2000, 2001); U.S. Census Bureau (1990, 2000)
Kentlands: Southworth (1997)
Stapleton: Calthorpe and Fulton (2001)

[a]Census data for City of Irvine only.

[b]Census data for census designated place (CDP). The Columbia CDP does not exactly correspond with the Columbia new town zoning area. The CDP includes significant out-parcels within the general outline of Columbia and does not include some commercial and industrial areas and the village of Dorsey's Search (which is also not in the new town zoning area). I have calculated separate densities based on Rouse Company figures for the area it has developed and compared with census figures.

[c]Census data for census designated place (CDP). The Woodlands CDP excludes land in Harris County, not yet developed, and some land in Montgomery County, notably in the new village of College Park. For density calculations I used census definitions of area and people, as the excluded areas are generally only partially constructed.

[d]Kentlands not constructed for 1990 census. As it is only part of a tract, 2000 census data will have to be compiled from blocks.

[e]Population densities sometimes calculated from dwelling units assuming household sized of 2.4 to 3.0 persons per household.

[f]City and developer figures used for employment due to suppression of data from economic census at this level.

Overall, Tables 1 and A-1 show that the new community developments mitigate many of the costs and keep most of the benefits of sprawl as they are outlined in the literature. In the following section, I examine in more detail how this occurs, linking the material in Tables 1, 2, and A-1 to the case histories. The section is divided into subsections relating to the dimensions listed in Table A-1:

- Density
- Aesthetics and identity
- Social equity, diversity, and access
- Efficiency and costs
- Environmental issues
- Benefits

Because various measures of density are so often used as indicators of sprawl, the section starts with a discussion of this issue. While it is only one feature of sprawl, it is probably the most studied feature. I conclude with some reflections on current ideas about best practices and on areas where more research might be useful.

## *Density*

All three developments meet smart growth criteria for density, and while this saves land, it has not had much effect on transportation choices. This is important because density is the most frequently used measure of sprawl or its absence and is believed to have implications for energy use, accessibility, walkability, and land conservation (e.g., Malpezzi & Guo, 2001).

Density is hard to measure because there are many different standards about what to include in the base land area calculation—just the lot, internal roads, local streets, neighborhood-level facilities, and so on. I developed five different residential density measures, although not all were available for each development. They consider densities in terms of both populations and dwelling units per acre, with the two measures reflecting slightly different results because of different household sizes. They do not consider employment density, although I comment on this issue in the text. The first four measures can all be considered to be gross density calculations—i.e., measuring land area beyond the house lot or development site. These measures are:

- *City-level population density:* the total area of the development (or for Irvine, the City of Irvine) divided by the total population. This is a gross density including open space, roads, easements, commercial areas, institutions, industrial areas, and—importantly—currently unbuilt areas.
- *City-level dwelling density:* the total area of the city or development divided by the number of housing units.
- *Village population density:* the total area of the residential village divided by the population. This is a different kind of gross density calculation, including housing, open space, neighborhood commercial and institutional uses, local roads, easements, and so on.
- *Village dwelling density:* the total area of the village divided by the number of housing units.
- *Proportion of detached, single-family housing:* a measure of perceived density, as attached housing is often perceived as dense.

As Table 1 indicates, the three new communities have fairly low overall city-level population and dwelling densities, ranging from 3.6 to 6.2 persons per acre and 1.4 to 2.5 units per acre. However, New Urbanist Stapleton at 2.6 units per acre is basically the same as Columbia's 2.5. Irvine's very significant agriculture and open space lowers its densities. These uses take up 54% of the zoned area of the City of Irvine *and its sphere of influence* (and some areas, for example the freeways, are not zoned ). A more accurate perspective of the character of Irvine's built up areas is provided by the village densities calculated for 11 largely completed villages with a total population of over 121,000 (see Table 2). In these villages, densities range from 5.2 to 16.0 persons per acre and average about 11.5. In addition, these figures are lowered by just one older hillside development, Turtle Rock. Excluding it takes the average to 12.9 persons per acre and well within the range for New Urbanist developments. The signature Irvine Company village of the 1970s, Woodbridge, has a gross population density of 14.6 persons per acre compared with 11.5 to 15.3 persons per acre for the village-level density in the New Urbanist Kentlands, and with a population of 26,000, Woodbridge is far larger. This gross density for a residential village includes open space, parks, easements, roads, schools and churches, and commercial and mixed-use areas, though not large employment or regional open space areas.

Interestingly, none have the 8 to 13 persons per acre across a metropolitan area that Newman and Kenworthy (2000, p. 100) suggest is needed for viable transit. With comparable city-level densities of 3.6 to 6.2 persons per acre, the new communities are below this threshold. However, so is much smaller New Urbanist Stapleton, unless it achieves an average household size of well over 3.0 persons per unit, whereas in 2000 even the average household size in family-oriented The Woodlands was only 2.8.

Irvine and Columbia are also above the density thresholds for designation as priority funding areas

**TABLE 2. Densities of residential villages in Irvine and The Woodlands.**

| Village name | Total dwellings | Population | Residential acres | Acres parks and open space | Acres public open space only | Roads | Total acres in village | Persons/acre | Persons/residential acre | Dwellings/acre | Dwellings/residential acre | Dwellings/acre excluding open space | % open space |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Irvine** | | | | | | | | | | | | | |
| East Bluff | 1,988 | 5,785 | 200 | 253 | 253 | 101 | 632 | 9.2 | 28.9 | 3.1 | 9.9 | 5.2 | 40 |
| Northpark | 2,600 | 5,000 | 188 | 80 | 65 | 94 | 392 | 12.8 | 26.6 | 6.6 | 13.8 | 8.3 | 20 |
| Northwood | 9,439 | 22,055 | 874 | 239 | 192 | 479 | 1,747 | 12.6 | 25.2 | 5.4 | 10.8 | 6.3 | 14 |
| Oak Creek | 3,104 | 7,800 | 162 | 159 | 152 | 108 | 488 | 16.0 | 48.1 | 6.4 | 19.2 | 9.4 | 33 |
| Rancho San Joaquin | 1,735 | 3,962 | 118 | 178 | 169 | 46 | 377 | 10.5 | 33.6 | 4.6 | 14.7 | 8.7 | 47 |
| Spyglass Hill | | | | 257 | 253 | 206 | 1,018 | 8.5 | 17.3 | 2.9 | 5.9 | 3.9 | 25 |
| Turtle Rock | 3,850 | 9,625 | 637 | 866 | 828 | 227 | 1,868 | 5.2 | 15.1 | 2.1 | 6.0 | 3.8 | 46 |
| University Park | 2,739 | 7,362 | 246 | 147 | 79 | 170 | 630 | 11.7 | 29.9 | 4.3 | 11.1 | 5.7 | 23 |
| University Town Center | 2,409 | 5,297 | 141 | 140 | 140 | 43 | 358 | 14.8 | 37.6 | 6.7 | 17.1 | 11.1 | 39 |
| Westpark | 7,983 | 19,521 | 560 | 308 | 275 | 240 | 1,226 | 15.9 | 34.9 | 6.5 | 14.3 | 8.7 | 25 |
| Woodbridge | 9,292 | 26,036 | 844 | 422 | 340 | 316 | 1,786 | 14.6 | 30.8 | 5.2 | 11.0 | 6.8 | 24 |
| **TOTAL** | **48,072** | **121,048** | **4,468** | **3,049** | **2,746** | **2,030** | **10,522** | **11.5** | **27.1** | **4.6** | **10.8** | **6.4** | **29** |
| **The Woodlands[a]** | | | | | | | | | | | | | |
| Alden Bridge | 9,091 | 20,230 | 1,579 | 658 | NA | 902 | 3,575 | 5.6 | 12.8 | 2.5 | 5.8 | 3.1 | 18 |
| Cochran's Crossing | 5,425 | 15,610 | 1,657 | 335 | NA | 964 | 3,361 | 4.6 | 9.4 | 1.6 | 3.3 | 1.8 | 10 |
| Grogan's Mill | 6,125 | 13,300 | 1,546 | 752 | NA | 983 | 4,032 | 3.3 | 8.6 | 1.5 | 4.0 | 1.9 | 19 |
| Indian Springs | 2,357 | 6,700 | 864 | 566 | NA | 378 | 1,879 | 3.6 | 7.8 | 1.3 | 2.7 | 1.8 | 30 |
| Panther Creek | 5,585 | 12,830 | 1,125 | 4 | NA | 743 | 2,070 | 6.2 | 11.4 | 2.7 | 5.0 | 2.7 | 0 |
| Sterling Ridge | 5,668 | NA | 1,558 | 246 | NA | 1,035 | 3,635 | NA | NA | 1.6 | 3.6 | 1.7 | 7 |
| Town Center | 2,153 | NA | NA | 14 | NA | 273 | 835 | NA | NA | 2.6 | NA | 2.6 | 2 |
| Village 7 | 5,639 | NA | 1,318 | 1,144 | NA | 513 | 3,990 | NA | NA | 1.4 | 4.3 | 2.0 | 29 |
| Total for 5 close to build out | 28,583 | 68,670 | 6,770 | 2,315 | NA | 3,970 | 14,916 | 4.6 | 10.1 | 1.9 | 4.2 | 2.3 | 16 |
| **TOTAL** | **42,043** | | **9,646** | **3,719** | **NA** | **5,790** | **23,376** | **NA** | **NA** | **1.8** | **4.4** | **2.1** | **16** |

NA = Not Available.

*Sources:* The Irvine Company (2001); The Woodlands Operating Company (2000, 2001)

[a]Figures for The Woodlands are at build out except for population, which are 2004 estimates for villages. These are similar to current figures except for Sterling Ridge, still under construction. The development also includes the Research Forest research park area.

under the State of Maryland's smart growth regulations. Under these regulations, the state will place infrastructure only in areas that fulfill certain requirements. Specifically, they have to be planned for 2.0 units per net residential acre (excluding public recreation, habitat, wetlands, and public open space) in existing areas with sewer or water. For greenfield or peripheral sites, this is raised to 3.5 units per net acre excluding those same public uses. The City of Irvine has only 1.8 units per acre across the entire city; however, only 8,205 acres are zoned residential (in the City *and* its sphere of influence). The actual residential density is at least 6.5 units per acre. In addition, presumably more construction will occur on this residentially zoned land, further increasing densities. The signature Woodbridge village has a gross village-level density of 5.2 dwelling units per acre.[9] Excluding only its 340 acres of public parks and public open space easements but counting all the other uses above, the density is 6.4 units per acre, much higher than the Maryland threshold. Ten of the 11 villages for which The Irvine Company has compiled data meet the Maryland standard. Similarly, Columbia has about 5,360 acres of public open space, which makes its first-cut Maryland-smart-growth density about 3.7 units per acre even including industrial and commercial areas, major roads, and institutional uses. In residential density terms, among others, two of these new communities are exemplars of current practices of smart growth. They also have a significant number of jobs per acre (see Table 1).

The Woodlands is the only development to have densities apparently below the Maryland standard. It has much more detached single-family housing than the other two developments—74% in 1990 compared with only 39% in each of the other two developments—and a layout that emphasizes natural drainage. It is less fully developed than the other new towns. In addition, only some of its open space could be excluded as public. Much open space takes the form of golf courses, roadside buffers, or forests and drainage areas protected by covenants on private land. However, if built today in Maryland, the general design could be similar, but the designation of public and private open space could likely be manipulated to fit the density criteria.

### *Aesthetics and Identity*

The case study developments made aesthetic and urban design innovations that were important in their period. While apparently valued by residents, these aesthetic innovations are not easily measured and are not of the kind valued in high-style design debates. The three developments have all been criticized on aesthetic grounds as being full of houses that are similar (Irvine) or architecturally undistinguished (Columbia and The Woodlands). Garage doors are prominent in the dwellings built before the 1990s. Loop and cul-de-sac road layouts limit options for vehicular movement. All the developments are large, and their arterials are lined with long planted buffers that are perhaps less interesting to walk along than quaint main streets. However, they have taken care with landscaping, creating identities for subdistricts, placing utilities underground, strictly regulating signage, building landscaped paths for pedestrians and cyclists, and banning strip shopping areas. They have created clearly defined edges of villages, just as New Urbanists propose should be done.

All the developments use an elaborate set of architectural and land use covenants to make the environment more predictable and certain. These covenants also restrict the potential for altering or retrofitting these suburban landscapes. However, covenants are enforced with different levels of vigilance, even within one development, and can be changed over time. For example, design guidelines are separate from the basic legal restrictions and have been changed over the years to allow more variations as of right, for example, more types of home businesses. Columbia has been the least aggressive in enforcing covenants but is starting a rolling program of inspections due to maintenance problems with some units, particularly those owned by absentee landlords. Some of the controls may be too rigid, but they did help sell certain design innovations such as attached housing to an unsure market. There are also opportunities for review and change by current residents.

The developments were designed using a structure of villages, or in the terms of the Charter of the New Urbanism "neighborhoods and districts," as a way of breaking the large developments into smaller, identifiable units. Each development drew on slightly different sources, and each has slightly different arrangements of housing, schools, parks, institutions, and commercial space. However, interviews indicate that almost everyone on the early design teams had visited Radburn, New Jersey. Columbia has nine villages of roughly the same size —as well as the town center village—and Rouse held strongly to an ideal of small-town life with shops and civic uses in the centers and elementary schools in neighborhoods. In Irvine, villages vary in size from 2,000 to 26,000 people but are more clearly distinguished from each other, representing the influence of concepts such as "district" and "edge" from Lynch's *Image of the City* (1960, pp. 46–49; The Irvine Company, 1970–71, p. 3). While in the older parts of the development beige tones predominate—and there are many local stories about the monotony of "Irvine beige"—since the 1980s bolder colors have been used. The general uniformity within vil-

lages and the very clear village identifying signage makes wayfinding relatively easy.

Uses are mixed within the overall developments, within villages, and increasingly within small neighborhoods and parcels. All three developments now use advertising with slogans like "live-work-shop-play-and-learn." Because of the large sizes of the developments, the planning and design teams could lay out these uses in ways that reflected an overall planning vision rather than immediate market forces or the luck and constraints of owning a small parcel in a particular location. However, some innovations did not sell well or were ahead of their time. For example, there are housing units over the shops in one of Columbia's early villages but they were not repeated in later villages. Only in the 1990s were significant numbers of housing units placed in commercial areas in any of the developments.

Finally, each development has several regional-scale business parks, entertainment areas, and shopping areas often clustered loosely into areas classified as edge cities by Garreau (1991). However, while fulfilling edge city criteria in terms of offices space, retail, job concentration, identity, and newness, they are not as chaotic as Garreau suggests.

Have these strategies of mixed-use villages with well thought out circulation patterns, aesthetic controls, and designed open space made these new communities better places? The North Carolina study found that people appreciated neighborhood pools, culs-de-sac, underground utilities, and good maintenance, and residents of attached units also appreciated neighborhood services such as stores and gas stations (Burby & Weiss, 1976, pp. 203–204). However, they found little difference in satisfaction between residents of planned and conventional communities because the major contributors to satisfaction were housing tenure and the characteristics of the dwelling units (Burby & Weiss, 1976, p. 209). The high design quality, "meticulous landscaping," and recreational amenities in Irvine's apartment complexes, generally developed and managed by The Irvine Company, did result in a statistically significant difference in satisfaction in that community (Burby & Weiss, 1976, pp. 213–124). Irvine and Columbia also rated highly in terms of quality-of-life questions in that same survey, and 21% of Irvine residents and 15% of those in Columbia mentioned the community plan as one reason for this high rating (Burby & Weiss, 1976, p. 368).

Several recent surveys of the three new communities update these findings. The most recent telephone survey of Columbia residents was conducted for the Columbia Association in 1998, using a random sample of 1000 residents stratified so that each village was equally represented. It found that residents stated that they had moved to Columbia because of its location relative to employment (29%), housing opportunities (17%), family reasons (15%) and quality of life (11%). However, quality of life emerged as the factor that was most important to residents currently, with 28% ranking it number one (Chesapeake Group Inc., 1998). The recent City of Irvine Satisfaction Survey relied on a sample of 400 residents, telephoned in 2000 (Fairbank et al., 2000). With a margin of error of plus or minus 4.9%, it found that 96% of the City of Irvine's residents ranked the quality of life as excellent (64%) or good. This was the same figure obtained in the 1970s when 95% of residents rated the community as an excellent or good place to live (Burby & Weiss, 1976, p. 365). The main reasons for moving to Irvine were schools (30%) and safe neighborhoods (25%); the top priorities for City spending were park maintenance (75%) and "preserving a well planned community with a proper mix of homes, businesses, and open space" (74%; Fairbank et al., 2000, p. 7). The Woodlands Community Service Corporation surveyed residents of houses, not apartments, in February 1999 (575 respondents) and October 2000 (634 respondents). In these phone interviews, four items topped both surveys in terms of what residents liked most about The Woodlands: its trees and natural setting (41% in 1999, 46% in 2000), self-containment with everything nearby (18%, 22%), friendliness and good neighbors (17%, 16%) and hike and bike trails (16%, 15%). Suggestions for changes to improve the development reflect the increased pace of construction with two issues topping both surveys: slower growth (11%, 15%) and improving and reducing traffic (10%, 24%; Creative Consumer Research, 1999, 2000).

Overall, it seems that these urban design strategies have made the planned environments pleasant ones with high quality of life. Inasmuch as current planning proposals share the characteristics of these case study communities, it seems that such environments will be pleasant and functional.

### *Social Equity, Diversity, and Access*

All three new communities have attracted the middle class, although residents are ethnically diverse. Through what seem to be unusual efforts, they also managed to have small but significant proportions of government-sponsored affordable housing. However, in new communities, affordable market-rate units are difficult to create until the housing stock ages.

The three developments have managed to mix housing types in a sophisticated and innovative way for their regions (see Table 1). Columbia and Irvine have very significant proportions of attached and mobile housing, proportions that have increased over the years. Irvine mixed housing types at first for design reasons—particu-

larly to preserve open space—but increasingly did it to attract businesses by improving affordability and to increase overall sales (Agid, 1972). Interviews indicated that housing professionals from Columbia inspected Irvine's innovations in attached housing and took them back to Columbia in the 1960s and early 1970s. Irvine also pioneered market segmentation in the 1970s in villages such as Woodbridge, with different housing for different household types, and in this sense was more responsive to social changes than the other two developments that had loftier social goals but were more concerned with providing housing for nuclear families. However, by the 1990s both Columbia and Irvine had high proportions of working women and single-person households. In contrast, The Woodlands remains dominated by detached houses and nuclear families (see Table A-1). Although Kentlands is only part of a tract, the 2000 census indicates demographics similar to the new towns: 27% under age 18, 16% family households, 77% White.

Columbia itself innovated by mixing economic and racial groups and was known in its region as a place where interracial couples could find housing. It included a number of larger, federally subsidized developments in its early period. The Woodlands was required to have income mix because of its federal funding. By the late 1970s when activists sued the City of Irvine and The Irvine Company to create more affordable housing through Section 8 funding, such funding was already becoming harder to obtain (Banzhaf, 1980; "Settlement Agreement," 1977). Each development has about 5–6% of its stock as subsidized housing or housing in local programs for affordable units, lower than the initial aims for Columbia and The Woodlands. However, the developments are often not given credit even for this level of "affordable" units because the high quality of design renders low-cost units invisible, particularly in Irvine and The Woodlands (see Tables 1 and A-1). Irvine's units are also mainly the result of local programs, making them harder to track than federally supported developments (Schiesl, 1991). Partly as a result of the lack of inexpensive housing, few people in poverty live in these developments (ranging from 3 to 6% in 1990). Interestingly, Columbia's 1990 poverty rate was half that of the other two developments in spite of its goals of economic integration.

In the absence of such large and comprehensively minded developers either promoting such housing or being sued to provide it, it is hard to see that greenfield smart growth strategies such as mixing housing types will do much better in solving the affordability issue. In the City of Irvine Citizen Satisfaction Survey, 56% of the population saw a lack of affordable housing as a serious problem, ahead of traffic congestion (42%) and behind only the plan, later abandoned, to build an international airport on the El Toro Marine Air Base (66%; Fairbank et al., 2000). This reflects the high cost of market-rate housing in California. While the aging of the housing stock means some units are becoming relatively less expensive, this is occurring only after several decades, showing the limits to private sector provision of truly affordable housing particularly in desirable places.

In cultural and racial terms, Irvine and Columbia have significant populations of Asians and African Americans respectively. Preliminary work with the 2000 census figures by UC Irvine sociologist Yuki Kato indicates that all three developments are substantially less racially segregated than their surrounding metropolitan regions, and this holds true for all six racial pairings. Such fine-grained integration was planned in Columbia and may be the result of housing variety in Irvine. Columbia's integration is the most notable because it is highly diverse (Kato, 2002).

Columbia and The Woodlands have also experimented with religious institutions. In Columbia, congregations from different faiths share "interfaith" centers in the village centers—although many groups are now buying land nearby to have their own buildings. In The Woodlands, the developer initiated an interfaith group, which is a collaboration of various faith communities and has a community-building role. It acts as an incubator and coordinator of religious groups and is now also a large social service agency with over 250 staff (Franzmeier & Gebert, 1979, pp. 26–27; Interfaith, 2002). Each development has also provided spaces for performances and other cultural events—from Halloween parties in an Irvine shopping center and gay pride celebrations at UC Irvine to symphony and rock concerts in the pavilions in Columbia and The Woodlands. Apart from Irvine's large Asian population, which seems to have been unplanned, these cultural dimensions have all involved a great deal of effort and in some ways made sense only because of the large sizes of the developments. Even the best designed subdivisions on their own will not inevitably lead to such efforts and innovations. Bloom (2001) argues that a complex civic life is a major achievement of the new communities due to both planning and resident action.

Government is also fairly open. Irvine became part of several municipalities—the largest portion is in the City of Irvine, but significant parts are in Newport Beach and several other locations—giving formal political representation to residents. Columbia and The Woodlands are not incorporated but have resident, not homeowner, community associations. Community associations seem to have been a path to political office for many women, and in Columbia, for African Americans.

However, even these developments that have been conceived of as integrated wholes are starting to have some gated sections—proposals that were resisted in the earlier decades by the new community planners and developers. Irvine planners indicated that they are trying to keep pedestrian paths open through these areas, although along the coast the areas are significant. In Columbia the fenced development is small with a low, unlocked iron fence. In The Woodlands, under new owners, the gated area is large enough to include a golf course. Overall, the development companies' marketing departments have made significant changes. These trends obviously represent new challenges. However, the cul-de-sac layouts of the road networks within the villages, particularly in Columbia which has an almost free-form layout, have always been difficult for outsiders to navigate, even without walls.

### *Efficiency and Costs*

While built on open land beyond the metropolitan edge, these were not isolated developments but were deliberately integrated with existing and planned infrastructure supporting both jobs and housing. However, some benefits from location and coordination were obviously counterbalanced by additional costs due to preservicing.

All three communities were in or beside the three metropolitan areas that grew fastest in sheer numbers in the 1960s. As the main monograph on The Woodlands explains, "In the decade 1960–1970 metropolitan Houston added 540,000 new residents, a population growth only exceeded by the Anaheim-Santa Ana, California areas and by Washington, D.C." (Morgan & King, 1987, p. 35). All three took advantage of freeways, train lines, and airports in or near their developments. The Woodlands was located north of the new Houston Intercontinental Airport; the John Wayne Airport is on land originally part of the Irvine Ranch; and Columbia is west of the Baltimore-Washington International airport. However, it has still taken each one at least four decades to reach build out—Irvine will take twice that long.

Given this lengthy development time frame, the developers all faced tremendous problems with start-up funding for infrastructure, exacerbated by downturns in real estate markets and the need to have at least some of the basic structure of the community in place at the start. Irvine solved the funding problem by using agricultural production as an income stream and focusing on the high-end housing first (which was overdetermined by the location of the UC campus close to Newport Beach). Columbia used backing from Connecticut General Life Insurance Company (now CIGNA) for the majority of its initial funding and was virtually owned by that company at one stage (other funding came from banks and pension funds). The Woodlands used federal loan guarantees, revenues from George Mitchell's gas and oil ventures, lines of credit from banks, and some logging income from the forests it was holding for development. As it was coming on line during the real estate market crash of the early 1970s, The Woodlands had particularly severe problems with cash flow. This is perhaps the biggest problem for market approaches to greenfield smart growth—to sell some of the design innovations, it is important to have the infrastructure in place, but this requires large amounts of capital.

While the development design may have saved some money, it is not clear that this will have made up for the costs of accelerating provision of major items, increasing quality, and holding very large land areas. Burchell et al. (1999, p. 3) estimate that cost savings through compact development would save only about 10% of infrastructure costs overall. Similarly, Peiser's (1984) analysis of costs of planned versus less planned development using the case of a 7,500-acre site in Houston found land development, social, and transportation cost savings of only 1 to 3% in planned versus unplanned development at the same density.[10] Overall, the advantages of coordination have been counterbalanced by the additional interest and other costs from preservicing.

### *Environmental Issues*

All three new towns were ahead of their time in terms of open space provision. Accessible open space, woven into the fabric of the development, tends to spread out development and make nonmotorized transport more difficult—and people in these developments drive a lot. However, open space is undeniably saleable. It has helped these developments survive in the market place and has had some benefits for habitat and water quality.

All the physical plans emphasize open space and landscape character—working with the existing agricultural and timber industry landscapes of the developments. All mix local parks with regional recreation and environmental protection areas. Irvine in particular has very lush and distinctively formal plantings, even in its parking lots and very separate habitat areas. The Woodlands really does live up to its name, and Columbia has protected the surroundings of its many rivers and streams.

Habitat protection became more important in each development over time—just as it became more important for society as a whole. Although it was not in the initial plan, The Irvine Company has gradually responded to government and citizen pressure for habitat protec-

tion, with about 44,000 acres protected, after additions in November 2001. Another 6,000 acres are parks, making a total of about one half of the development, although some may be protected for only 75 years. While my interviews and local documents indicated that TIC has had many conflicts over wetlands and habitat issues, it eventually adapted to environmentalism (Forsyth, in press; Jasny, 1997; The Irvine Company, 2002). At a smaller scale, Table 2 shows that open space makes up about 29% of the land in 11 villages studied, and this is largely in addition to habitat protection areas, few of which lie within villages.

The Woodlands has emphasized natural drainage and protection of the aquifer, and its early planning involved very extensive ecological studies (e.g., Wallace, McHarg, Roberts, & Todd, 1971, 1974). Since the early 1970s, George Mitchell has funded conferences, awards, and research on sustainable development, currently supporting a sustainability center at the Houston Advanced Research Center in The Woodlands. Columbia, though without such an explicit environmental program, was being designed at about the same time as Wallace-McHarg Associates' famous 1964 *Plan for the Valleys* area north of Baltimore. Overall, Columbia's landscape design developed over time, taking up some of the ideas that were obviously coming into currency.[11] In particular it protected its rivers and streams, and the overall new town is 38% open space.

The developments have not been as successful in promoting alternatives to the private car. Columbia has municipal buses, Irvine has buses and an Amtrak line, and The Woodlands a commuter shuttle to Houston. However, 1990 census data indicate that the developments each had from 78-82% of residents driving to work alone, 10% higher than the state average in California and Maryland, and 2% higher than in Texas (see Table A-1). Commute patterns also do not seem to have changed much over time. At the time of the new communities studies in the early 1970s, 93% of Columbia residents drove or carpooled to work compared with 92% in 1990; the figures for Irvine were 96% in the 1970s and 91% in 1990 (Burby & Weiss, 1976, p. 336). As the 2000 census results are released, it may turn out that these numbers have improved, along with the increase in the number of jobs in each new community—by the late 1990s ranging from 1.2 per household in The Woodlands to 3.1 per household in Irvine. However, even in 1990 high proportions of residents of Irvine (37%) and Columbia (27%) both lived and worked in the same census designated place or city, and still most people drove (see Tables 1 and A-1).

Certainly the developments allow for pedestrian use. The development teams treated pedestrian and bicycle paths with care, seeing them as often separate to the road network. At first the home-to-school route and recreational uses were emphasized, but later nonmotorized trips to work and services were included (although in Columbia the recreational focus is still strong, and paths could be more continuous). In 1990 walkers made up 7% of commuters in jobs-rich Irvine. Analyses of their vehicular road networks show a large number of loops and culs-de-sac. However, this misrepresents the pedestrian experience of these communities, where the path systems are more connected. Given the difference between road and path systems, Columbia and The Woodlands have very helpful pedestrian maps created by their resident associations, and the City of Irvine has created an excellent cycling map. However, in Irvine it is hard for outsiders to find parking spaces, particularly on main roads where bicycle lanes take up the edge of the road, and that does limit the access of outsiders to park and walk. Obviously, having a walkable path network doesn't necessarily lead to walking—but it is still important to recognize the differences between the pedestrian, cycling, and motorized vehicular networks.

The analysis of nonwork trips, a major focus of planning, is hampered by a lack of place-level data. However, Burby and Weiss (1976, pp. 340-342) described how in the early 1970s, respondents in Irvine and Columbia reported slightly *more* vehicle miles traveled per family per year compared with their counterparts living in less planned areas. They surmised that the convenient layout of new communities might actually promote more social, recreational, and shopping trips.

Overall, these cases seem to show that densities that conform to smart growth and New Urbanist practices and that even contain mixed-use centers and corridors are not enough in themselves to significantly shift trips away from cars. The large proportions of attached-dwelling units in Irvine and Columbia rather than density per se and the early interest in climate-sensitive house siting in The Woodlands may have some benefits in terms of energy use at the household level, but this has not occurred in the transportation realm.

### *Benefits of Sprawl*

Finally, as can be seen in Table A-1, unplanned suburban development does have some benefits in terms of affordability to the owner, private open space, and other aspects of choice. These new communities had to compete with more generic developments for sales, meaning that they had to provide similar benefits, particularly in the private realm, although there has probably been some trading off of private for public space. In addition, within this larger landscape, the new communities also provide an additional choice of planned development.

For example, one of the major perceived drawbacks of such developments—the land use and architectural covenants—in fact supplies a market demand for order.

## Conclusions

These new communities are often seen by those proposing smart growth and New Urbanism as rather dated in their urban designs—with low densities, culs-de-sac, and automobile-based shopping. This is certainly true for some parts of these developments, although it glosses over variations within developments, their detailed design, and change over time, with all three developments having newer sections with a New Urbanist flavor. In addition, judged against the criteria developed by proponents of smart growth and New Urbanism, the developments fare very well on such issues as density, pedestrian paths and access, income and ethnic mix, neighborhood identity and layout, and open space. This means that criticisms of these more established new communities are in fact criticisms of ideas about current best practices. For example, these developments highlight the situation that in the environmental realm, urban designs that emphasize open space, recreation, and water quality are not always consistent with those emphasizing energy conservation through increased density.

These findings have implications for a number of dimensions of the suburban growth and urban sprawl debates. In these conclusions, I highlight three of them—the importance of examining submetropolitan areas in empirical work, the significance of learning from early planning innovations, and the current disconnect between the sweeping aims and mild policy prescriptions of many current smart growth programs and projects.

Recently there has been much attention paid to issues of urban sprawl and metropolitan growth. However, most of this work has focused on the metropolitan level of analysis. Some analysts have relied primarily on one measure, such as density or the conversion of agricultural land. Others have tried to come up with more robust, multidimensional measures of sprawl and have broken metropolitan areas into small units (e.g., Galster et al., 2000; Malpezzi & Guo, 2001). This article joins an important alternative tradition of analyses, looking at significant components of metropolitan areas at a scale that can take account of issues of urban form at the subregional level (e.g., Girling & Helphand, 1994; Moudon & Hess, 2000; Peiser, 1984; Southworth, 1997). Perhaps metropolitan-scale analyses may eventually be able to take account of detailed design and planning factors, but at present these submetropolitan studies are needed to fill in the gaps and to bridge to work at the village or project scale.

In terms of recent moves toward smart growth, it often seems that the U.S. needs to learn from Europe, Canada, Australasia, or some unique locations such as Oregon. However, these three case study developments provide important lessons from within the U.S. planning tradition from deep suburban areas that are not normally associated with the cutting edge of planning practice. These developments survived over decades in conservative market places, and to paraphrase one of my interviewees, they made a market for what were perceived as risky products—attached housing, racial mix, and forest understories residents are not allowed to clear even in their own back yards. They certainly did not change the whole culture, but they shifted preferences a little. Some people bought into the whole new community package, some came for the good schools and convenience, but the developments wooed a market, and they did this at a very large scale within their regions.

This assessment shows that they did fairly well in their own terms, and those terms were forward looking. The developments were smart growth pioneers, even using some principles that could be described as New Urbanist. They show what it is possible to do at a large scale and not just in a niche market. They give hope to those proposing current innovations in a similar vein in that it is possible to sell such products—although they also show that they are initially very expensive to develop.

While they are special places—they are large, with continuous ownership—they are not unique. It is possible for both business and government to replicate at least some of their characteristics. The question, however, is which parts should be replicated, and which instead show the limits to current thinking about better urban development. In particular, they cause one to wonder about the basic idea behind smart growth and New Urbanism. This idea is a hopeful one—that people in the U.S. can continue to use resources freely, and with some small changes this can turn out all right. However, many of those who support smart growth criticize new towns such as the case study developments. The findings of the research indicate that in smart growth and even New Urbanist terms, there is very little to criticize about these developments. People certainly drive a lot in these developments, their covenants slow change, and they could be more economically integrated. However, it is not at all obvious that many high-profile smart growth and New Urbanist projects—particularly those in suburban areas—will do better. They certainly fulfill the general aims for development outlined in the preamble to the Charter of the New Urbanism:

> . . . neighborhoods should be diverse in use and population; communities should be designed for the pedestrian and transit as well as the car; cities and towns should be shaped by physically defined and universally accessible public spaces and community institutions; urban places should be framed by architecture and landscape design that celebrate local history, climate, ecology, and building practice. (Leccese & McCormick, 2000, p. vi)

While they are not perfect, they are very good examples of a consensus view of best practices in urban development, and their weaknesses generally highlight problems with those best practices (Downs, 1989). If everyone in the world lived in these patterns, greenhouse gas production would accelerate even faster. However, as this article argues, smart growth and New Urbanism probably are not enough either to achieve key sustainability gains, and the U.S. may have to make some tougher choices about land use planning and design. This is the lesson of these developments. The U.S. planning profession's current ideas about best practices potentially work in many economic and social areas, and they can save habitat and improve aesthetics. They can make convenient developments with a high quality of life for residents. However, in some environmental dimensions and in some aspects of social equity, they show where current practices may not be smart enough.

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## NOTES

1. For The Woodlands there were 18 relevant interviews in Kutchin (1998); for Columbia, seven relevant interviews in Olsen (2000), and for Irvine, one in Hellis (1992).
2. While companies had thrown out many documents over the years, in the cases of Irvine and Columbia many of these had found their way to collections at the University of California Irvine and the private Columbia Archives (now affiliated with the Columbia Association). Finding materials for The Woodlands was more difficult, though there were a number of Title VII related files in the National Archives. A number of individuals very generously allowed access to their files or correspondence, including Land Design Research/HNTB, James McAlister, Sr., Johnson Fain Partners, Joseph Kutchin, Gerald Brock, Herbert Gans, Bill Deobele, Bob Dannenbrink, Richard Reece, Don Webb, Ray Watson, and Len and Ann Ivins.
3. The Irvine Company has had three ownership regimes (see Table 1 for details). Sources for the history of Irvine include Bloom (2001), Cameron (1979), Cleland (1962), Forsyth (in press), Griffin (1974), Hellis (1970), and William Pereira Associates (1964a, 1964b).
4. The 1970 General Plan prepared by the company proposed 430,000 people on 53,000 acres, but it omitted coastal development. The total figure for the Ranch was 67,000 acres (The Irvine Company, 1970; William Pereira Associates, 1964a, 1964b).
5. The top development for home sales was Summerlin near Las Vegas, a Rouse-owned new town started in the 1990s; Columbia's residential areas are almost completely built out.
6. These postwar developments, of course, in turn drew on a still earlier history of designed suburbs from Llewelyn Park and Riverside to Forest Hills and the Green Belt towns (Fishman, 1987; Girling & Helphand, 1994; Jackson, 1985).
7. These followed earlier work out of the university of Michigan (Lansing et al., 1970).
8. See Arendt (1999), Beatley (2000), Burchell et al. (1998, p. 129), Calthorpe (1993), Calthorpe et al. (1991), Calthorpe and Fulton (2001), Duany et al. (2000), Esseks et al. (1999), Ewing (1996), Galster et al. (2000), Leccese and McCormick (2000), Newman and Kenworthy (2000), Southworth (1997), and Southworth and Owens (1993). There has been some work to quantify effects, for instance, on what densities are necessary to support public transport and to lower infrastructure costs. However, many of the critiques of sprawl involve qualitative assessments.
9. Calculated by the author from 2000 City of Irvine GIS data. This is assuming all of this residentially zoned land is inside city boundaries. If some of the residential land is in the sphere of influence, the density will be higher.
10. He considered within-site transportation but omitted analysis of "interior streets and utility costs for residential subdivisions" (Peiser, 1984, p. 424).
11. Thanks to Uri Avin and Jim Wannemacher for this insight.

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## APPENDIX

**TABLE A-1. Critiques of suburban growth with evaluations of case study new communities.**

| Features and effects | Dimensions | General comments | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[b] |
|---|---|---|---|---|---|
| **URBAN DESIGN** | | | | | |
| **Features of growth** | | | | | |
| 1 Lack of definition/identity of neighborhoods, in terms of both centers and edges | Aesthetics & identity | Identity is an aim. | Irvine has clearly named villages, differentiated architecturally and with landscape themes. They vary greatly in population from about 2,000 to 26,000. | Columbia is composed of villages. It uses landscape areas between villages to define boundaries—though this is not very clear. | The Woodlands uses extensive greenbelt and parkway areas to define villages. This has been done more clearly than in Columbia. |
| 2 Widespread commercial strip development | Aesthetics & identity | Strips have basically been eliminated. | Very proud of having no strips. | Columbia has some window areas with strips. | In The Woodlands most shopping centers are buried in the forest. |
| 3 Road patterns that limit options for movement | Social equity, diversity, & access<br>Efficiency & costs | True of the new communities. All have many culs-de-sac. In some cases pedestrian paths are more of a grid structure. | Good overall wayfinding, with a loose arterial grid into which villages are inserted. While residential streets tend to be cul-de-sac and loop structures, the pedestrian system is generally more grid like. | Confusing and limited set of primary roads. The pedestrian system is recreationally focused, although attention was paid to the walk to school. | Modified grid as in Irvine, although not all the primary roads have been built. Good and improving major pedestrian paths, although not all streets have sidewalks (perhaps to limit impervious surfaces). |

**TABLE A-1. (continued)**

| Features and effects | Dimensions | General comments | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[b] |
|---|---|---|---|---|---|
| 4 Spatially segregated land uses developed at a coarse grain | Social equity, diversity, & access<br>Efficiency & costs | All have some kind of land use and housing mix within the overall development and within villages. | Irvine mixes offices and shops in many village shopping centers and is gradually retrofitting its research parks and mall areas with more uses including residential. | Village centers contain shops, civic, recreation, and educational facilities. Some supermarkets have struggled but a commendable mix of public and private space is provided. | Each village has a commercial village center, but the developing town center will mix residential, entertainment, retail, and office space. |
| 5 Low density | Social equity, diversity, & access<br>Efficiency & costs<br>Benefits | Columbia and Irvine have more attached and apartment housing than comparable developments in their region. See also Tables 1 and 2. | Irvine pioneered attached upper-income housing, with the tradeoff being linked open space. In 1990, only 39% were 1-unit detached homes. | Has significant apartment and townhouse development near neighborhood centers but overall low density. In 1990, only 39% 1-unit detached homes. | More detached housing units than the other developments. In 1990, 74% 1-unit detached homes. |
| **Effects of growth** | | | | | |
| 6 Aesthetic issues—monotony | Aesthetics & identity | Developers have not been particularly daring about mixing housing styles. | Clusters of similar housing units and village design themes are criticized as being monotonous. | More variety in housing than Irvine, even with the same number of detached houses. | Like Columbia. |
| 7 Reliance on filtering for low-income housing. Sources: Bloom (2001), Irvine Company (2000), Rouse Company (1999), U.S. HUD (1998) | Social equity, diversity, & access | Each made some attempt at low cost housing with 5–6% of units delivered through affordable housing programs. The subsidized housing is of high design standard. | City of Irvine has 6% units in government affordable housing programs, 3,233 units, although only 717 are federally subsidized. New housing starts at $144,000. | Columbia has 1,800 units (around 5%) subsidized, 1,498 federally. Much subsidized housing clustered near village centers making it more visible. New housing starts at $108,000. | Low-income housing a criteria for HUD Title VII. Over 1,000 federally subsidized units in 1998. New housing starts at $108,000. |
| 8 Social, economic, civic, cultural (arts) isolation/inequality within the region | Social equity, diversity, & access | Each has worked hard to attract such facilities/ opportunities; good school systems. | Irvine has UC-Irvine with many cultural facilities and the Irvine Spectrum entertainment complex. | Columbia has a music pavilion and an African American history museum. | The Woodlands has a music pavilion. |
| 9 Lack of locations for public or community activities and interaction | Social equity, diversity, & access | This has been an interest for all; while not perfect all have some strengths. Some facilities require membership of a resident association. | Municipalities provide typical civic centers and open spaces; Irvine Company provides shopping areas and builds some parks, also funds events (e.g., Halloween costume competitions). | A strength. Village centers have shops mixed with community facilities. They have had to be redesigned, but the basic concept is good. Interfaith centers for congregations, rather than separate facilities. | Schools used for community activities. Resident association provides extensive park system with innovative recreational facilities for people of all ages. |

**TABLE A-1. (continued)**

| Features and effects | Dimensions | General comments | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[b] |
|---|---|---|---|---|---|
| **URBAN DESIGN** **Effects of growth** | | | | | |
| 10 Disinvestment in historic commercial areas | Social equity, diversity, & access Efficiency & costs | Historic commercial areas nearby have not declined. | Nearby Newport Beach and Laguna Beach have boomed. | Ellicott City, the nearby county seat, has redeveloped. | No real signs of change in County seat, Conroe. |
| 11 Lack of useable, designed, accessible open space | Social equity, diversity, & access Efficiency & costs | Extensive path/ recreation/open space systems designed for a variety of uses. See also item 9. | Of 11 villages studied by The Irvine Company, park/ open space varied from 17–50% of land area. | The Columbia Association maintains a wide array of indoor and outdoor recreation facilities. | Over 100 miles of trails and walkways; very comprehensive park system. |
| 12 Isolation for those without cars | Social equity, diversity, & access Efficiency & costs | This has been a difficult issue. | Has Amtrak, county bus system and well developed biking community. | Columbia's planned bus system failed, although there is a county service. | The only transit is a well-used commuter bus to Houston. |
| 13 Automobile dependence due to density and overall urban structure | Social equity, diversity, & access Efficiency & costs Environmental issues | All were automobile based; located/ developed because of existing or proposed interstates. In 1990, 78–82% of commuters drove alone. See also item 12. | Potential for transit/ nonmotorized transportation because of the high density of jobs. In 1990, 82% of commuters drove alone (compared to 72% in CA); plus 9% drove in carpools. | The path system is circuitous and designed for recreation and trips of children to school. In 1990, 80% of commuters drove alone (compared to 70% in MD); plus 12% drove in carpools. | Like Irvine, has a fairly good path system along major roads. In 1990, 78% of commuters drove alone (compared to 76% in TX); plus 12% drove in carpools. |
| 14 Long commute times for both journey to work and other trips | Efficiency & costs Environmental issues | All have attempted jobs housing balance. See employment figures in Table 1 and item 13 in this table. | Jobs/housing ratio in late 1990s: 3.1/1. In 1990, 37% worked in place of residence (City of Irvine), compared to 17% in CA). | Jobs/housing ratio in late 1990s: 2.0/1. In 1990, 27% worked in place of residence (CDP), compared to 19% in MD. | Jobs/housing ratio in late 1990s: 1.2/1. In 1990, 5% worked in place of residence (CDP), compared to 49% in TX); has increased. |
| 15 Lower levels of neighboring, civic involvement, etc. | Social equity, diversity, & access | Unclear if new towns do better than elsewhere. | Typical municipal boards, committees, and councils. | Columbia Association has active village and town-wide boards. | Resident association has many boards, but it is in an earlier stage of development. |
| 16 Large amounts of private space, both indoor and outdoor | Benefits | All trade off some private space for common areas, but still have much private space. | See general comment to left. | See general comment to left. | See general comment to left. |
| 17 High levels of individual mobility (transportation) | Benefits | New communities are unlikely to be worse than generic sprawl and may give some extra options (e.g., bike paths). | See general comment to left. | See general comment to left. | See general comment to left. |

**TABLE A-1. (continued)**

| Features and effects | Dimensions | General comments | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[b] |
|---|---|---|---|---|---|
| 18 Good fit with cultural perceptions: home, success, etc. | Benefits | Each one uses "home town" imagery in marketing. | See general comment to left. | See general comment to left. | See general comment to left. |
| **ENVIRONMENT** | | | | | |
| **Features of growth** | | | | | |
| 19 Unlimited outward extension | Density Efficiency & costs | Developments reshape expansion, but do not stop growth. See item 5. | Much attached housing and relatively compact suburban form. | Much attached housing and relatively compact suburban form. | The lowest density. |
| 20 Lack of consideration of natural habitat | Environmental issues | Increasingly an issue. | Approx. 44,000 acres in habitat protection, not part of the initial plan. | Focus on parks more than habitat; early protection of river and stream areas. | Extensive ecological surveys before planning; focus has been most on hydrology. |
| **Effects of growth** | | | | | |
| 21 Loss of agricultural land, open space, vegetation, habitat | Environmental issues | Open space has been lost, but each development protected it more than typical subdivisions. | Protected large areas of coastal sage scrub. See item 20. | Protected the rural atmosphere. | Maintained forest; research park, and shopping areas are hidden by wide forest buffers. Declining value? |
| 22 High energy use/waste production | Efficiency & costs Environmental issues | The developments may have few advantages, with the following exceptions. | Large percentage of attached houses and people who work in place of residence may have some benefits. | Large percentage of attached houses and people who work in place of residence may have some benefits. | Early concern for microclimate in house siting. |
| 23 Water quality problems: erosion, runoff | Environmental issues | All paid some attention. | An issue of some conflict with the EPA. | Columbia protected streams, which has had benefits. | A clear strength—it aimed for basically zero runoff. |
| 24 High water consumption | Efficiency & costs Environmental issues | Similar to generic development. | Innovative water recycling program. | Information not available. | Information not available. |
| 25 Air quality problems from automobile use | Environmental issues | Work trips are mostly by car. It would be useful to examine nonwork trips. See item 13. | See general comment to left. | See general comment to left. | See general comment to left. |
| 26 Spaciousness and closeness to nature | Benefits | All use design to create this sense. | Formal, modernist plantings and habitat protection areas. | Rural and forested character. | Wooded aesthetic complete with understory. |

**TABLE A-1. (continued)**

| Features and effects | Dimensions | General comments | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[b] |
|---|---|---|---|---|---|
| **COORDINATION** | | | | | |
| **Features of growth** | | | | | |
| 27 Leapfrog development | Efficiency & costs | All were phased; only The Woodlands seems to have been phased very sequentially. Superficial fragmentation masks an underlying logic. | The Irvine company was forced into developing on multiple fronts because it had sold central valley land earlier to land owners who wanted to develop. | Has very discontinuous land holding with many outparcels, so development was and is a patchwork. | Seems to avoid the appearance of leapfrog development. |
| 28 Land uses not coordinated with (existing) infrastructure | Efficiency & costs | Coordination is highly valued, although as fast-growing developments all have had some lagging infrastructure. | See general comment to left. | See general comment to left. | See general comment to left. |
| 29 Fragmented land-use control | Social equity, diversity, & access<br>Efficiency & costs | Strong companies worked around the fragmentation issue. | County and seven local governments have control—often new areas approved by the county and then annexed. | County the approval authority. | Subdivision approval only required, by City of Houston; coordinated with other government agencies. |
| **Effects of growth** | | | | | |
| 30 Expensive or delayed infrastructure | Social equity, diversity, & access<br>Efficiency & costs | Inefficiency and delays are avoided, but infrastructure is still expensive because of high amenity levels and early provision. | See general comment to left. | See general comment to left. | As a more isolated development, delays were more of an issue. |
| 31 Variation in local fiscal capacity (affecting education, public services) | Social equity, diversity, & access<br>Efficiency & costs | A complex issue. In each new community residents expect high service levels but the large employment areas also supply tax dollars. | Because Irvine is incorporated, it has really not avoided the problem of variations in local fiscal capacity at a regional level. | County benefits from taxes; added parks and recreation in Columbia are paid for through a separate fee, part of an early agreement with the county to limit the costs of the development. | The Woodlands is in the extraterritorial jurisdiction of Houston as George Mitchell wanted it to contribute taxes to the city. |
| 32 Slow emergency service response times. | Social equity, diversity, & access | Developments are all dense enough for this criticism to be less relevant. | See general comment to left. | See general comment to left. | See general comment to left. |
| 33 Less expensive housing due to lower land costs | Benefits | All are competing successfully with unplanned sprawl. See item 7. | See general comment to left. | See general comment to left. | See general comment to left. |

**TABLE A-1. (continued)**

| Features and effects | Dimensions | General comments | Irvine, CA[a] | Columbia, MD[b] | The Woodlands, TX[b] |
|---|---|---|---|---|---|
| 34 Choice among different municipalities providing different bundles of services | Benefits | New communities add to choice, given that they do not make up the whole housing market in their region. | Irvine is large, but different areas within the development have different service bundles, and it falls in multiple municipalities. | Columbia is the urban center for Howard County, providing an option not previously available. | The Woodlands and other master-planned communities in the Houston region (which does not have zoning) provide a planned alternative. |

*Sources:* Bloom (2001, p. 173); City of Irvine (2000, 2002); The Irvine Company (2000, 2002); Rouse Company (1999); The Woodlands Operating Company (2000, 2001); U.S. Census Bureau (1990, 2000); HUD (1998).

[a]Census data for City of Irvine only.

[b]Census data for census designated place. See notes to Table 1 for explanation of relationship between new communities and census designated places.