

Chapter 4



LAND USE PLANNING AND POLICY ISSUES

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Introduction

How can land be used, and who makes that determination? These are among the most contentious questions faced by any community. When that community is in the wildland-urban interface, conflicts can arise between newcomers and long-term residents; between private and public land management needs; and between Federal, State, and local governments. Current land-related public policies at all levels of government are contributing to the severity of these conflicts by failing to provide a way for communities to direct and control the increasing demand for land development that results when large numbers of people move into the interface. As long as people have the ability and desire to live in rural and undeveloped areas, land use policies should be designed to minimize the negative impacts such movement has on natural resources in the interface. ►



Table 4.1—Southern State rankings by acreage and rate of non-Federal land developed for 1992–97 and 1982–92^a

State	1992–97			1982–92			
	Rank	Change in total land developed	Avg. annual conversion rate	Rank	Change in total land developed	Avg. annual conversion rate	
		----- Acres -----				----- Acres -----	
Texas	1	893,500	178,700	1	1,387,000	138,700	
Georgia	2	851,900	170,380	5	738,400	73,840	
Florida	3	825,200	165,040	2	1,088,200	108,820	
North Carolina	6	506,600	101,320	3	933,100	93,310	
Tennessee	7	401,900	80,380	7	464,000	46,400	
South Carolina	10	362,000	72,400	11	386,400	38,640	
Virginia	11	343,500	68,700	10	441,000	44,100	
Alabama	13	315,300	63,060	13	320,400	32,040	
Kentucky	16	237,100	47,420	12	355,100	35,510	
Mississippi	22	206,400	41,280	29	147,400	14,740	
Oklahoma	26	176,700	35,340	27	156,100	15,610	
Arkansas	28	168,900	33,780	36	96,800	9,680	
Louisiana	29	133,600	26,720	18	256,300	25,630	

^a Out of 49 States. Alaska data not yet available.

Source: Natural Resources Conservation Service 2000.

Natural resource management and conservation in the interface are complicated by current land-related public policies. These challenges are related to both the amount of land being developed in the interface and the speed with which this development is taking place (table 4.1). The health and condition of natural resources are also related to the manner in which land is developed. It often appears that land use decisions are made without regard to the sensitivity of the landscape or its suitability for development. Land development too often inhibits natural ecosystem functions, such as flood mitigation and natural habitat. The migration of large numbers of people into the wildland-urban interface, however, creates increasing demand for land development, public services and infrastructure, and places greater strains on existing natural resources (fig. 4.1).

Current Public Policies and Programs Affecting the Wildland-Urban Interface

Federal Policies and Programs

Various Federal laws and programs have created incentives for development within the interface. For example, the Federal Government subsidized the creation of the State numbered route system and the National Interstate Highway System. This road expansion has opened up previously isolated land to development. Development has been further encouraged by the availability of federally backed mortgages through the Federal Housing Administration and the Veterans Administration (Rylander 2000).



Photo by James Kundell, University of Georgia

Figure 4.1
Development for housing has allowed erosion and sedimentation to occur which can affect the quality of nearby water.

While the net result of such Federal policies has been to facilitate population movement into the interface, other Federal policies and programs are designed to protect and conserve the natural resources of public and private land. For example, pollution control laws such as the Clean Air Act (CAA) and the Clean Water Act (CWA) were created to decrease air and water pollution. To do so, the laws limit certain land use practices. The CWA, for instance, contains provisions for area-wide land use planning to address pollution from nonpoint sources. In addition, under the CAA, States create air-quality control regions and prepare State Implementation Plans (SIP) that are designed to enable each region to attain federally set numerical limits for ambient concentrations of specific pollutants. If a region fails to meet its SIP obligations or fails to prepare an adequate SIP, Federal highway funds can be jeopardized and new construction can be halted. In contrast, the Coastal Zone Management Act attempts to minimize adverse impacts of development in coastal areas by providing Federal funding and guidelines for States to develop coastal management plans tailored to fit their specific needs. The Endangered Species Act (ESA) is another example of a Federal law whose purpose is to conserve and protect natural resources. The ESA prohibits both public and private individuals from “taking” any species that has been listed as threatened or endangered. Under the takings provision, a habitat modification that indirectly kills members of a listed species can be prohibited, even if this habitat is privately owned.

State Policies and Programs

Authority to guide land use decisions lies mainly with the States, which may choose to delegate this power to local governments at the county or municipal level. State and local governments have authority to regulate land uses and forest practices based on police powers that can be invoked to protect the public health, safety, morals, and welfare.

Forest management practices play an important role in land management in the interface. Actions by private forest landowners that might pollute or damage roads may be regulated by the State directly through forest practice ordinances and indirectly through tree conservation, water quality, wetlands, and open-burning laws (figs. 4.2A, 4.2B). In the South, forest regulatory ordinances are usually adopted by counties (or parishes in Louisiana) and tend to be concerned with protecting

Figure 4.2

(A) Regulation of private forest land addresses a number of management activities including clearcutting; (B) some Southern States have relied on nonregulatory use of forestry best management practices to ensure that forest practices provide adequate protection to the environment, especially water quality.



Photo by James Kundell, University of Georgia

(A)



Photo by James Kundell, University of Georgia

(B)

local government investments in roads, bridges, and highway infrastructures. However, State government environmental policies can be an important stimulus for the creation of local forest laws. For example, Virginia requires localities to regulate forestry activities adjacent to the Chesapeake Bay (Martus and others 1995). Tree protection ordinances generally apply to the removal of trees associated with land clearing and development. Often enacted in response to changes from rapid land development, tree ordinances range in complexity from simple tree replacement standards to more comprehensive ordinances addressing natural resource issues (U.S. Department of Agriculture, Forest Service 2001). Nonregulatory best management practices (BMPs) are another way Southern States have attempted to ensure that forest practices provide adequate protection to the environment, especially water quality. These BMP programs are usually not mandatory in the South. The Florida Division of Forestry, for instance, has developed voluntary BMPs for silvicultural operations near streams, rivers, lakes, and wetlands (Cubbage 1991). However, BMP programs are not always completely voluntary. A North Carolina regulation requiring landowners to prepare an erosion and sediment control plan for activities that disturb more than one contiguous acre exempts forestry operations, provided that forest owners and operators adhere to performance standards established by the forest practices guidelines on water quality. State forestry BMPs are recommended as a way to achieve compliance with these water-quality standards (Cubbage 1995).

While the States generally delegate their authority over land use to local governments, State legislatures can review or supersede local zoning where statewide interests are at stake. The State's police powers are usually delegated through enabling statutes, frequently patterned after the Standard State Zoning Enabling Act (SSZEA) of 1924. The SSZEA was intended to provide a common statutory zoning scheme for municipalities engaged in controlling land uses. This model act was eventually adopted by all 50 States and is still relied on by many States today (Nicholas 1999). A 1997 survey conducted by the American Planning Association as part of its Growing Smart Project revealed that many Southern States lack modernized planning statutes (American Planning Association 1999) (**tables 4.2, 4.3, 4.4**). This deficiency makes it more difficult for these States to effectively manage growth and change in the interface.

Table 4.2—The status of land use planning statutes (extent of updates to State legislation governing local planning) in the Southern States, 1997

State	Extent updated			
	Substantially	Moderately	Slightly	None
Alabama				X
Arkansas			X	
Florida	X			
Georgia	X			
Kentucky		X		
Louisiana				X
Mississippi			X	
North Carolina				X
Oklahoma				X
South Carolina		X		
Tennessee				X
Texas				X
Virginia				X

Source: American Planning Association 1999.

Nationally, several States have adopted comprehensive growth management plans. In general, these plans establish statewide goals and policies, create regional agencies charged with reviewing and coordinating local plans, and require local governments to prepare plans that implement State goals. While statewide planning systems are designed to provide intergovernmental coordination, all too often, lack of local government cooperation prevents achievement of the goals of the State plan. Florida's attempt at implementing its comprehensive growth management plan is a case in point. While Florida's comprehensive planning statute requires local governments to adopt local land-development regulations that implement and are consistent with the State comprehensive plan, sprawling development remains rampant, and local zoning decisions still favor low-density and large-scale forms of development (Nelson and others 1995, Porter 1999).

State infrastructure policies have also contributed to problems with land-development patterns in the interface. Under the SSZEA, States are confined to regulating only narrow areas of State interest, such as highway systems. As a result, State departments of transportation are answerable only to the Governor and State legislature, and can build roads without regard for local plans or land use consequences (Buzbee 1999, Lindstrom 1997). State funding programs for basic community infrastructure also tend to promote development in the interface by emphasizing funding of new facilities rather than rehabilitation or replacement of older systems. State water and sewer system financing programs likewise are mostly concerned with adding capacity (Porter 1999). The consequences of such policies are expensive both environmentally and financially. For example, it has been estimated that South Carolina will pay more than \$56 billion in infrastructure costs between 1995 and 2015 if current development trends remain unchecked.

Table 4.3—The status of land use planning statutes (State with legislation mandating local land use planning) in the Southern States, 1997

State	Planning mandated?		
	Yes	Conditionally ^a	No
Alabama		X	
Arkansas			X
Florida	X		
Georgia	X		
Kentucky	X		
Louisiana		X	
Mississippi		X	
North Carolina			X
Oklahoma		X	
South Carolina		X	
Tennessee		X	
Texas			X
Virginia		X	

^a The statute requires a local government to develop a plan only if it chooses to first create a planning commission.

Source: American Planning Association 1999.

This total amounts to \$750 per citizen per year for the next 20 years (Burchell and Shad 1998) (see chapter 3 for more discussion on infrastructure costs).

Local Policies and Programs

Traditionally, the authority to guide and restrict land use has been the prerogative of local governments. The scope of local authority to make land use decisions is determined by whether the locality exists in a State with the Dillon rule or home rule. Under the Dillon rule, local governments may obtain power to govern only through a clear and expressed delegation of power by the State. In contrast, under home rule, State legislatures may give local governments the power to legislate with respect to local matters. State legislatures may limit, expand, or withdraw the locality's authority at their discretion. The extent to which home rule operates to limit the scope of State power varies from State to State. However, even in States where the scope of home rule is broad, State law supersedes local law except to the extent that it is prevented from doing so by the State constitution or by statute (Weiland 2000). Today, nearly every State has some type of home rule provision enabling municipalities to exercise some degree of self-governance.

Local governments exercise their authority over land use decisively through zoning ordinances. By geographically separating and organizing different land uses, zoning laws prevent incompatible uses from interfering with one another

Table 4.4—The status of land use planning statutes (strength of State role in local land use planning) in the Southern States, 1997

State	Description of State role		
	Strong	Significant	Weak
Alabama			X
Arkansas		X	
Florida	X		
Georgia	X		
Kentucky		X	
Louisiana			X
Mississippi		X	
North Carolina			X
Oklahoma			X
South Carolina		X	
Tennessee			X
Texas			X
Virginia			X

Source: American Planning Association 1999.

(Bernstein 1995). Local zoning codes divide the community into land use districts and establish building restrictions limiting the height, lot area coverage, and other dimensions of structures that are permitted to be built within each district depending on the degree of zoning authority granted to the local government. For example, counties with populations over 500,000 in Oklahoma are authorized to regulate building restrictions (height, number of stories, size of yards, and open spaces), population density, and location and use of buildings. Similarly, municipalities and counties in Mississippi are allowed to regulate the height of buildings and structures, the percentage of lots that may be occupied, open space, density of population, and the location and use of buildings.

Local governments have traditionally held the authority to make land use decisions because, in addition to being seen as more sensitive and responsive to local concerns, they are perceived as having more expertise in implementing fair and efficient land use policy. These local land use policies, however, often have the effect of increasing development and expanding the wildland-urban interface. Local governments receive most of their funding from property and sales taxes. They, therefore, have little reason to attempt to limit land development in their jurisdictions (see chapter 3). The desire to maximize property tax revenue sometimes results in overzoning for development by local governments. Many developing areas are highly overzoned for the amount of development they can expect in the foreseeable future. For instance, in Loudoun County, VA, current zoning allows between 50,000 and 53,000 new housing units to be built, even though current demand is running at about 3,000 units per year (Lindstrom 1997). Even when local governments attempt to limit growth, the policies they implement can have the indirect effect of increasing development in the interface. For example,

when local governments become alarmed about potential development impacts on available infrastructure, they often reduce allowable densities to levels supportable by private wells, septic tanks, and roads. The effect is to spread out settlement, causing more land to be developed. In Maryland, more than half of the development capacity allowed by local plans in 1996 was outside current or planned sewer service areas (Porter 1999). In another attempt to control growth, local governments sometimes implement restrictive zoning practices. However, by raising the entry costs for new residents and businesses and limiting undesirable land uses, localities direct would-be newcomers into undeveloped areas at the perimeter of the urban area (Lockard 2000). It is not yet fully understood what impact these developments may have on forest ecosystems and the goods and services they provide.

Public Attitudes and Involvement in Growth Management Policies

Property owners can contribute to natural resource problems in the interface because they do not always take into account the consequences their land use decisions may have on their neighbors. In addition, actions that are harmless in isolation can create serious problems when large numbers of people act in the same way (Freyfogle 1997). These two ideas came up repeatedly in the Assessment focus groups. Many participants saw private property rights as an important challenge for managing growth and conserving and managing natural resources. Others wanted to ensure that private property rights were respected and saw growth management tools, such as zoning, as a threat to these rights (Monroe

“I have the first place on the water that comes off of Piney Mountain, and I’m always so conscious of anything that I do impacting everyone else downstream, and I think there’s not enough of that. People need to be aware that what you do impacts so many other people.” Georgia

and others, in press). Despite the emphasis many landowners place on property rights, public attitudes towards land ownership are beginning to reflect a concern for natural resource protection. For example, a strong majority of private forest owners in the Tennessee Valley (all of Tennessee and portions of Mississippi, Alabama, Georgia, North Carolina, Virginia, and Kentucky) agreed with the statement that while private property rights are important, they are secondary to environmental protection and should be limited where necessary to protect the environment (Bliss and others 1997). The results of this survey signify that the public is becoming increasingly aware that the actions of individual landowners can significantly impact neighbors and the entire community.

Public attitudes also impact natural resource issues in the interface by influencing how these resources will be used. For example, individuals moving into the interface frequently are unfamiliar with forest management needs and often are intolerant of certain harvesting practices and changes in the appearance of the forest. Such new interface residents are more likely than their long-term, forest-production-oriented neighbors to favor zoning and logging regulations that place

limits on forestry operations, such as clearcutting, herbicide use, and prescribed fire (Bliss and others 1997). However, this dichotomy may be changing. A recent study on the environmental attitudes of forest owners in the Midsouth revealed that, to a large extent, the views of forest owners on key forestry and environmental issues were no different from those of nonowners. Both groups supported regulating forest-harvesting practices, even on private land, where necessary to protect the environment (Bliss and others 1997). These results suggest that in order to be responsive to the needs of forest owners in the interface, natural resource managers will require more environmentally sensitive approaches to forest management (see chapter 6).

Future Trends of Current Land-Related Policies

To a large extent, current land use policies have been ineffective in altering land use patterns and slowing the influx of people into the interface. Part of the reason why traditional land use control programs have had limited impact on interface development is that they were not designed for that purpose. The purpose of traditional zoning ordinances, for example, was to protect private property values and public investment in infrastructure by restricting neighboring landowners from using their land in a way that reduced property values or added cost to the community. In a survey of the most sprawl-threatened cities in the United States, 9 of the top 15 cities were in the South (Sierra Club 1998). A rapidly increasing human population in the South (see chapter 2) will result in further movement on to land in the interface as well as continued degradation of environmental resources (fig. 4.3). Increased human activity in the interface will also place greater stress on water supplies (see chapters 5 and 6). Water shortages in the South have already resulted in conflicts between several States, and total water withdrawals in the South are expected to increase by 40 percent between the years 2000 and 2045 (Kundell and Tetens 1998, Pringle 2000).

Current land use policies also have been unable to prevent the overlap of multiple Federal, State, and local jurisdictions over land use. As a result, various levels of government are making land use decisions independently of each other. Often these decisions are made without any common understanding of what long-range growth management goals separate government levels want to achieve and without an approach for addressing environmental issues that cross jurisdictional boundaries. Assessment focus group participants in Virginia suggested that current policy is “crying out for vision and clear direction and that there needs to be cooperation among agencies involved in the management of the interface” (Monroe and others, in press). The current system encourages private landowners to make land use decisions that are in their own short-term best interest without regard for whether these decisions will be beneficial to the broader community.

“There is no empowerment of regional planning because there are so many local municipal governments. There is fragmentation, an imbalance of power, and a lack of coordination.” Texas



Figure 4.3
Rapid development leads to the fragmentation and loss of forest land in growing areas.

Tools for Protecting Natural Resources Within the Interface

Technologies

Increasingly, innovative ways are being found to use Geographic Information Systems (GIS) to aid in land use planning in the interface. For instance, CITYgreen is a GIS application developed by the nonprofit organization, American Forests. It allows users to calculate the environmental and economic benefits of forests and trees. CITYgreen is used by planners and policymakers to map and measure tree-cover changes (see chapter 5) and to calculate the benefits urban trees and forests provide, including reduced stormwater runoff, energy savings, carbon sequestration, and the removal of pollutants. CITYgreen is part of a method of land assessment used by American Forests called Regional Ecosystem Analysis (REA). Regional Ecosystem Analysis measures a region's or city's tree canopy and calculates its economic worth. For example, an REA conducted in Austin, TX, found that if canopy coverage in the city was increased to match that of the best canopied sample site, annual carbon sequestration would increase from 5,700 to 10,000 tons, and the annual value of that sequestration would increase from \$5.3 million to \$9.2 million (American Forests 2000) (see chapter 6).

Geographic Information System technology can also be used to analyze land use trends. The Georgia Land Use Trend Project (GLUT) was instituted to produce landcover maps based on satellite data for Georgia from 1973–98, and to analyze rates of change in landcover during this 25-year period. The GLUT provides information on the impact of changing land use on the State's natural resources as well as the relationship between land use activities and water quality. This information allows resource managers, planners, local officials, developers, nonprofit organizations, and other stakeholders to incorporate the needs of resource management into their land use decisions (Wexler 2000).

Local governments can also benefit from computer technology when making land management decisions. The Land Capacity Model is an example of a computer program designed to allow the user to forecast the effects of a continuation of recent development trends or to project the effect of possible changes in existing trends (Dahlstrom 1997). Likewise, the California Urban Futures Model (CUF Model) uses GIS for data integration and spatial analysis to examine the environmental impacts associated with different potential development policies (Landis 1995). In this way, land use models can provide local government planners with the information they need to determine where growth can be accommodated without sacrificing environmentally sensitive land.

Land-Related Policies

Local governments are using a number of programs and policies to guide and control growth in the interface. These growth management measures include such policies as:

Smart growth programs—This term includes a range of approaches to contain development by using more efficient and compact urban development patterns, such as urban growth boundaries that preserve open space and protect environmentally sensitive areas.

Alternative zoning ordinances—These can be used to protect forests, wetlands, floodplains, or environmentally sensitive land (fig. 4.4). There are several different forms of alternative zoning ordinances:

- ◆ **Floating zones**—A floating zone is a specialized use district that floats over an entire jurisdiction until it attaches to a specific property upon the request of the owner who must demonstrate that a variety of impacts will be properly handled, such as the project's effect on natural resources and preservation of open space.
- ◆ **Overlay zones**—An overlay zone supplements the underlying zoning standards with additional requirements that can be designed to protect the natural features in an important environmental area.
- ◆ **Cluster development**—A cluster development is a subdivision in which the applicable zoning ordinance allows or requires development to be placed on a portion of the parcel and the rest to remain undeveloped open space.
- ◆ **Incentive zones**—Incentive zones are significant waivers of zoning requirements offered to developers as a method of directing larger scale development into designated growth areas.
- ◆ **Impact fees**—In order to pay for development and not impact current residents, local governments have implemented impact fees as a mechanism for assigning a share of the new required public service infrastructure to new owners of developed property.

Transferable development rights (TDR)—Under a TDR program, a landowner is assigned rights to develop which cannot be used on sensitive land but can be transferred to other land or sold to other developers.

Purchase of development rights (PDR)—Under a PDR program, landowners can volunteer to sell the development rights to their land to the Federal, State, or local government or a nonprofit group while retaining ownership of the land. The current and future owners of the land are restricted from development activities.

Conservation easements—Conservation easements that permanently restrict the use of a particular tract of land can be purchased by Federal, State, or local agencies or by private groups.

Priority funding areas (PFA)—PFAs control growth by limiting State support for growth-related projects such as sewer and water systems to locally designated growth areas. Maryland has implemented PFAs since 1998 (American Planning Association 1999).

Open-space preservation—Open, or green, space is defined as agricultural and forestry land in a natural state or land developed only to the extent consistent with the protection of the environment (Urban Land Institute 1999) (fig. 4.5). Many State conservation programs include open-space preservation as part of the State's overall policy to preserve land. For example, Georgia recently created a Greenspace Trust Fund with the goal of ultimately preserving 20 percent of Georgia's land area as open space (Griffith 2000).

Land trusts—In addition to Federal and State land conservation programs and policies, there are over 1,000 land trusts currently operating at the local and regional levels in the United States, protecting over 4 million acres of land through voluntary land transactions (Wiebe and others 1997).



Figure 4.4
Alternative zoning techniques provide greater flexibility than traditional zoning and allow planners to design developments that better fit the land and to set aside more green space.



Photo by Annie Hermansen, USDA Forest Service

Figure 4.5
Many local governments are acquiring green space as part of their conservation programs.

Examples include The Nature Conservancy, which currently protects more than 11 million acres in the United States, and The Trust for Public Land, which protects more than 1.2 million acres in 45 States (The Nature Conservancy 1999, The Trust for Public Land 2000).

The following tabulation shows Southern State acreage that is protected by The Nature Conservancy:

State	Area protected Acres
Alabama	101,000
Arkansas	230,000
Florida	920,000
Georgia	200,000
Louisiana	205,000
Mississippi	106,578
North Carolina	457,154
Oklahoma	84,000
South Carolina	165,198
Tennessee	93,000
Texas	473,000
Virginia	200,000
Total	3,234,930

Needs

Research needs to be conducted to better define natural resource management issues in the interface and their relationship to land use policies. Analysis should focus on the following areas:

- ◆ Public policies toward land use and the influence of subsequent land uses on natural resources.
- ◆ The role land use policies play in managing growth in both rural areas, which may lack many land use policies, and more suburban areas where land use policies are in place but may or may not be effective in controlling growth in the interface.
- ◆ Weaknesses in land use policies as well as options that are available to better address natural resource management and conservation issues in the interface.
- ◆ Public support for land protection and how much people are willing to pay for land protection. For example, one recent survey of Chicago suburbanites revealed that residents were willing to pay \$484 per year for 5 years to permanently protect about 20,000 acres of farmland in their county from development (American Farmland Trust Center for Agriculture in the Environment 1997).
- ◆ The value of strategically using forests to offset some of the negative environmental consequences of urbanization and changing land use patterns in interface and urban areas.

- ◆ Approaches to planning that have worked in other areas.

Natural resource managers and local planning officials need to understand the role each plays in protecting natural resources in the interface. In particular, natural resource managers need to better understand and influence public policies related to natural resources. Natural resource managers can do the following:

- ◆ Help adjacent communities and private landowners understand ecological systems so that they can make their planning and development decisions in an informed, science-based manner.
- ◆ Initiate communication with planners and developers by responding to requests for comments or participation by local communities and by paying closer attention to the goals and effects of the local planning process.
- ◆ Conduct environmental outreach by communicating with key audiences at the local, regional, State, and national levels. Natural resource managers need to make messages easily understood by the public.
- ◆ Engage the public to establish mutual understanding, promote involvement, and influence attitudes and actions in order to foster joint stewardship of natural resources.

To best address natural resource and conservation issues in the interface, the appropriate level of government needs to have the authority to deal with issues on the most suitable scale. Scaling requires an awareness of individual changes, an understanding of what the changes mean in terms of natural resources and environmental quality, and an ability to determine whether the rate of change is acceptable. Each level of government has a role to play in controlling the rate of change in the interface.

The Federal Government can provide:

- ◆ Research,
- ◆ Technical assistance, and
- ◆ Management of public lands and natural resources.

State governments can provide:

- ◆ Research;
- ◆ Monitoring, compliance, and enforcement;
- ◆ Oversight of local programs (including funding);
- ◆ Training and technical assistance to local governments; and
- ◆ Management of State land and natural resources.

Local governments can provide:

- ◆ Infrastructure and program funding,
- ◆ Land use planning and regulation, and
- ◆ Management of lands of local interest.

There is also a need to encourage cooperation and collaboration when dealing with multijurisdictional natural resource issues (see chapter 7). As long as cities and counties differ in their visions of how development should proceed, developers will be able to shop for lenient forums and make decisions that yield the highest profits. Growth management issues are often best addressed at a regional level, especially around large metropolitan areas with multiple local governments. In some cases, regional cooperation can be encouraged by State policies.

The current lack of reliable natural resource information on critical wildlife habitats, aquifers, and other environmental quality indicators also needs to be addressed. In the absence of relevant scientific and technical data, environmental needs cannot be prioritized and long-term threats may not be identified. The technology to conduct this research, such as GIS, satellite imaging, and computer systems, is currently available. However, it is not presently being used enough for these purposes. In order to address this information deficit, natural resource managers need to:

- ◆ Correlate natural resource information with demographic and land use change data;
- ◆ Collect more GIS data from more communities;
- ◆ Project growth and estimate the impact of that growth on natural resources; and
- ◆ Establish sound, interdisciplinary research to serve the needs of policy-makers.

“I think we need a lot more information about the transition, how you protect your environment and forests in a transition from rural to urban.” Virginia

The land use policies discussed above, such as TDRs, conservation easements, and alternative zoning, when implemented at the State and local levels, can improve natural resource management and conservation in the interface. Natural resource managers and the public, as well as State and local officials, need to become both more aware that these land use policies exist and be more willing to put them into practice.

One of the most important roles natural resource managers can play in affecting policy change is in educating the public about the value of natural resources and conservation in the interface. Natural resource managers can:

- ◆ Encourage those who live in the interface to become aware of their connection to the forest and of their responsibility to assist with its stewardship. For example, many people do not understand the importance that watersheds have in supplying clean water to communities. Consequently, they do not actively assist managers in ensuring that watersheds are sustainably managed.
- ◆ Conduct educational programs to increase the perceived legitimacy of specific natural resource measures.

- ◆ Distribute information over the Internet through use of Web sites aimed at the general public.
- ◆ Help stakeholders develop a consensus about what the interface community should look like in the future. Such visions should, in turn, be reflected in local ordinances.
- ◆ Integrate stakeholders into natural resource decisionmaking. Land and resource planning must provide mechanisms for dialogues that are open to any person. Ideas should be expressed in nontechnical terms that are readily understandable to the general public. The participation of citizens should be encouraged from the beginning and be maintained throughout the planning process.

“There is a huge lack of understanding, knowledge, and appreciation of the valuable rural and forest assets that are here. They’re just taken for granted, both rivers and forests.” Mississippi

It is important for natural resource managers to remember that without broad-based public understanding and support, land use policies cannot conserve and protect natural resources in the interface.

Conclusion

Risks to natural resources and conflicting interests of stakeholders make urban development in the interface a most difficult problem for natural resource managers. The underlying policy issues need to be addressed by the public as well as elected officials if natural resources in the interface are to be preserved. Natural resource managers can play an important role in raising public awareness of the natural resource and conservation issues in the interface. Too often communities wait until development has begun before attempting to revise their land development plans. By then, emotions are often running high, and anger, divisiveness, and resentment preclude rational discussion about the long-term goals of the community. Because these issues are multifaceted, proactive and flexible land use policies are needed to deal with them. Fortunately, such policies exist, and communities across the South are implementing them. However, much more still needs to be done to assure natural resource protection in the interface.

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