

REDUCING IMPACTS OF DEVELOPMENT ON WATER QUALITY: POLICY DIRECTIONS FOR GUIDING URBAN GROWTH

By

Lawrence W. Libby¹

Introduction

Paving and developing open land have many obvious impacts on water. First, impervious cover essentially eliminates the groundwater recharge service that land can perform. Land is both conduit and filter for water returning to the aquifer for further use. Secondly, paving or otherwise constructing on open land results in excess surface water (in most climates), some diffused over the surface, some collected in pools or streams causing flooding or other damage. Thirdly, excess water from impervious areas often carries pollutants and sediment into drains, streams, lakes and other collection points, pollutants that come from whatever activity is underway on the covered surface. Finally, paving open land deprives consumers of the many services available from that open land. Included are food and fiber production with the related economic benefits, and a set of open land amenities that people value. Certainly development creates its own rewards, but open land has services to be weighed against those rewards; open land is more than the absence of development.

This paper considers the trends in conversion of land from open to developed, the policy context for efforts to guide land development and deal with related water impacts, and suggests policy directions for the future. Emphasis here is on exurbia, the interface between urban and rural, and on the U.S. experience.

U.S. Land Use Trends – Growing Exurbia

The major population increases in the U.S. have been to the *edge* of metropolitan areas, not to the metropolitan core or the more rural non-metro areas (Fig. 1). Counties and communities *adjacent* to metropolitan areas have also seen population increases in the past 20 years, and those trends have increased in the last 5 to 10 years. Recent work by McGranahan and by Beale and Johnson indicate that much of the rural or exurban migration can be explained by the amenities available in those adjacent areas, for retirement, recreation or commuting to nearby metro employment (Fig. 2). Migration explains a far greater proportion of increase in all types of non-metro counties, but

¹ C. William Swank Professor of Rural-Urban Policy, Department of Agricultural, Environmental and Development Economics, The Ohio State University. Libby is working with the Kellogg Land Policy Group at Michigan State University January-July, 2003. Paper prepared for the “Workshop on Urban Land-Use Impacts of Great lakes Water Quality,” Toronto, Ontario, January 8, 2003.

particularly retirement and recreation. Natural increase explains more of the population change in counties specializing in government, farming and mining.

Recent data for Ohio show the significant increases in township population, outside of incorporated cities and villages (Fig. 3). In fact there were more people in unincorporated Ohio townships in 2000 than in either small or large cities. People are moving to the countryside in far greater numbers than anyone realized, though the consequence for those rural areas are obvious.

Where is that developed land coming from? The USDA National Resources Inventory tracks land cover (Fig 4) and cover changes over time (Fig.5). In 1997, only 5% of land surface in the US was developed. The proportion runs to 14% in Ohio and Pennsylvania, 20% in Maryland, and 29% in New Jersey, our most developed state. These more urban states have the most active farm and open land protection programs as well.

Of the 421 million acres of cropland in 1982, 350 million acres were still cropped in 1997, 30 million went into the Conservation Reserve Program, 20 into pasture and 7 million acres were developed in that 15-year period. There were also some conversions *to* cropland in that period, 197,000 from development. Developed land drew from other uses as well, to increase 34% from 73 to 98 million acres. Crop and forest lands explained 2/3 of the new developed land nationwide in 1997 (Fig. 6), with emphasis on forests in the East and Northwest, cropland in the Midwest, rangeland in the West.

Policy Directions

Several areas of policy have emerged with reference to these land use shifts and related water quality problems. Land use tends to be a state and local issue in the US, with water quality a national policy concern. While these policy developments are obviously related, they have developed quite separately and remain so today. Each area tends to have its own “power cluster,” the mix of implementing agencies, interest groups, and academic disciplines or units investing in those issues. The areas are growth management, farmland and open space retention, water quality, and drainage. Each has its own goals and policy instruments designed to alter behavior of resource users, employing the basic powers of government to create tax and other incentives, to regulate in the public interest and to spend public funds for valid purposes. Choice among these basic authorities in pursuit of a particular land or water goal affects who gains and who loses in achieving that goal and thus the politics of the issue.

Growth management. There is much attention in metro areas throughout the US to guiding the pattern and pace of development. Part of the rationale is to reduce the environmental cost of unplanned growth, particularly non-point pollution. Sprawl also affects water supply. Various policy instruments are employed – regulations on what development is acceptable where, incentives to encourage patterns that maximize net social gains from development and selective spending decisions at the state level.

Urban Growth Boundaries: Oregon is the most frequently cited state model for urban growth boundaries. A sharp line of separation is maintained between urban and rural land uses, with boundary revision every 20 years or so depending on political pressure. Portland, Oregon has the only elected metropolitan government in the US, providing a base for dealing with regional growth. Portland Metro was created in 1992 with a charter covering 3 counties and 24 municipalities. Tennessee has mandated that all municipalities establish urban growth boundaries as part of municipal growth plans subject to local ratification by county and municipal governments and then by the state. Those that have enacted plans receive “bonus points” for state funding. The important innovation here is the organized collaboration among local governments that happens in few other states. Land use zoning, subdivision controls, infrastructure requirements, historic preservation, farmland zoning, and access management restrictions are additional regulation tools employed to guide development and limit the environmental cost of development.

The test is whether UGB’s, zoning and other development regulations really affect expectations of developers and others in the land market. If regulations are easily changed or unevenly enforced, they have little lasting impact on development. Studies by Liberty, Knapp, and Nelson find that land markets reflect the feeling by buyers and sellers that these growth boundaries are far from airtight.

Urban Service Boundaries: A less aggressive cousin of UGB’s, service boundaries operate by sending signals to landowners and developers that development will be strongly encouraged in some areas and discouraged elsewhere. Several cities and counties in Ohio build service boundaries into their development planning, with the added requirement that central water and sewer be available for new development. Such a requirement has huge potential for reducing development-induced non-point pollution from private septic systems. Florida’s “concurrency program” directly links development to service provision. So-called “zero-discharge” systems that employ land treatment of wastewater are acceptable to EPA for water quality purposes and increasingly popular for developers as a way to escape the tether to a central sewer system. But these systems hamper growth management in ways that may reduce water quality in other ways.

Selective spending decisions are state policy in Maryland. The Priority Funding Areas Act established the basis for selectively supporting development in existing municipalities and in counties that meet established density and utility availability requirements. At the other end of the development stream are the protected rural areas. The Rural Legacy Program asks counties to designate large areas of farmland to be protected. Then funds are made available for easement purchase. Recent elections and current budget problems in Maryland and other states will inevitably curtail conservation easement purchase programs. Maryland’s previous Governor Glendinning was considered the nation’s leader in state growth management policy, while the new Governor is less committed to that issue.

Farmland Protection. All states do something to encourage farmland retention, employing rural zoning, property tax reductions and farmland easement purchase.

Interestingly, urban and suburban demand for the various services of working farmland is the primary source of political pressure for policy change. Food is one valued product of farmland – others include wildlife habitat and a long list of open land amenities like an attractive countryside, the heritage value of active farms and farm-based “agri-tainment.” All states except Michigan tax farmland at its use value, rather than market value. Michigan, Wisconsin and New York use a circuit breaker that ties property tax relief to state income taxes. Twenty-one states have rural zoning, starting with California and Pennsylvania in the 1970’s. Limits on regulated land use involve “the takings issue” under the US Constitution (unique among developed nations), though courts have generally upheld the right of local governments to regulate rural land unless all economic value is sacrificed in the process. Twenty states authorize purchase of agricultural conservation easements under various terms and conditions.

As noted above, effectiveness of policy designed to alter land use patterns depends on how those rules or incentives affect land prices. Property tax reductions for farmers do little more than delay development. When the gains to selling for development outweigh the net returns to farming (with lower taxes included), including any non-monetary returns to the farm family, development usually occurs. If buyers feel that zoning can be modified easily, protected farmland will still carry a development value increment. Buying a permanent easement on the right to develop the land would seem to be a definitive action, but even there developers feel that “permanent” is an untenable length of time in modern society and bid on land accordingly. To some buyers, permanently protected land is worth more than unprotected land, the “rural estate” factor.

A technique gaining favor in these tough budget times is “transfer of development rights.” The basic notion is that the valuable right to develop may be bought and sold separately from other land rights in the bundle. The developer wanting to develop in an area designated for that purpose must first purchase a right from an owner in an area where development is not permitted. The price reflects the value of additional density in the development area and present value of future development for the rural landowner. TDR can also work in urban areas where a less intensive use like low-income housing is preferred over new development. Gainers compensate losers in the growth management game, and there is little public cost. Twenty-five states grant specific authority to local governments for TDR. In some cases, a county or other local government will be the broker/banker, arranging sales in preferred areas and even buying and holding rights for future sale. In King County, Washington, sellers may accept a permanent conservation easement and sell the development right at a later time when it might be worth more. Similarly, developers may buy and hold rights for a time when there is demand for housing in permitted areas. Success in TDR nearly always requires an extraordinary level of leadership and cooperation among units of government. Growth is not a local phenomenon and its control demands a broader sense of community.

Drainage. Water can be either problem or opportunity, depending on how much there is, where it is, and its composition. Venue for water -- surface water in defined lakes and streams, groundwater and diffused surface water – has affected the evolution of law and policy. Drainage policy generally refers to the conveyance of excess diffused

surface water into defined surface supplies. The “common enemy doctrine” has governed US drainage law in most urban settings and is still the prevailing doctrine in about half of the states. The landowner has an unqualified right to get rid of excess water under this doctrine; it is a problem for everyone, to be handled as the owner sees fit. Civil law has emerged in many eastern US states. Based on English Common Law, civil law acknowledges that excess water runs down hill and requires the downhill owner to accept an amount deemed to be “natural flow” while limiting the uphill owner from increasing that natural flow through drainage. Law has evolved further to the doctrine of “reasonable use” under which all landowners, whether up hill or down hill, have rights and options in dealing with excess water. The upper owner can reasonably drain, the lower owner can reasonably obstruct down hill flow, with limits imposed on a case-by-case basis. Each state has some form of drainage policy. Ohio relies on “petition ditches” where owners can petition the county to develop or improve a drainage system, with costs shared by owners benefiting from the ditch. Other eastern states have similar means for charging riparian owners for any drainage structure or other cost. Permits for a ditch may include consideration of whether the benefits of the proposed ditch exceed its cost and the ditch will serve an overall public purpose.

Law and policy for dealing with the quality of that drained water are still developing. Run-off tends to carry various pollutants, including sediments, but there is no mention of environmental impacts in drainage policy. Obviously, the goals of drainage policy in both urban and rural areas differ from those of water quality policy. The Federal Clean Water Act has identified these urban and rural non-point sources conveyed through drainage systems as the largest remaining challenge to meeting water quality goals, and so the pressure is on to change drainage policy. Permits are required for the large urban (>100,000) storm water management systems as point sources of pollution and smaller cities are facing a key deadline in March, 2003 for storm water management plans that could include non-point management with “best management practices.” Designation of “total maximum daily loads” of pollutants for selected streams has generally not yet been applied to non-point sources, though there is much debate on that point.

Water quality policy in the US has generally accepted that “fishable and swimmable” standards will not be achieved for all stream segments. The reasonable use doctrine is alive and well for water quality as well as drainage, to acknowledge that any water use will bring pollution and not all streams can be returned to pristine conditions. Instead, “beneficial uses” are defined for different stream segments with the admonition that quality not be allowed to threaten that defined use. Some streams are designated as “high quality waters,” others as “outstanding national resource waters” with standards reflecting those values. Storm water and agricultural drainage may be defined as beneficial uses in situations where quality has been irretrievably damaged by past use.

Directions for Future Policy

There are clear trends in policy for managing growth, protecting farmland, and storm water management/water quality. All are goals which voters and taxpayers value, but rules or incentives to achieve those ends must fit with other community goals, be fiscally

sound, and not irreparably damage the law and traditions of private property, freedom of movement, or home rule.

Regional Action. Future policy must account for the trans-boundary realities of growth and water quality. As noted, there is little US experience with formal regional government or decision-making. Home rule is a doctrine and tradition with few counterparts in other developed nations. But individual states have provision for inter-governmental cooperation and will be seeking creative ways to do so. Various forms of regional governance will be developed in years ahead. Polls show that Americans want their local governments to cooperate in matters of growth management, farmland protection and provision of services that are cheaper to provide collectively. Whether the Portland model of elected metropolitan government or the Minneapolis-St Paul approach of a Governor-appointed regional body, other metropolitan areas will follow suit. Regional cooperation is already part of air quality and transportation policy; watershed planning is increasingly part of water quality management.

Incentive-based Approaches to Growth Management and Water Quality Improvement. There is increasing realization that incentives do matter in decisions, both private and collective. More programs for purchase or transfer of development rights on farmland and other environmentally important land will be enacted. These are voluntary programs for the landowner, enabling the owner to make a private decision that has public utility. There will be more development impact fees implemented to move toward “full-cost development,” not the heavily subsidized version we have now. There will always be a place for regulations in land use, to establish the basic structure of rights and responsibilities attendant with land ownership. Incentive programs will only work within a reasonable regulatory framework, but the trend is toward incentive instruments to accomplish the public interest.

Non-point water quality policy may also benefit from greater attention to the economic and technical performance of alternative methods of abatement. There has been little analysis of the water quality impacts of best management practices for urban and rural non-point abatement. Have they really affected water quality? Various forms of pollution-rights trading will be tried and implemented. Technology-driven practices make little distinction among various water users or their relative costs of meeting standards. A colleague at Ohio State has proposed a system whereby landowners along a particular river segment could collectively agree to meet a water quality standard and share in a public compensation for the change. Each would have an incentive to reduce run-off in the least expensive way rather than to install expensive BMP's that may not be needed.

Conclusions

1. Since paving land at the urban fringe leads to additional non-point pollution, attention to urban non-point must include factors that affect pattern and pace of open land conversion. *Rural* non-point is an issue too, but urban sprawl and farmland conversion affect the nature and magnitude non-point pollution.

2. The patterns of urban development are fairly consistent across the US, resulting more from migration than natural increase. In the Great Lakes States, most migration is internal to that state, from urban/suburban to rural/exurban. Consistently, new exurban development consumes more land surface than existing development. Percent increase in urban area is about four times increase in population.
3. Rural and urban land use policy, open land protection, water policy, and water quality policy tend to be developed and implemented in parallel with each other, rather than collaboratively. Real success will require far better integration of these policy objectives across political and resource boundaries.

