Decentralized Wastewater Management: Linking Land Use, Planning & Environmental Protection

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INTRODUCTION

Even though wastewater treatment is a critical factor in land development, planners historically have had very little to do with determining how and where a community's wastewater treatment will happen. Planners are frequently left to react to municipal decisions on sewer line extensions, connection policies, or allocation of new capacity. In unsewered communities, planners have often relied, for better or for worse, on the ability of land to support septic systems as a *de facto* method of development regulation.

If one of the fundamentals of smart growth is to ensure that desired land use patterns determine infrastructure decisions, instead of the reverse, strategies for providing wastewater treatment in support of smart growth solutions are essential. For communities around the country working to achieve desirable land use patterns, environmental goals, and smart growth infrastructure policies, *decentralized wastewater management,* including the use of advanced wastewater treatment technologies, provides a flexible tool for integrating wastewater treatment with land use planning and environmental protection. This approach also challenges communities to define community goals first, and develop wastewater treatment solutions that best serves those goals, instead of allowing the infrastructure to determine land use outcomes.

The Decentralized Management Concept

Decentralized wastewater management approaches all wastewater systems--from the largest sewage collection and treatment systems to privately-owned individual septic systems--as pieces of an integrated wastewater treatment utility. Proper wastewater treatment is ensured through *centralized management of multiple, unconnected* *wastewater treatment systems,* rather than through centralized collection of wastewater for treatment by one system. This approach recognizes that on-site systems, like sewer systems, must be properly managed and maintained to protect the environment and public health, and to achieve water quality goals.

Policy Initiatives Shifting Focus to Decentralized Approaches

With twenty-five percent of all existing U.S. households and thirty-nine percent of all new construction served by on-site septic systems (Rubin 1998), ensuring the proper performance of these systems is vital to protecting environmental quality and public health. U.S. Environmental Protection Agency (EPA) surveys have found that between ten and thirty percent of systems fail annually; wastewater contamination is also a factor in more than one-third of beach impairment and shellfish bed closures (Rubin et al. 2000). Improperly functioning septic systems contribute to pathogen and nutrient contamination in surface and groundwater, and lead to outbreaks of bacterial and viral illnesses (ibid.).

At the Federal level and in several states, new policies and incentives are helping communities use management, planning and regulatory techniques to ensure the proper maintenance and performance of all wastewater treatment systems. In addition, some local communities have pushed for these solutions as alternatives to traditional sewer systems, which often prove to be both expensive and potentially detrimental to their desired land use patterns and community character.

The Connection to Land Use Planning

For planners, dealing with on-site wastewater systems and their management presents opportunities and challenges. Devising wastewater solutions that serve community land use goals first requires breaking many well-established financial, regulatory and administrative systems around traditional sewers. It also requires extensive work educating citizens, officials, regulators and funding agencies about alternative approaches.

At the same time, advances in wastewater treatment technology are making it increasingly difficult to "zone by septic," as new advanced treatment technologies can safely treat wastewater on nearly any parcel of land. This can enable desirable or undesirable development patterns, depending on the community's other land use regulations. And, if not properly managed, advanced treatment systems pose a far greater risk of failure than do conventional septic systems, with attendant environmental and public health problems.

Overview

This paper outlines how decentralized wastewater management has emerged nationally, its key components, the role of advanced treatment technology in wastewater treatment and land use, and how these elements relate to community planning. To illustrate how decentralized management works in practice, examples from two national community wastewater management demonstration projects--Warren, Vermont and Block Island--are briefly presented. The paper concludes by highlighting the important role of planners in implementing this approach.

THE POLICY BASIS FOR DECENTRALIZED MANAGEMENT

The Push from the Top: Federal Policy Begins to Support Decentralized Systems

Nationwide, many communities are moving beyond the conventional thinking that on-site wastewater treatment (septic) systems are temporary fixes, waiting to be replaced when a sewer system is built. However, Federal money for traditional central sewer systems, whose construction was heavily subsidized in the 1960s and 1970s, largely disappeared in the 1980s and early 1990s. This left many communities--often smaller, rural and/or less affluent areas and areas with more difficult situations--relying on aging septic systems for wastewater treatment.

In 1996, Congress asked EPA to evaluate available alternatives to costly sewer systems. In its 1997 "Response to Congress on Use of Decentralized Wastewater Treatment Systems," the U.S. Environmental Protection Agency concluded that:

> "Adequately managed decentralized wastewater treatment systems can be a cost effective and long-term option for meeting public health and water quality goals, particularly for small, suburban and rural areas." (EPA 1997)

EPA subsequently expanded its National On-Site Demonstration Project (NODP), a national program to support decentralized management projects, by selecting six national demonstration communities for decentralized management programs and the developing voluntary national standards for on-site management programs. Relative to the ongoing investment in traditional sewers, these initiatives are small; in 1998, funds invested in decentralized wastewater amounted to three percent of EPA's total wastewater spending (Hogye 1999). Like many changes in policy and approach, the move towards decentralized wastewater options is starting out as a small one.

The Push from Below: Communities Seek Alternatives to Sewers

However, communities facing serious water quality or land use problems resulting from septic systems may turn to decentralized management as an alternative to an undesirable, expensive, "one-size-fits-all" sewer system. In addition, this approach is more palatable for communities that may have some areas where septic systems are inappropriate and do not function properly, but other areas where septic systems can work if managed. In this situation, a smaller sewer coupled with continued use of good septic systems can be a permanent solution.

Managing septic systems instead of providing sewers has been especially appealing in many resort areas that see large seasonal variations in population, and/or which have natural features such as beaches, boating areas, or fisheries that would be at grave risk from contamination by failing septic systems. It is also more common in rural areas that do not have the financial wherewithal or growth potential to support multi-million dollar sewer projects. As the field expands, other communities with different needs are adopting this strategy to serve other goals.

The Role of Advanced Wastewater Treatment Technology

At the same time that decentralized management offers a new tool for achieving land use and environmental goals, major advances in wastewater treatment technology have the potential to undermine the very same goals. Advanced treatment units (ATUs) are systems that treat wastewater to a very high degree, resulting in an extremely clean effluent being discharged to a leach field. This allows wastewater to be dispersed in areas much smaller than required by a conventional septic system, and in far less desirable conditions.

In some states, notably Wisconsin and Vermont, both planning and environmental lobbies have worked to prevent the expansion of advanced treatment technologies, primarily because of concerns over the potential to increase development in inappropriate or sensitive areas. In other states, advanced treatment units are allowed without accompanying requirements for oversight and maintenance. However, in coastal Rhode Island, Oregon, and the Florida Keys, these systems are being used in the context of a management district program to protect threatened water resources.

DECENTRALIZED WASTEWATER MANAGEMENT: CONCEPTS

Defining Decentralized Wastewater Management

Decentralized or community wastewater management can be defined as the *centralized management of decentralized wastewater treatment systems, including on-site septic systems, cluster wastewater systems serving two or more properties, and traditional collection systems*. This concept moves beyond providing wastewater treatment exclusively with a centralized sewer system or exclusively with private, on-site septic systems--"septic or sewers"--by centrally permitting and managing *all* wastewater treatment systems on an ongoing basis, regardless of their location, ownership, configuration, or attachment to a central collection network.

Illustrating the Decentralized Management Concept

The differences between traditional and decentralized approaches relates to how and where wastewater is treated, and who is responsible for the process. In both centralized and decentralized approaches, wastewater treatment involves a source, a collection system, a treatment system, and a dispersal system, as well as a person or persons to operate and maintain the system[1].

The decentralized wastewater management model offers an alternative to the two extremes sometimes described as "flush and forget": unmanaged septic systems, and centralized sewers. With a centralized sewer system, wastewater is collected from individual points of origin (houses, businesses, etc.) and brought to a central collection point for treatment and dispersal or discharge. A trained operator will oversee and maintain the collection and treatment system. Municipalities or sewer districts typically obtain the permits to operate the system, send out sewer bills, and allocate new connections.

Unsewered Communities: In unsewered communities, the collection and treatment system is the privately-owned septic system, which treats and disperses wastewater on site. While each municipality or county may review the system's design and installation and issue a permit for its construction, the "operator" of the system is the home or business owner. Only in a few communities does anyone other than the landowner have any responsibility for ensuring proper functioning once systems are designed and installed; in some parts of the United States, including 30 Vermont towns, no septic system permits are required at all . Neglect of an on-site system--particularly an advanced treatment unit--can create environmentally unsound conditions where wastewater is not properly treated, even when the system appears to the homeowner to be functioning properly.

Communities with Decentralized Management: In communities with a decentralized management program, long-term operation and maintenance of all wastewater treatment systems (on- and off-site) is overseen by a management entity, whether a municipality, county, or special district. The activities of the management entity vary widely depending on the community, the environmental sensitivity of the area, political constraints, financial resources, and the community's goals. Communities with a specific objective, such as improving water quality in an important recreation or shellfishing area, are more likely to support intensive management than communities where threats and rewards are less obvious.

The decentralized approach can lead to very different wastewater treatment systems being installed in close proximity to each other. In communities such as Tisbury, Massachusetts and Block Island, Rhode Island, local wastewater management programs oversee small centralized sewer systems in core village areas, advanced treatment units at properties in highly sensitive areas abutting coastal ponds, and conventional septic systems in outlying areas with better soils. In Warren, Vermont, two homes with tiny lots on the Mad River are slated to connect to an advanced treatement system across the street, on land owned by a neighbor; the neighbor will retain the use of an existing conventional septic system at the other end of the property. In each case, the local management program must manage different systems equitably and effectively.

DECENTRALIZED WASTEWATER MANAGEMENT: IMPLEMENTATION

Developing a Decentralized Wastewater Management Program

Decentralized management programs involve murkier issues than the conventional "septic or sewers" approaches. New management programs immediately run afoul of individual homeowners, most of whom are unlikely to be pleased by a sudden municipal interest in the state of their household plumbing. A decentralized management program must address not only the proper functioning of these systems, but also system permitting, legal considerations, the maintenance of multiple types of treatment and collection systems, and not insignificantly, setting user fees that fairly reflect different individual circumstances and system types as well as usage. Developing a system to inventory, permit, manage and maintain septic systems requires significant staff time and in many cases training; the more sophisticated the management program, the higher the level of expertise required for inspections and maintenance.

However, communities are choosing this option when the cost, land use, and community character impacts of traditional sewer systems are not a palatable or effective way to address water quality problems. The heart of the decentralized option is creation of a community wastewater management plan. The process of developing a publicly supported, financially feasible community management plan generally involves five steps, all of which use tools familiar to planners.

- *Needs Assessment*. A Needs Assessment is a comprehensive, lot-by-lot inventory and evaluation of a community's wastewater treatment needs and existing systems. GIS mapping is used to assess site conditions affecting septic suitability, such as locations of on-site water supplies, impervious coverage, building footprints, setbacks to surface water, relationship to groundwater resources, and soils. Regulatory constraints such as required setbacks from roads or property boundaries may be included in the assessment, or a purely natural resource-based assessment may be made.

  Next, site-specific information--often including the results of system inspections--is mapped for individual wastewater systems. An assessment can then be made as to whether each site is suitable for a conventional on-site septic system, requires an advanced treatment unit, or requires an off-site solution (connection to a sewer or cluster system).

- *Resource and Land Use Plans*. This part of the process dovetails with a community's comprehensive plan. To support planning goals, localities must have a clear idea of what land use patterns they wish to support with their wastewater capacity. In addition, the resources to be protected through improved wastewater management, such as swimming holes, beaches, shellfishing beds, ponds or aquifers, need to be identified so that appropriate protection strategies can be developed.

  In some cases a future land use plan is adopted directly into the wastewater management plan as the guide for the engineering assessment; in others, the wastewater management plan and Needs Assessment end up being incorporated into natural resource section of a local plan

- *Engineering Assessment*. Once a Needs Assessment is conducted and the land use pattern and resources to be promoted are established, an engineering assessment can begin. In contrast to the typical approach to sewers, which works to maximize the number of connections, in this approach there is often an effort to minimize the number of connections to off-site systems or existing sewers in order to save costs or achieve land use goals such as limiting growth. This approach also allows municipalities and engineers to compare the short- and long-term costs of different solutions. Particularly with advanced treatment units and cluster systems, operation and maintenance costs that must be covered through user fees differ greatly depending on the type of system; the one with the lower initial construction cost may have extremely high annual maintenance costs, and vice versa.

- *Public Education and Outreach*. From the experience of communities nationwide, the common factor in all successful management programs is public understanding, acceptance and support. Common elements of success noted in national studies include development of a mission statement for the wastewater planning process; involvement of a committee with affected landowners as well as officials, staff and consultants; and agreement on a common goal for the process (Mancl 2000). This is an aspect of wastewater planning that is very different from the sewer engineering process, and requires an approach more typical of community planning than wastewater engineering.

- *Management Plan and Financial Structure Development*. This is the core of the decentralized management approach: providing an equitable system that ensures the proper functioning of multiple types of wastewater treatment systems and multiple types of users within one integrated management system. Its components are described in detail below.

Components of the Decentralized Wastewater Management Plan

Once the planning work is done, certain functions common to all decentralized wastewater management plans must be carried out. These functions are:

- *Site evaluation criteria*: These criteria will determine the suitability of a parcel for various types of on-site wastewater treatment or establishes that an off-site solution (sewer or cluster system connection) is needed. Often these are linked to state standards.
- *System design standards*: Basic design standards, again often linked to State standards, ensure that systems are properly designed. Compliance can be handled either through local review, licensing/certification of designers, or both.
- *Supervision of system installation:* Whether done by a local or state official, or through licensing and/or certification of installers, this is key to ensure proper system functioning.
- *Operation and maintenance standards*: O&M standards can range from simple septic tank pumping requirements, to requiring system owners to have a service contract with the company that

makes their treatment system, to having the management entity take over all maintenance of the system. Frequently, the approach will depend on the types of technologies used in the management program.

- *System inspection*: Inspections can range from a voluntary program to inspections on an as-needed basis, up to annual inspections required for a permit to operate the system. These can be done by a local official or by a certified or licensed contractor. These inspections are important at the beginning of a management program to establish the community's existing conditions, needs, and degree of environmental and public risk posed by on-site systems.
- *Financing*. At a minimum, communities must set fees or establish funding sources adequate to carry out management functions. Some develop loan or grant programs for property owners to upgrade, repair or replace septic systems, or to connect to cluster or sewer systems.
- *Planning*. Planning is needed at a minimum to establish the policies and operations of the management entity.
- *Program coordination*. This key component is needed to coordinate permitting, inspection, maintenance and other functions among various agencies or departments responsible for permitting, management and inspections, as well as any private contractors licensed or authorized to do management and operations.
- *Water quality monitoring*: Typically a monitoring program will focus on establishing the success of the program against a community goal, such as keeping beaches open or improving bacterial counts in rivers.
- *Public education*: Both in terms of political and financial support for a management program, and for the education of the homeowners and business owners who will serve as the "operators" of on-site treatment systems, public education is a central function of management programs. This is very different from the traditional sewer or septic approaches, which rarely focus on the role of the wastewater generator--the individual home or

business--in the process. (Venhuizen 1991)

Management Program Financing

One of the most significant differences between traditional sewer systems and decentralized management is project financing. In the traditional approach, the total cost of constructing, operating and maintaining a system is paid back through various types of user fees (e.g. per-gallon use fees, connection fees, and development impact fees). Financing a decentralized management plan, which may include some households on sewer systems, others on multi-household cluster systems, and others on privately owned (but community-managed) septic systems, requires a financial plan that deals equitably with all of these different situations. It is unquestionably more complex than the simple fee per gallon of capacity system offered by a traditional sewer system. However, this does allow more room for communities to make a fee schedule that best suits their local goals and needs.

At this time, there has been very little assessment nationwide of the financial implications of decentralized management versus traditional sewer systems. Fee structures and management plans vary widely from place to place, but there is a general sense that decentralized management programs managing of *existing* septic systems are more cost effective than sewers in communities of 100 or fewer users (Balmer 2000). Where construction of new on-site or cluster systems is involved, the experience of the Warren, Vermont demonstration project suggests that the construction, operation and maintenance costs may in some cases be comparable to the cost of constructing and operating a traditional sewer system (Phillips et al. 2001).

Community Benefits of Adopting Decentralized Wastewater Management

If the costs of system construction, operation and maintenance are sometimes comparable to a sewer system, and the financial management is more complex, it may seem incongruous that community would choose decentralized wastewater management. The underlying reason most communities choose this approach reflects a growing rejection of the one-size-fits-all approach of a traditional sewer system and the reflexive growth that so often follows provision of off-site wastewater. Some of the benefits of decentralized management cited in many places are:

- *Community involvement and control*. Communities often feel that traditional sewer engineering is something that is driven by engineers or consultants, and done "to" them. Decentralized management plans require communities to make contact with individual property owners, and nearly always involve much more intense citizen participation. This gives participants much greater control over their own destiny, rather than a blanket sewer system and rate schedule.

- *Use of advanced treatment technology in a controlled setting*. Many new advanced treatment systems offer better wastewater treatment at a much lower cost than conventional on-site alternatives such as sand filters or mount systems[2]. State regulators are often very reluctant to approve these systems because of their high maintenance needs. Decentralized management programs offer a way to use these technologies with responsible oversight.

- *Groundwater recharge with on-site systems*. While poor on-site septic systems pollute groundwater resources, traditional sewers remove the potential to recharge groundwater resources. Properly designed, installed and maintained on-site systems ensure that wastewater can be safely treated and then discharged to the groundwater. This is a very important benefit in communities where groundwater supplies are under stress.

- *Fact-based process builds understanding and support*. Very often communities undertake sewer facility or extension processes without clear public understanding of the need for the action. Environmental problems such as bacterial contamination in a river will be assumed to require a sewer system to "clean up the problem," but without concrete evidence of environmental cause and effect, it is often difficult to build public support. Decentralized management planning requires a fact-based assessment of existing conditions and alternatives, and may reveal unexpected results that lead to better solutions. In addition, providing citizens with facts about the impact of poor wastewater treatment through the planning process boosts support for solving problems.

- *Tools to support land use goals.* Using decentralized management allows communities to support a much broader range of land use patterns than either "zoning by septic" or creating growth incentives when sewer lines are built. For example, advanced treatment units and cluster systems can support high-density, small-lot development in an area where sewers would support the density, but might be expensive or create unwanted growth pressures elsewhere. Decentralized management allows all of the alternatives to be integrated through the management program.

THE PLANNING AND LAND USE CONNECTIONS

Fundamentally, decentralized wastewater management is *growth neutral*. Where central sewers, as traditionally planned, financed and operated, involve inherent financial incentives to create additional system users through land development, the decentralized approach does not. The decentralized management planning process allows communities to select the combination of wastewater treatment methods that best serves their land use goals, environmental resources, and political constraints, rather than relying on one-size-fits-all solutions.

This growth-neutral, bottom-up approach to wastewater management requires more local effort than does a traditional sewer system or simply leaving the problem alone. However, by linking wastewater management planning to local zoning ordinances, comprehensive plans, and permitting processes, planners have the opportunity to make wastewater treatment technology serve community interests.

Preserving Historic Development Patterns: Warren, Vermont

In the historic Village of Warren, Vermont, home to roughly 100 households and businesses, a decentralized management program is focusing on developing lower-cost, less invasive alternatives to a planned central sewer system that had raised significant growth concerns.

Warren linked wastewater management to two Town Plan goals: protect drinking water supplies, and preserve the historic development density and pattern by limiting additional growth. The Village wastewater committee and Select Board thus chose solutions that maximize the use of growth-limiting on-site septic systems, minimize expansion of the Village's small sewer system, and utilize advanced treatment units only to solve physical and environmental problems on the Village's many small, riverside lots as opposed to allowing more intensive development of slightly larger properties.

While the decentralized wastewater planning process has been successful, the land use planning-wastewater communication process was not a smooth one. The Planning Commission, which was rewriting the Town's zoning, took little interest in the wastewater planning process. At one point, one draft of the new zoning would not have permitted cluster wastewater treatment systems in an area of the Village that badly needed this type of solution. This was due more to the Planning Commission's fatigue with the zoning revisions than to any bias against the wastewater project, but points out the pressing need for a constant education process as decentralized solutions are developed.

Protecting Environmental Resources: New Shoreham (Block Island), Rhode Island

Block Island (the Town of New Shoreham) is a 6,400 acre island ten miles off the southern Rhode Island. The Island has about 1,300 homes and a year round population of about 800 that mushrooms to over 10,000 persons per day at the height of the tourism season. Here the wastewater management program grew from the Town's dual interest in managing growth and protecting its sole source aquifer. Studies show water quantity is limited, but adequate for future growth under current zoning. This includes a central harbor business /village district served by public water and sewer, with low density (3 acre) residential development in the remainder of the Island. Both the comprehensive plan and sewer facilities plan restrict the sewer service area to the harbor business/village district to limit sprawl and excessive water use. The wastewater management ordinances are strongly tied to these comprehensive plan goals, which specifically call for maintaining existing, high quality waters.

The planning board spearheaded development of what eventually became the wastewater management program. The original intent was to develop land development regulations that would better protect groundwater, the Island's many small ponds, and a coastal pond open to shellfishing. With increasing development the zoning board was beginning to see more applications for septic systems in wetland buffers, as well as requests for special exceptions on waterfront and marginal land. The Planning Board wanted technically sound guidelines for development on waterfront property, marginal land, and substandard lots that would not be overly burdensome for applicants.

Taking a watershed approach, the Town worked with the University of Rhode Island's Cooperative Extension to conduct a screening-level wastewater needs assessment. Results pointed to the need to manage septic systems and identified high-risk areas where advanced treatment would be desirable. The next step was to identify existing systems and eliminate the most serious failures. In 1996, an ordinance requiring inspections with maintenance as needed was approved which included phasing out cesspools by 2005.

Inspections raised the issue of what type of septic system would be required when inspections uncovered failing systems. This took longer to resolve, and implementation of the inspection program was put on hold. After much broader debate with involvement of a citizen "ad hoc scientific advisory group," zoning performance standards were adopted that specified wastewater treatment performance standards. Most of the island fell into the basic "T1" treatment zone, which requires low-cost improvements to conventional systems such as septic tank access risers, effluent filters, and testing to ensure that septic tanks are water tight. However, in critical wellheads and coastal pond watershed, called "T2" treatment zones, advanced treatment systems were required for all new systems and repairs. The specific level and type of treatment depends on location, soil constraints, and location within wetland buffers.

All ordinances are in place but implementation was delayed until a staff person could be hired to oversee the program, implement the loan program, and develop educational materials. With funds from the EPA Block Island/Green Hill Pond Watershed National Community Decentralized Wastewater Treatment Demonstration Project the program is proceeding quickly, with inspections starting this summer. Similar programs are being adapted in the nearby South Kingstown and Charlestown on Rhode Island's south shore.

Advanced Treatment Units: Friend or Foe of Land Use Planning?

Advanced treatment units, when properly managed, can provide wastewater treatment on lots that by virtue of soils or size do not support conventional septic systems. This may be desirable in areas such as an historic village or areas with high-density seasonal camps, where environmental conditions are problematic but dense development patterns are desired. It may be highly undesirable on steep hillsides or in headwaters areas, where the aesthetic and environmental impacts of development and driveways could have serious adverse consequences. The use of ATUs is further complicated by the fact that they absolutely require maintenance and management--in some cases, frequently--in order to function properly.

The message for planners and for regulators might be summed up as "Don't shoot the technology." The issue is not the treatment units, but the effectiveness of the underlying land use regulations and the presence or absence of a reliable management program to ensure that these systems function properly. To reap the many significant land use and environmental benefits that ATUs offer, planners and regulators alike will need to examine and strengthen land development regulations and begin to adopt on-site wastewater management instead of relying on "zoning by septic" and restrictive limits on permitted technologies.

An Alternative to the Sewer-Growth Cycle

Finally, on-site wastewater treatment and decentralized management programs offer communities a genuine alternative to traditional sewers and the reflexive sewer extension-growth cycle that has often led to undesirable land use patterns. Sewer lines can be extended with the best of intentions, usually to remedy public health hazards. Once done, however, new growth to tie in to the extended line becomes an expected consequence, necessary to pay user fees to cover the cost of that new infrastructure. The move towards decentralized solutions, and the use of ATUs in a management context, recognizes that on-site solutions may, in some cases, be the better way to achieve public health and related goals. However, for most municipalities and developments, it simply has not been part of the standard analysis to investigate this type of alternative strategy.

Looking purely at the land use perspective, managed on-site systems offers a way to put development in desirable locations without creating incentives for undesirable development. A development project in an unsewered area can be supported one of two ways: with an on-site system, whose performance is ensured through a management program; or with a traditional sewer line extension. In the on-site case, provided the system is managed, the community gains a desired land use on the desired site without creating the incentive to create additional growth to pay for a new sewer line or expanded capacity. Again, on-site solutions have not been a standard part of the community planning toolbox, and must be brought into the process.

The Need for New Alliances and the Planner's Role

Rethinking the wastewater-land use connection, and rethinking old models of wastewater treatment, requires a break well-established habits of planning, financing and regulating wastewater treatment and land use. Cooperation is needed between state, county and local governments, and between agencies that typically have limited communication on wastewater treatment planning. State regulations may also stand in the way of local goals, and sometimes legislative actions are required to bring about change.

In creating new alliances and helping communities envision alternatives, planners can play an important role in making decentralized wastewater management work. Providing a framework for mediating between the private use of land and desired community goals is at the heart of what planners do; it is also at the heart of developing and implementing a successful community wastewater management plan. As with zoning, design review, or any other regulatory process, when individual landowners (in this case, septic system owners) come to understand the connection between their actions on their land and shared community goals, the management process can begin to work.

CONCLUSION: Putting Wastewater Treatment to Work for Smart Growth

There is a consistent underlying theme connecting land use planning with decentralized wastewater management: Choose and implement the wastewater treatment and management methods that supports community goals. When properly managed, advanced treatment units, traditional sewers, and conventional septic systems can all protect public health and the environment. It is in their relationship to land use regulations and to implementation tools, particularly zoning and infrastructure financing, that these wastewater treatment methods can cause desirable or undesirable land use outcomes. While decentralized management requires more complex planning, communities nationwide have developed approaches that work.

Through decentralized management planning, wastewater treatment methods can be harnessed to support smart growth objectives. This requires a concerted effort on the part of many agencies that are not accustomed to working together, and a serious rethinking of traditional funding, planning and engineering methods. The planning process, while seldom easy, can do a great deal to educate the public and develop support for project goals. Decentralized wastewater management offers a way to rethink the wastewater infrastructure model, and using standard planning tools and public involvement methods, make wastewater treatment support smart growth solutions.

Notes:

1. Authority to Create Management Programs: The form of a local management program will be shaped by state enabling legislation. In general, literature and case studies on decentralized management have found that in nearly all states there is ample authority through zoning, public health, water quality and/or wastewater management enabling legislation to provide authority to develop a management district. [back]

2. The National Small Flows Clearinghouse's nationwide survey of on-site system costs in 1998 found that sand filters and mound systems were among the four most expensive types of on-site systems, costing an average of $5,679 to $9,105 versus an average of $3,364 for a conventional system or $4,790 for a constructed wetland system (Agnoli 2000). [back]

REFERENCES

Agnoli, T., 2000. Summary of the Status of Onsite Wastewater Treatment Systems in the U.S. during 1998.

2000 NOWRA Proceedings, p. 143.

Balmer, Candace, 2000. Wastewater Treatment Alternatives for Small Communities--Onsite Management Programs. Northeast Rural Community Assistance Program, Spring 2000.

Hogye, S., 1999. Discussion with Warren Village Wastewater Advisory Committee, Warren, VT, September 1999.

Mancl, K. November 1, 2000. Keynote Address to the 2000 National On-Site Wastewater Recycling Association National Conference.

Phillips, D. and Camara, K., 2001. Memo to Warren Village Wastewater Advisory Committee, Forcier Aldrich & Associates, Essex, Vermont.

Rubin, A.R., 1998. Onsite Wastewater Management Systems: Moving from a Short Term Fix to a Long Term Solution. 1998 NOWRA Proceedings.

Rubin, A.R., Hogye, S. and Hudson, J., 2000. Development of EPA Guidelines for Management of Onsite/Decentralized Wastewater Systems. 2000 NOWRA Proceedings, pp. 15-17.

USEPA, 1997. Response to Congress on the Use of Onsite and Decentralized Wastewater Systems, USEPA, Washington, D.C.

Venhuizen, D., 1991. Town of Washington Wastewater System Feasibility Study: Management Program for a Decentralized Wastewater System. Washington, WI.

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