

Executive Summary

Ecological Wastewater Management in Iowa: Hope for Iowa's Small Communities

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October 2005

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The discharge of untreated or partially treated sewage into lakes and streams is a major pollution problem in Iowa. The Iowa Department of Natural Resources (IDNR) has recognized this as the No. 1 threat to Iowa's surface waters from point-source discharges.¹ Iowa has an estimated 739 unsewered communities, which collectively discharge 1.2 billion gallons of inadequately treated sewage each year into the state's waters.²

These sewage discharges pose significant environmental problems and cause the contamination and degradation of rivers, lakes and streams. Discharge of untreated sewage results in the spread of disease-causing organisms (pathogens), an overabundance of algae blooms and impairment of surface waters.

Swimming use is impaired because of bacteria contamination in 52 percent of Iowa rivers and streams and in 25 percent of Iowa lakes that have been assessed for support of this use.³ While agricultural sources also contribute to this problem, inadequately treated sewage plays a significant role, especially during low stream flows.⁴



A visible example of untreated sewage being discharged, this photo shows the waste collected in one hour from tile line discharging into Clear Creek, south of Conroy, Iowa, January 2005.
Photo courtesy D. Ratliff

Fixing this problem is projected to cost between \$214 million and \$322 million.² However, many potentially less expensive technologies for collecting, treating and disposing of wastewater are now available. These technologies include alternative sewers, constructed wetlands, enhanced pond systems, media filters, drip irrigation, and effluent reuse. *These technologies offer the best solution to providing cost-effective*

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wastewater services to the small communities left behind by more conventional engineering approaches.

While some of these technologies have been introduced in Iowa, they have not been implemented on a broad scale or in a consistent manner. Although the need is clear, and the technology is available, ecological wastewater management is more of a hope than a reality in the state. This lack of adoption results from management, regulatory and educational factors.

Fiscal Management and Responsible Management Entities

Wastewater treatment systems succeed only to the extent they are managed well. Effective management is the key to long-term success. Iowa must work proactively to identify, promote and, in some cases, create regional management entities.

Specific actions that would promote effective management include:

- Working with existing management entities, such as rural water districts, sanitary districts, and water utility companies to promote their involvement in wastewater projects within their territory.
- Passing legislation to allow formation of new management entities where none currently exist. In Minnesota, the environmental subordinate service district model has been successfully used for this purpose.⁵
- Creating programs to provide upfront technical and financial assistance to unsewered communities. Due to their small size, economic status and lack of self-governance, these communities often lack the resources to get projects developed to the point where they are eligible for state and federal financial assistance.

Regulatory Framework

Changes to the NPDES permit process

Currently, projects that propose elements of ecological wastewater management undergo lengthy and sometimes contentious permit reviews. Under the current system, it is much easier to obtain permit approvals for conventional big pipe systems, even if the big pipe technology is not the most cost-effective for the community or the best thing for the environment. IDNR can solve these problems through changes in how they process permit applications.

The department could take the following specific actions:

- Create an internal culture that is accepting of new technology. This culture shift will require resources to train staff and academic support. The University of Wisconsin-Madison and the University of Minnesota extension services, for example, provide key support to regulators in their states.
- Move away from reliance on prescriptive criteria, such as the Wastewater Facilities Design Standards, in favor of more open, performance-based criteria.⁶

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- Creating voluntary fast track permit approaches similar to the process developed by the Minnesota Pollution Control Agency for nitrogen removal.⁷ For instance, IDNR could create a fast-track process for systems that use soil infiltration to achieve zero discharge.
- Develop monitoring requirements and permit language appropriate to the technology being used.
- Institute permit fees for mid-size systems to create funds, and dedicate those funds to adding permit support staff.

Update Chapter 69

Single-home treatment systems can be an effective wastewater management option if these systems are designed, installed and operated properly. Several Midwestern states have made changes to their onsite system rules to increase the level of accountability and professionalism in the onsite industry.

A number of specific changes to Chapter 69 would improve Iowa's water quality:

- Update Chapter 69 to require that onsite treatment systems are inspected whenever a house is sold. Require that failed systems be brought into compliance with the current code. (Point-of-sale inspections are required in Minnesota and Wisconsin.^{8,9} Fifteen counties in Iowa already require point-of-sale inspections.)¹⁰
- Update Chapter 69 to require licensure of onsite professionals, including soil scientists, system designers, inspectors, and operators. Tie license renewal to continuing education, as do the programs already in place in Minnesota and Wisconsin.^{8,9} The Iowa Onsite Wastewater Association (IOWWA) has already created a training program and offers voluntary training.¹¹ Additionally, IDNR has created an onsite system design manual.¹²
- Update Chapter 69 to make it easier to adopt new technology without legislative changes to the rules. The component manual approach developed by the Wisconsin Department of Commerce offers a useful model in this regard.⁹
- Consider non-renewal of General Permit No. 4. This permit allows for surface-water discharges from single-home onsite systems. This is a very unusual regulatory approach that depends on periodic renewal of General Permit No. 4 by the EPA. However, continued support and renewal of the General Permit is not assured. Iowa should develop a program that proactively reduces the number of surface water discharges.
- Consider a new rule or extension of Chapter 69 that governs larger cluster or small-community-based systems that employ soil-infiltration. This rule could be similar to Chapter 7081 or Minnesota's Large Subsurface Wastewater System guidance document.^{13,14}

Education and Training

There is little support from the academic community for ecological wastewater management in Iowa. Compared to Minnesota and Wisconsin, collaborations between university faculty members and regulators are notably lacking. Implementing regulatory changes without the support of the academic community is much more difficult than in a collaborative environment because, faculty members are a key source of information, training and support in an environment of changing wastewater technologies.

The following list identifies specific actions to improve access to academic sources of knowledge:

- Offer a course on decentralized wastewater management in the engineering programs at Iowa State University and The University of Iowa. This course could be taught as a senior-level design course for civil or agricultural engineering majors. A university curriculum has already been developed for this purpose and is available on the internet.¹⁵
- Get academics involved in training. In Minnesota, the Extension Service is responsible for the training of licensed onsite professionals. If licensure, and continuing education, were required through modifications to Chapter 69, the Iowa State University Extension could provide this service. Training materials developed by IDNR and IOWWA could be leveraged in this effort.¹²
- Use training, in addition to licensing of onsite professionals, to fulfill continuing education requirements for professional engineers. This step would create links between the academic and consulting communities and introduce much-needed new concepts and technologies into the consulting world.
- Implement a new operator training section for licensed wastewater treatment plant operators in decentralized wastewater treatment technologies.
- Use training for licensed wastewater operators as a means to fulfill continuing education requirements.
- Support graduate-level research. This model has been successful in leveraging federal grant funds at institutions such as the Colorado School of Mines, the University of Minnesota and North Carolina State University.

Conclusion

In summary, alternative wastewater treatment technologies exist that could be used by Iowa's unsewered communities as well in communities that need supplemental treatment. These technologies may provide cost savings over traditional technologies and greater environmental benefits.

In order to create an atmosphere in which ecological wastewater management is the norm, rather than the exception, four major changes must occur:

- Iowa must work proactively to create and support regional wastewater management entities.
- IDNR must change its NPDES permit process to make it more user-friendly for ecological wastewater management proposals.
- Chapter 69 must be changed to create more accountability, allow more flexibility in new technology adoption, and promote soil infiltration to create zero-discharge onsite systems.
- University faculty members must get involved and support regulators at both the state and local level.

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