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# On-site water supply and wastewater disposal— quality maintenance of the water cycle

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no. 4.662



## Quick Facts

If a well and on-site wastewater system are not properly maintained, the water supply may become polluted; this is especially true in the Colorado mountains where freshwater supplies and effluent from wastewater systems often are closely connected.

Water quality must be considered and protected throughout the groundwater use cycle—groundwater, water supply, wastewater treatment and disposal, back to groundwater.

If everyone would accept the responsibility and properly maintain their on-site home sewage disposal systems, the groundwater quality would be protected; however, this is not happening.

The alternative appears to be more government involvement in the ongoing operation and maintenance of on-site systems via "community management."

Homes located beyond central water supply lines and sewers often will use a domestic water well and an on-site wastewater treatment and disposal system to provide these basic utilities needed for modern living. If properly designed, installed and maintained, the well and on-site wastewater system should provide the home with plenty of clean, safe water and adequate wastewater disposal.

If the well and/or the on-site wastewater systems are not properly maintained, the water supply may become polluted resulting in a health hazard for the community. This is especially true in the mountains of Colorado where the groundwater providing the freshwater supply and the groundwater receiving the effluent from the on-site wastewater system often are closely connected due to fractured rock formations. Fissures in fractured bedrock may permit inadequately treated wastewater to contaminate wells located considerable distances from malfunctioning on-site wastewater systems. Thus, it is critical that on-site wastewater treatment and disposal systems properly treat wastewater before it reaches the groundwater.

This Service in Action sheet will briefly describe the water cycle, particularly important in Colorado mountain areas, and will emphasize the problems that can arise when homeowners neglect the maintenance of on-site wastewater systems. Hopefully, the discussion will encourage homeowners to perform the maintenance procedures described in Service in Action sheet no. 4.666.

## Groundwater

The geology of the Colorado mountains greatly influences the groundwater available, its movement and its use as a water supply source and as a sink for wastewater disposal. The rock fissures in consolidated rock formations contain the groundwater used for many mountain homes. The fissures can transmit groundwater rapidly in any direction depending upon direction of the fissures and the groundwater gradient—the slope of the groundwater. For example, a well pumping water from fractured bedrock creates a groundwater slope toward the well.

Figure 1 illustrates, in conceptual form, the role fissures may play in the transmission of wastewater to a well. The effluent discharge from the leachfield can enter the fissure system and possibly be transmitted back "uphill" to the well. If the effluent is not adequately treated in the leachfield it will contaminate the well.

Figure 1 also illustrates that the quality of the groundwater, the water supply from an individual well, and on-site wastewater treatment and disposal are all very closely related. Safe water supplies are dependent on the proper understanding of the relationship and the adequate operation of the on-site waste treatment system to prevent pollution of the groundwater supplies.

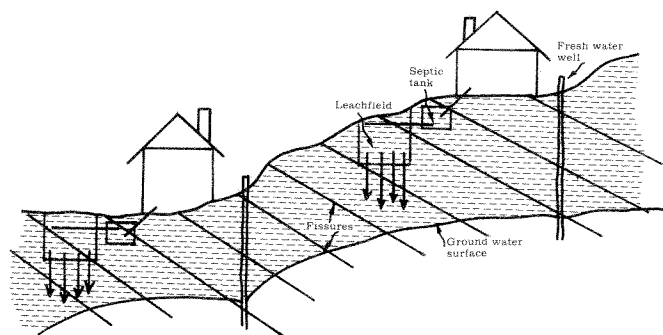


Figure 1: Water movement through rock fissures from polluted sources to well water supply.

## Current Situation

A 1976 survey of homeowners in three Colorado communities with individual wells and on-site disposal systems indicated that 49% of the people felt

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that the state or county should be responsible for maintaining the quality of the groundwater and 39% felt the state or county should be responsible for the drinking water quality. However, only 11% felt that the state or county should be responsible for maintaining on-site waste disposal systems. Sixty-one percent felt that individual homeowners should be responsible for maintaining their own on-site wastewater treatment and disposal systems. Yet, 55% of those surveyed did not maintain their systems unless they failed to the extent that their lifestyle was affected.

Thus, while groundwater, water supply from a well and on-site wastewater disposal are all physically related, the public perceives them as not being connected, or at least capable of being managed separately. This is probably a reflection of the historic manner in which groundwater, water supply and on-site systems have been managed.

Groundwater has been managed from the state level primarily from a quantity viewpoint (e.g. well permits, etc.). Domestic water supply has been managed by local health departments as has the design and installation of on-site waste disposal systems. Once installed, however, on-site systems have been the responsibility of the homeowner.

Given the physical relationships that prevail, especially in the Colorado mountains, it is evident that the separation of groundwater quality management, water supply management and on-site wastewater system management cannot continue to exist if everyone is to be assured of having a safe water supply. When individuals do not accept responsibility for their actions that affect public health, government must assume the responsibility. The problem is compounded by the increasingly large numbers of people involved.

## Summary and Conclusion

Water quality must be considered and protected throughout the groundwater use cycle (from groundwater, to water supply, to wastewater treatment

and disposal and back to groundwater). This is the only way that groundwater (and water supplies) in rural or recreation communities can be adequately protected. How can the general public be assured that all aspects of the cycle are properly functioning? The answer is open to question. If everyone would accept the responsibility and properly maintain their on-site home sewage disposal systems, the groundwater quality would be protected. However, this is not happening. The alternative appears to be more government involvement in the ongoing operation and maintenance of on-site systems via "community management."

Public awareness of the problem, its causes and potential solutions is the best way to get satisfactory protection of groundwater quality.

For more information on the problems of simultaneously managing groundwater quality, water supply quality from individual wells and on-site wastewater treatment and disposal, refer to:

- Proceedings of the Third Workshop on Home Sewage Disposal in Colorado, July, 1978, Colorado Water Resources Research Institute Information Service No. 29. Available from CSU Bulletin Room, 171 Aylesworth Hall, Colorado State University, Fort Collins, Colo. 80523. \$4.00.

- Geologic Factors in the Evaluation of Water Pollution Potential at Mountain Dwelling Sites, December, 1973, Colorado Water Resources Research Institute, Completion Report Service No. 54. Available from CSU Bulletin Room, 171 Aylesworth Hall, Colorado State University, Fort Collins, Colo. 80523. \$10.00.

- Soil survey reports prepared for individual areas of interest. Available from any local Soil Conservation Service office.

- Alternatives for Small Wastewater Systems, 3 volumes, #4011—EPA Series. Available from ERIC, Technology Transfer, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268. No charge.