

## WATERSHED

# Assessing the Transferability of a Water Erosion Model: The Turkey Creek Watershed Case Study

Conducted by: Colorado Geological Survey

On the Web: [www.geosurvey.state.co.us/](http://www.geosurvey.state.co.us/); [www.co.jefferson.co.us/](http://www.co.jefferson.co.us/);  
[www.bearcreekwatershed.org/](http://www.bearcreekwatershed.org/)

Contact: Karen Berry, Colorado Geological Survey

Project Partners: Jefferson Conservation District, Jefferson County, and the Bear Creek Watershed Association

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Often, sediment from urban development is the starting place of nonpoint source pollution, but it is expensive, and often impractical, to monitor water quality in a large watershed. There is a clear need for a better way to evaluate how urban development relates to water quality. Using GIS models, the Colorado Geological Survey developed tools that look at the links between land use, runoff, and sediment loading in an urbanized mountain watershed. Using these tools, Jefferson County, the Jefferson Conservation District, and the Bear Creek Watershed Association put into action land use policies and management practices to help protect water quality.

The project lies within the Turkey Creek Watershed, southwest of Denver, and includes the urban centers of Conifer, Aspen Park, and Indian Hills. Watershed runoff flows into Bear Creek Reservoir. The watershed contains about 4,900 single-family homes, various industrial uses, and several major commercial centers. It is possible that another 12,000 homes could be built; such development could significantly increase nonpoint source pollution in the reservoir.

In 1990, a Clean Lakes Study found that the health of Bear Creek Reservoir is at risk from nutrient and



**Example of sediment from urban development.** Downstream of urban development, Turkey Creek changes from clear to murky water with high amounts of suspended solids. Water flows from foreground to background. 2002

sediment loading. At times, the reservoir is plagued with excessive phosphorus, nitrogen, sediment, algal blooms, and elevated metals in fish. Urban development is thought to be a key cause of sediment and nutrient loading.

A few of the tools that connect urban development in a complex watershed with varying land use, soils, and management practices, to prevention of nonpoint source pollution include the following:

- Effectiveness of Construction Best Management Practices (BMPs)
- Water Quality Land-Use Planning Policies
- Countywide Map of Highly Erodible Soil
- Countywide Map of Sensitive Soil
- Sediment Yield and Soil Type
- Sediment Yield and Land Use

About 350 development applications have been reviewed and approved since inclusion of the tools and policies in county land-use plans. Generally, development proposals were improved to protect water quality in the following ways:

- Development or land use changed to fit the terrain;
- BMPs changed or added to prevent erosion and increase capture of sediment;
- Grading and construction timed to minimize soil exposure; and
- To the extent feasible, existing vegetation was retained.