

Sustainability of the Ground-Water Resources in the Atlantic Coastal Plain of Maryland

A 2004 report by the Advisory Committee on the Management and Protection of the State's Water Resources identified the need for a comprehensive assessment of ground-water resources of the Maryland Coastal Plain, where the population is expected to grow by 37 percent between the years 2000 and 2030. Accordingly, the Maryland Geological Survey (MGS) and the U.S. Geological Survey (USGS) have begun the first phase of a three-phase assessment of Maryland's Coastal Plain aquifer system. This Fact Sheet describes this assessment and the current and planned activities necessary for its implementation.

Importance of Ground Water in the Atlantic Coastal Plain of Maryland

Ground water is the primary source of water supply in most areas of Maryland within the Atlantic Coastal Plain (fig. 1), and is pumped from sand and gravel layers underlying the Coastal Plain. These sand and gravel layers alternate with layers of silt and clay to form a wedge-shaped system of sediments that begins at the Fall Line (the boundary between the Atlantic Coastal Plain and the Piedmont Physiographic Provinces) and gently tilts and thickens to the southeast toward the Atlantic Ocean (fig. 2). The buried sands and gravels form a sequence of confined aquifers that is overlain by sandy deposits that form a surficial aquifer. These aquifers are the primary water supply for southern Maryland and the Eastern Shore.

levels in confined aquifers to decline by tens to hundreds of feet from their original levels (fig. 3). The current rate of decline in many of the confined aquifers is about 2 feet per year. The declines are especially large in southern Maryland and parts of the Eastern Shore, where ground-water pumpage is projected to increase by more than 20 percent between the years 2000 and 2030, with some regions experiencing significantly greater increases. Continued water-level declines at current rates could affect the long-term sustainability of ground-water resources in Maryland's heavily populated Coastal Plain communities and the agricultural areas of the Eastern Shore.

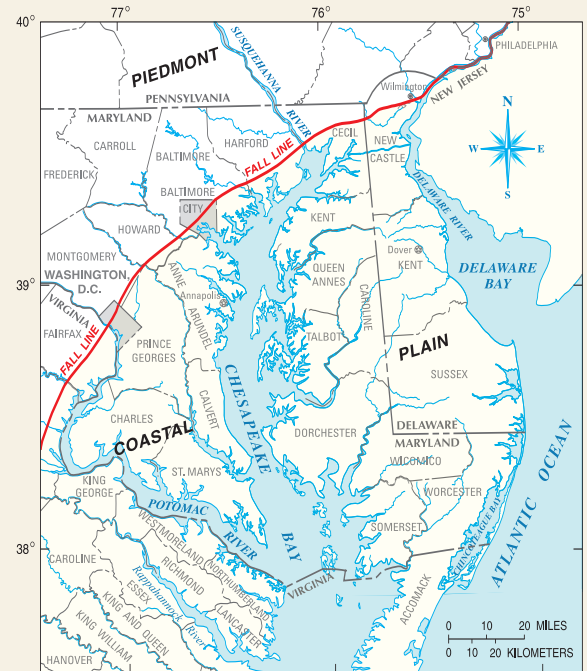


Figure 1. Extent of the Atlantic Coastal Plain in Maryland and adjacent states.

Why is this Assessment Necessary?

1) Water Levels in the Aquifers are Declining at a Significant Rate

Withdrawals from Maryland Coastal Plain aquifers have caused ground-water

2) Water Quality in Some Areas is Significantly Compromised

Water quality in the Coastal Plain aquifers is a concern for several reasons. Contamination by saltwater intrusion is a significant water-quality issue for the confined aquifers, and has been documented in several of Maryland's waterfront communities. However, the potential for saltwater intrusion is not well known in the deeper parts of the aquifer system because few data are available. Some areas have problems with naturally high concentrations of trace-element contaminants (including arsenic and radium), and further evaluation of these public health issues is warranted. Elevated concentrations of nutrients and agricultural chemicals in the surficial aquifer is a significant concern, especially on the Eastern Shore, where shallow

ground water is the water-supply source for many homeowners and provides much of the base flow to streams.

3) Ground-Water Resource Managers Need Better Tools

Water managers, policymakers, planners, and developers need to know how much ground water is available in the different areas of the Maryland Coastal Plain for public and domestic water supply, agriculture, industry, and electric power generation. Ground-water withdrawals in Maryland are managed by the Maryland Department of the Environment (MDE) through the Water Appropriations Permit Program. While studies of individual aquifers or multi-aquifer subregions are available, MDE needs more comprehensive

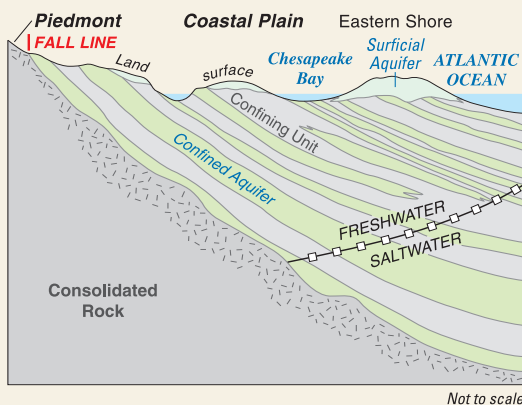


Figure 2. Schematic of the Atlantic Coastal Plain aquifer system in southern Maryland.

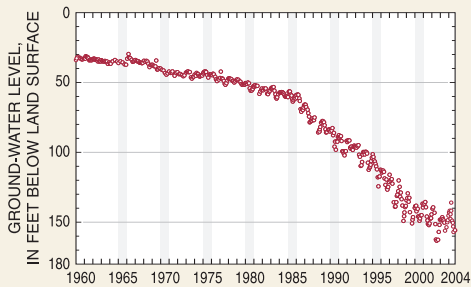


Figure 3. Hydrograph showing declining water levels in a well in the Aquia aquifer in southern Maryland.

and interactive tools for making management and permitting decisions. Specifically, MDE needs information systems and simulation tools to evaluate the effects of increased withdrawals on the entire aquifer system in important subregions and throughout the Maryland Coastal Plain. These tools need to take into account that some of the aquifers are units of a regional system that extends into and is used for water supply in adjacent states.

Evaluation of alternative water-management strategies requires enhancements in the monitoring networks for ground-water levels and streamflow throughout the Coastal Plain. Water managers and planners need to understand where and when continued withdrawal of ground water may reduce streamflow and/or induce changes in water quality that would require additional treatment or limit uses of the water resource.

Plans for the Comprehensive Assessment of the Coastal Plain Aquifer System in Maryland

In response to the Advisory Committee's 2004 report recommendations, MGS and USGS are preparing a science plan and implementation plans for conducting a comprehensive regional assessment of the Coastal Plain aquifers in Maryland and appropriate areas of surrounding states.

Comprehensive Assessment is Underway

MGS and USGS started Phase I of the Comprehensive Assessment in January 2006. Phase I activities are being jointly supported by funds and services from MDE, MGS, and USGS. Phases II and III of the assessment will require significant additional investment from current and new funding partners from 2008 to 2013.

Goals of the Assessment

- Document the geologic and hydrologic characteristics of the aquifer system in the Maryland Coastal Plain and appropriate areas of neighboring states.
- Conduct detailed studies of the regional ground-water-flow system and water budget for the Coastal Plain aquifer system in Maryland.
- Improve documentation of patterns of water quality in all Coastal Plain aquifers, including the distribution of saltwater.
- Enhance ground-water-level, streamflow, and water-quality monitoring networks in the Maryland Coastal Plain.
- Develop tools to facilitate scientifically sound management of the ground-water resources in the Maryland Coastal Plain.

Implementation Plans

PHASE I (2006-2008) <i>Getting Started and Building Partnerships</i>	PHASE II (2008-2012) <i>Filling in the Gaps and Building the Resource Management Tools</i>	PHASE III (2010-2013) <i>Using the Tools to Manage and Optimize the Resource</i>
<ul style="list-style-type: none"> • Develop an aquifer information system. • Refine the aquifer framework. • Determine management criteria. • Identify information gaps. • Develop plans for addressing gaps. • Build partnerships and inform the public. 	<ul style="list-style-type: none"> • Develop and test ground-water-flow model. • Simulate flow system and conduct field studies of recharge and leakage. • Enhance ground-water-level and streamflow-monitoring networks. • Conduct water-quality studies. 	<ul style="list-style-type: none"> • Develop optimization model. • Link flow and optimization models to create interactive management model. • Test water-management scenarios. • Inform partners and stakeholders.

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