Developments in the Ground-Water Level Monitoring Network in the Maryland Coastal Plain

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Review of Ground-Water Level Monitoring (why and where in MD)

Coastal Plain Monitoring Networks

Recent State Network Enhancement in the Coastal Plain
A COLLABORATIVE EFFORT

Enhancement of the State water level monitoring network is part of a larger Coastal Plain initiative conducted in partnership with:

US Geological Survey (USGS) and Maryland Department of the Environment (MDE)

Physiographic Provinces and Aquifer Types in Maryland

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Why monitor groundwater levels?

A direct measure of the status of Maryland’s aquifers

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Why monitor groundwater levels?

Provides information to assess:

- Groundwater availability
- Long-term regional trends of natural or human influences
- Local effects of pumping
- Aquifer continuity
- Potential for induced salt-water intrusion and land subsidence

![Water level in Aquia Formation, St. Mary’s County](chart)

Why monitor groundwater levels?

In water table aquifers, also provides information to assess:

- Effects of droughts
- Longer term changes due to climatic factors
- Dynamics between groundwater and surface water

![Dynamics between groundwater and surface water](diagram)
Why monitor groundwater levels?

Calibration of ground-water-flow models
Inform permitting/regulations

Review of Existing Ground-Water-Level Networks

STATE-WIDE COOPERATIVE NETWORK (MGS-USGS)
Established in 1943
By ~2003-2004:
~141 wells, including:
water table wells in shallow bedrock, overburden, & Coastal Plain sediments
confined aquifer wells in the Coastal Plain
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Wells in the State Ground-Water-Level Monitoring Network as of 2003

State network wells in the Coastal Plain (2010)

~145
Review of Existing Ground-Water-Level Networks

Other networks in the Coastal Plain
(some overlap and sharing of wells)

- POWER PLANT NETWORK
  Established in 1975 to monitor impact of power plants in SO MD
  287 wells, 5 aquifers

- COUNTY/CITY-FUNDED NETWORKS
  Targeting aquifers used in production locally
  6 networks:
  - Anne Arundel, Calvert, Charles, Queen Anne’s, St. Marys Counties,
  - Ocean City
  In each, ~18 to 38 wells; 2 to 5 aquifers

State and County/City network wells in the Coastal Plain (2010)
~438
Advisory Committee on the Management and Protection of the State’s Water Resources ("Wolman Committee")

- Interim report 2004
- Final report 2008

Some conclusions/findings:

Water supply management depends on data provided by surface water & ground water monitoring networks

The existing [State] networks are not adequate to meet management needs

Comprehensive evaluation of significant aquifers needed

- Coastal Plain assessment began in 2006 (MGS, USGS, MDE)


Recommended additional wells

In Coastal Plain--
- ~ 6 additional for water table
- ~ 49 additional for 7 major confined aquifers

Major aquifers/aquifer systems:
- Chesapeake Group
- Piney Point-Nanjemoy
- Aquia
- Magothy
- Upper Patapsco
- Lower Patapsco
- Patuxent
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Aquifer Information System
Developed as part of the assessment to address recommendations of the “WOLMAN COMMITTEE”

- GIS database of the hydrogeologic framework
  - Aquifer structure
  - Hydraulic properties
  - Water levels
  - Water use
  - Water quality

- A suite of tools for working with the data
Coastal Plain AQUIFER INFORMATION SYSTEM (AIS)

Development involves:

- RENDERING IN 3-D THE MAJOR AQUIFERS AND CONFINING UNITS
- INCORPORATING THOSE LAYERS IN AN ARCInfo GEODATABASE
- AND ADDING OTHER RELEVANT HYDROLOGIC ATTRIBUTES (HYDRAULIC PROPERTIES, THICKNESS, ETC)

Applying the AIS to Locate Monitoring Wells

POINT FEATURE
MDE wells database or USGS NWIS database

POINT FEATURE
EXISTING MONITORING WELLS

SURFACE FEATURE
AQUIFER LAYERS

POLYGON FEATURE
AREAS OF SPECIAL CONCERN (WETLAND OR WATERSHED)

POINT FEATURE
WATER USE

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Example -- Calvert aquifer system (part of Chesapeake Group)

- Number of individual aquifers varies
- Affects hydrogeology and appropriate monitoring

Example -- Calvert aquifer system

Showing:
- Extent (subcrop/outcrop dark shading)
- Contours -- elevation of top of aquifer system
- Calvert system wells in the network ~2004
- Proposed locations for additional monitoring
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Example -- Calvert aquifer system

Adding: Water Use
major ground water appropriations (GAPs)
withdrawals designated from Calvert Fm or related aquifer or other potentially related "Miocene"

Adding:
• New drilling locations (well clusters)
• Possible existing wells to add to monitoring network

Proposed Additions:
Additional Observation Wells (designated locations 2016)
- Cherwood
- Federalsburg/Cherwood
- Calvert

Possible existing Wells to Add to Observation Well Network (well IDs shown are USEP-B SPAR site names)
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Greensboro carnival grounds well site

Collecting a split-spoon core

Cuttings/ditch samples

Greensboro drilling and logging

Geophysical logging
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Diagram from purdue.edu

Greensboro -- artesian wells
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Greensboro – (artesian wells) testing and sampling

Results will help define Calvert aquifer(s)

State Network – Coastal Plain Wells

Network Enhancement is on-going
Awaiting a few existing wells to become available
Securing access and verifying viability
Still seeking additional existing wells

Ideal wells would be:
• coming “off-line” or
• being replaced (and abandonment not essential)
• limited use (e.g. seasonal)

Recommendations for potential monitoring wells, please contact:
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