Free Workshop
Household Water Well System
Workshop Agenda

Presentation March 14, 2010
Monroe County Conservation District

Protecting Our Groundwater / Surfacewater Resources
By Working as a Community

PNERCD

Presented by:

Mr. Brian Oram, Professional Geologist (PG),
Soil Scientist, Licensed Well Driller,

IGSHPA Accredited Geothermal Installer

Laboratory Director, Center for Environmental Quality
Wilkes University
http://www.wilkes.edu/water

and

B.F. Environmental Consultants Inc.

http://www.bfenvironmental.com

http://www.water-research.net

Pocono Northeast
Resource Conservation & Development Council

Agenda for Today

- Introduction to the Council and Program
- Geology / Hydrology
- Private Wells and Drinking Water Issues
- RC&D Household Water Well Program
- More Details on the Program
- Q & A Session

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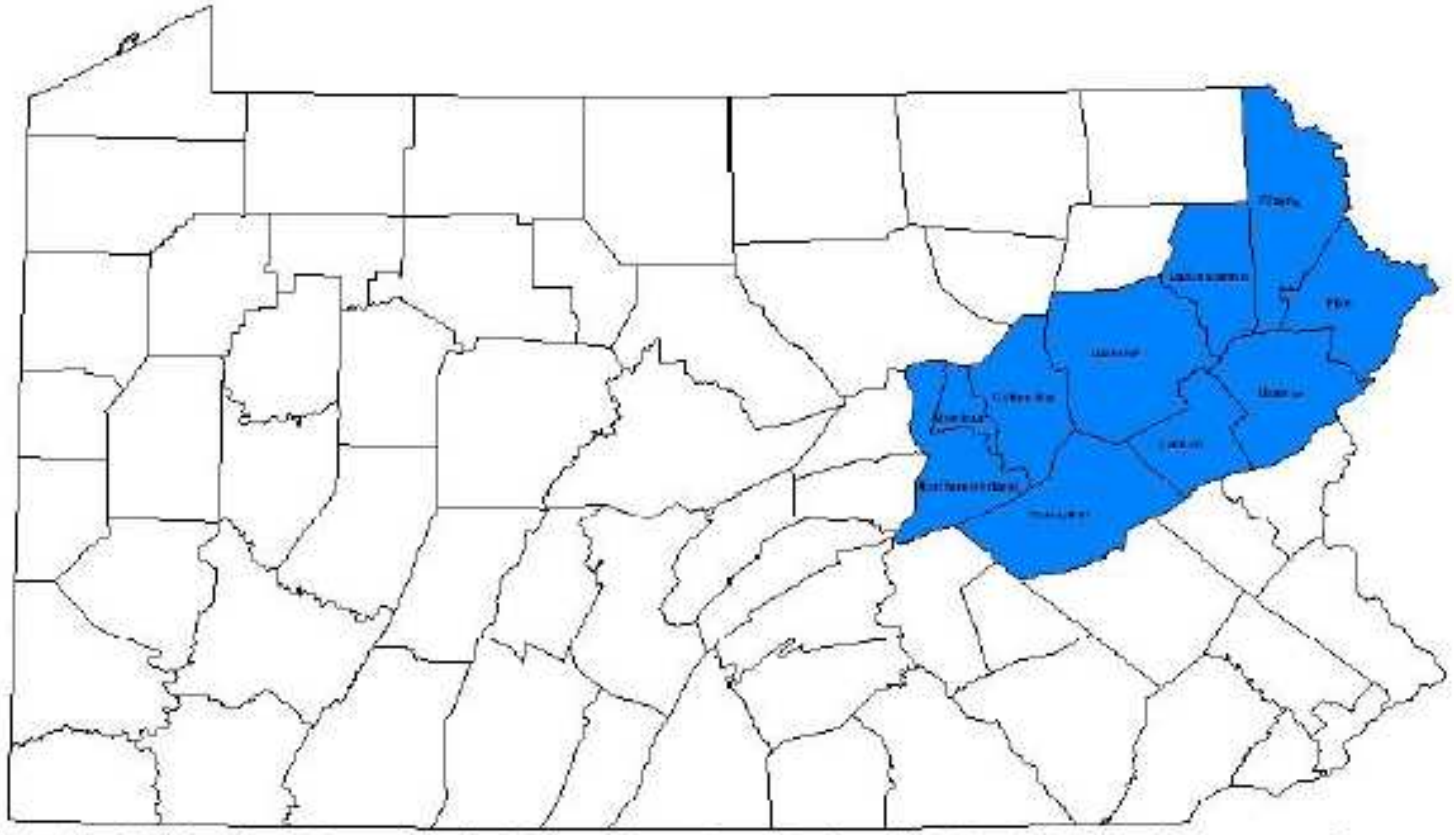
Coverage Area



Serving the Following Counties in Pennsylvania: Carbon, Columbia, Lackawanna, Luzerne, Monroe, Montour, Northumberland, Pike, Schuylkill, and Wayne

Pocono Northeast
Resource Conservation & Development Council

Project Managed by
The Pocono Northeast RC&D Council

- **The Mission:** to enhance and improve the ecological, cultural, and economic characteristics of the area through projects and programs that promote the management, protection, and utilization of the area's resources.
- http://www.pnercd.org

Pocono Northeast
Resource Conservation & Development Council

PNERCD

The Council

- The Council is a nonprofit IRS 501c3 organization .
- The Council Board is composed of concerned citizens and stakeholders that work to improve and promote the management, protection, economic development, and utilization of the area's resources

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SOME OF OUR OTHER PROJECTS

FUEL for Schools and Beyond

- Started November 2006
- Statewide energy-use initiative
- Promotes the use of local renewable resources to provide reliable energy for Pennsylvania schools and businesses
- In one project – we eliminated the use of over 45,000 gallons of oil in one year
- http://www.pnercd.org

CSAW
Consortium for Scientific Assistance to Watersheds

Pennsylvania Fuels For Schools And Beyond

FREE

TECHNICAL ASSISTANCE
FOR
WATERSHEDS!!!

C-SAW

(Consortium for Scientific Assistance to Watersheds)

Funding provided by Growing Greener and the in-kind support of the partners

CSAW
Consortium for Scientific Assistance to Watersheds

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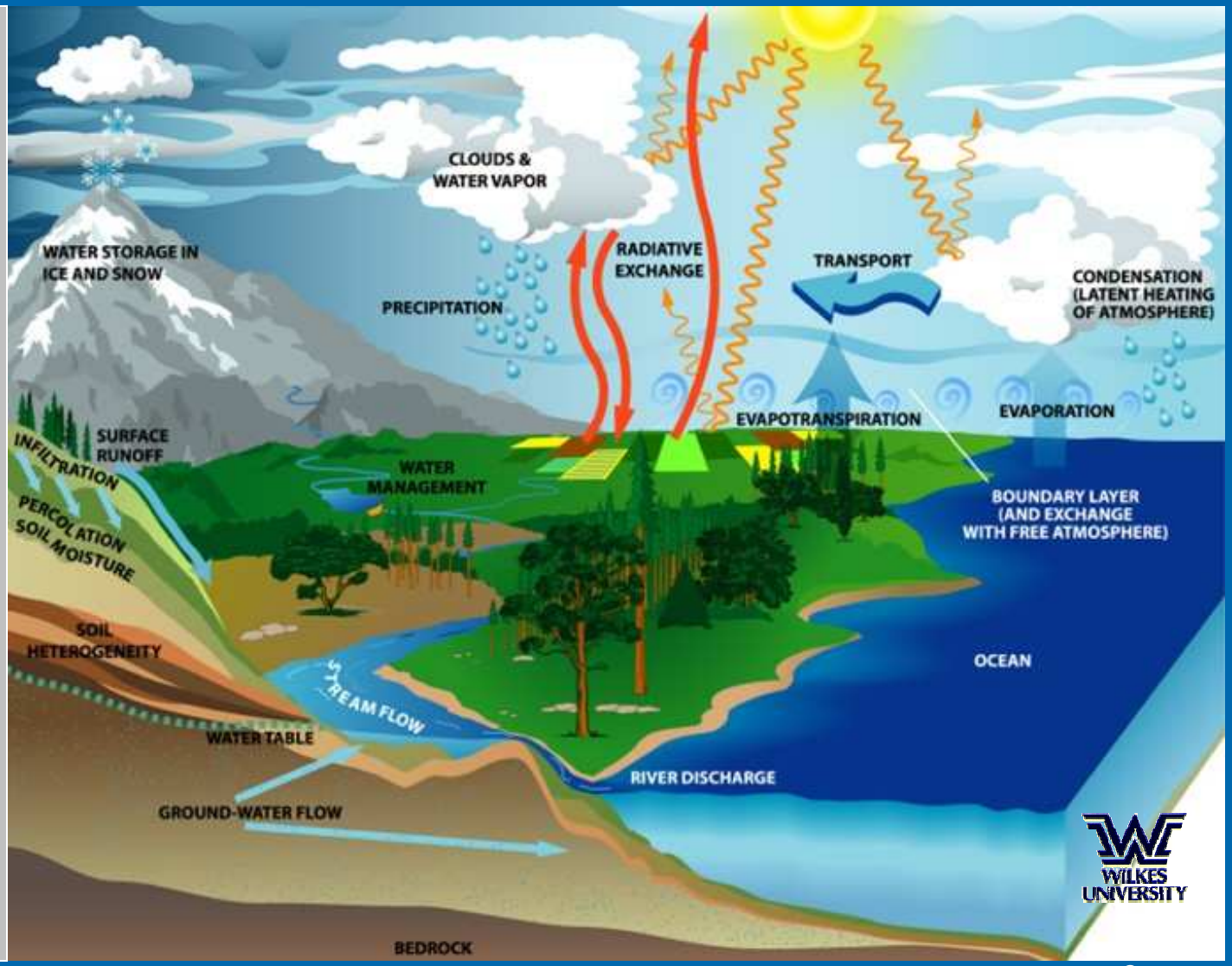
Pennsylvania is... Growing Greener

Components of the Water Cycle

First The Ins
Solar Energy Input
Precipitation
Condensation
Well Injection
Irrigation

The Outs
Evaporation
Transpiration
Infiltration
Percolation
Runoff
Groundwater Flow
Surfacewater Flow
Well Pumping

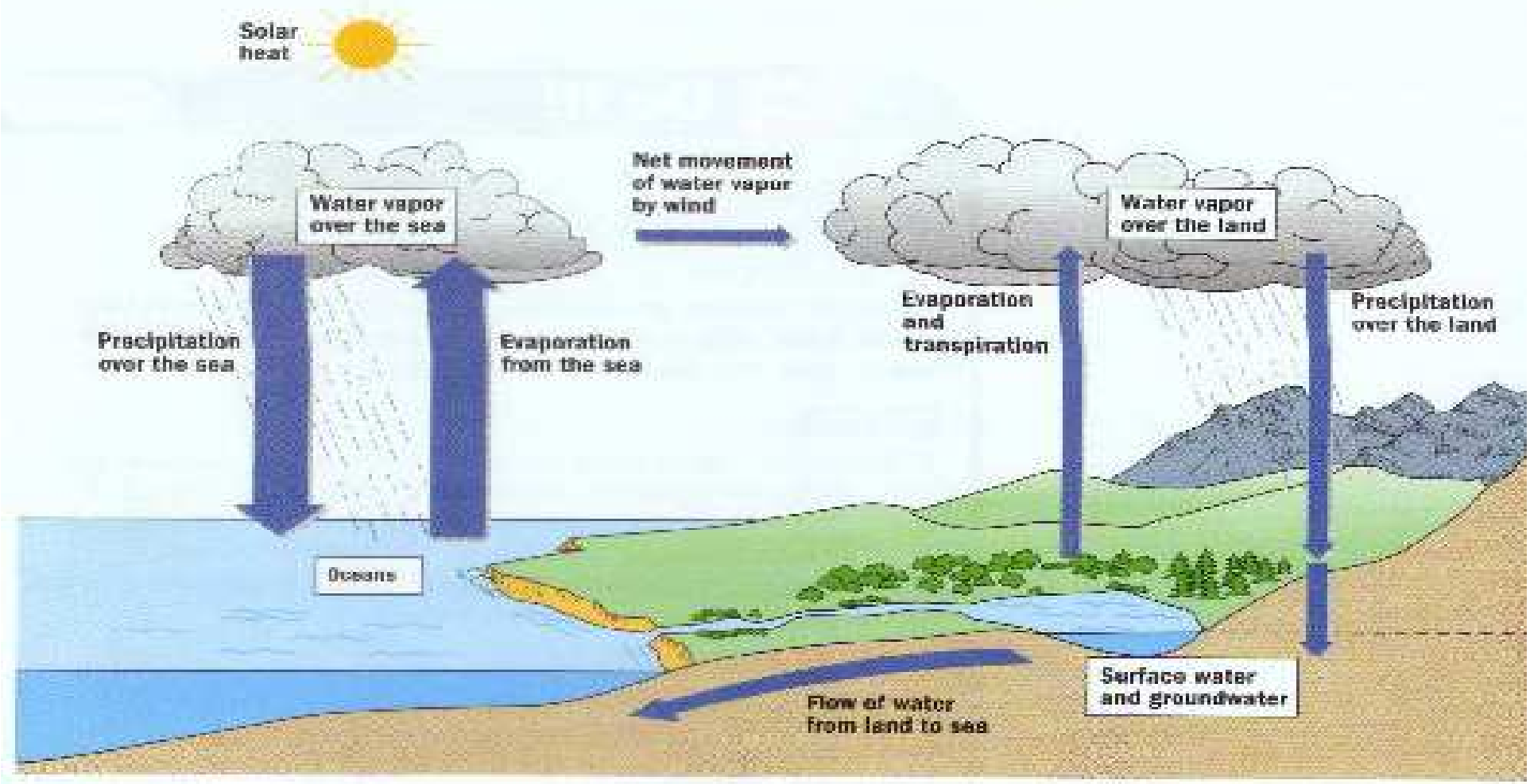


The Water Cycle
Powered by the Sun- Solar Power

FIGURE 37.11

The Water Cycle

Solar radiation powers the water cycle. How does the water cycle affect the weather?



Precipitation

Types of Precipitation

Natural

Rain

Snow

Ice

Hail

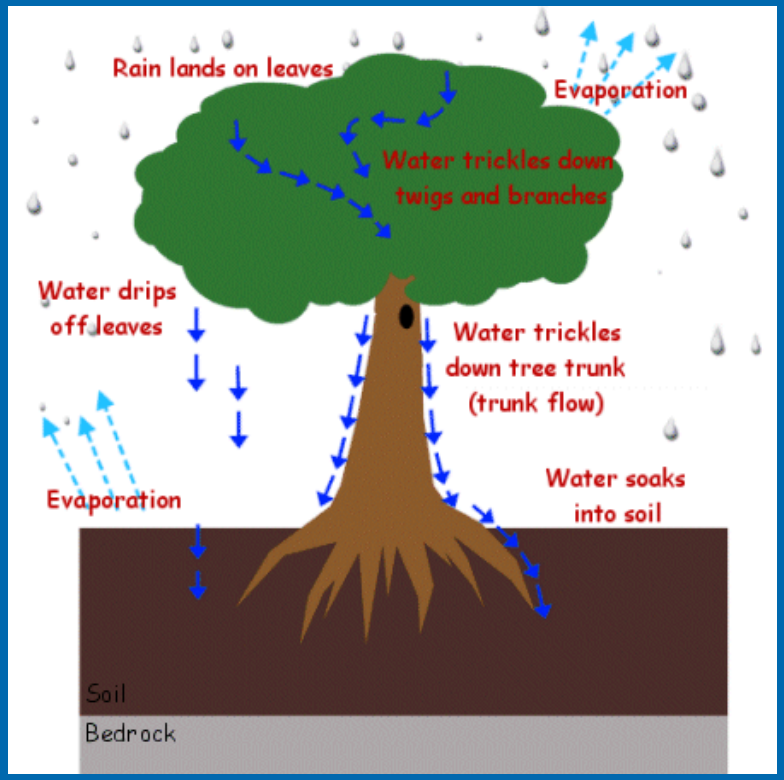
Condensation/ Dew

Man-Made

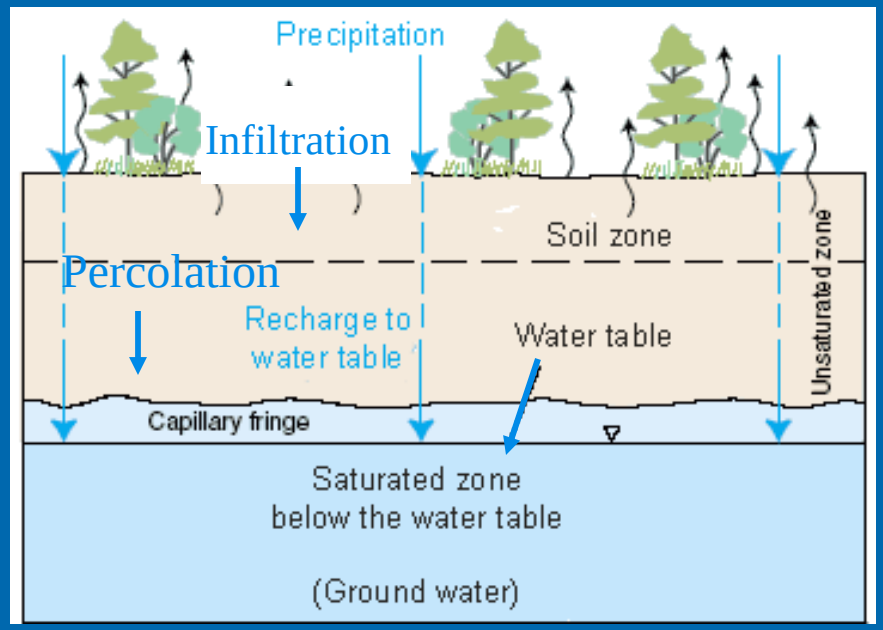
Irrigation

Wastewater Applications

Interception
Infiltration / Percolation



Canopy Interception



Infiltration- Movement Water Into Soil

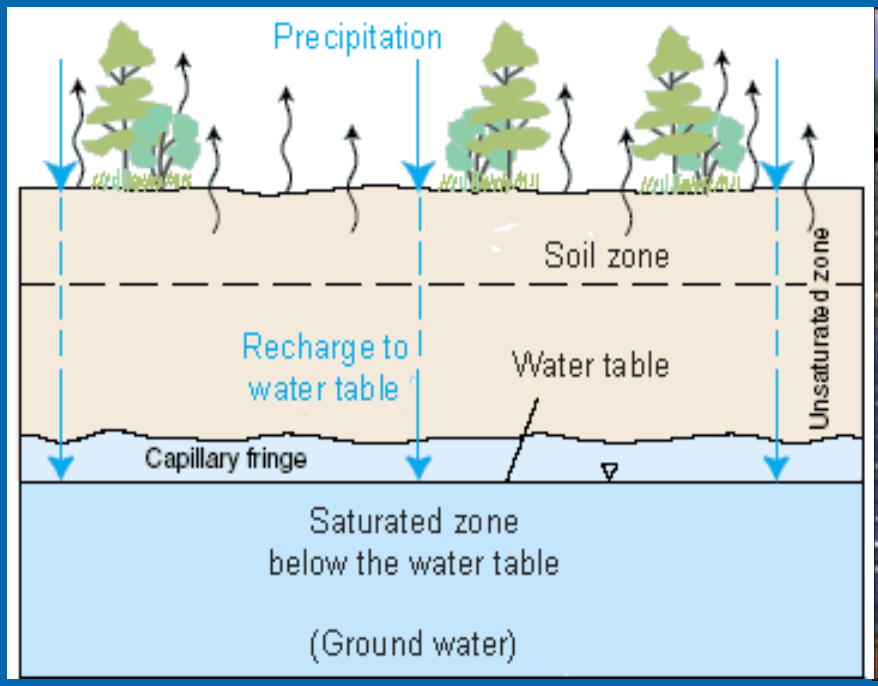
Percolation - Water Movement Through the Soil

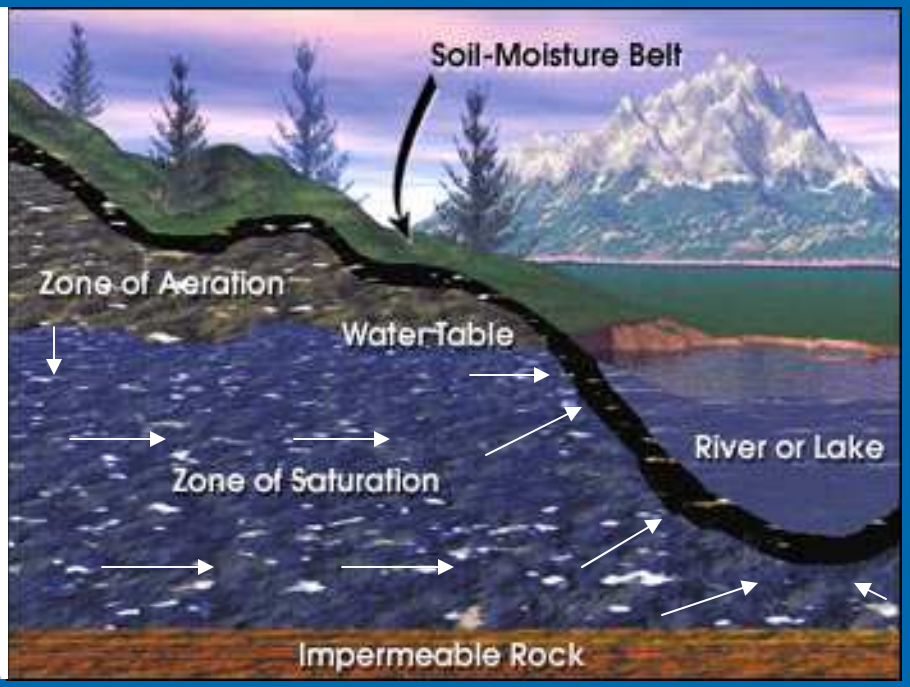
Evaporation / Transpiration
Evapotranspiration

Evaporation- Driven by Thermal Gradient and Moisture Difference

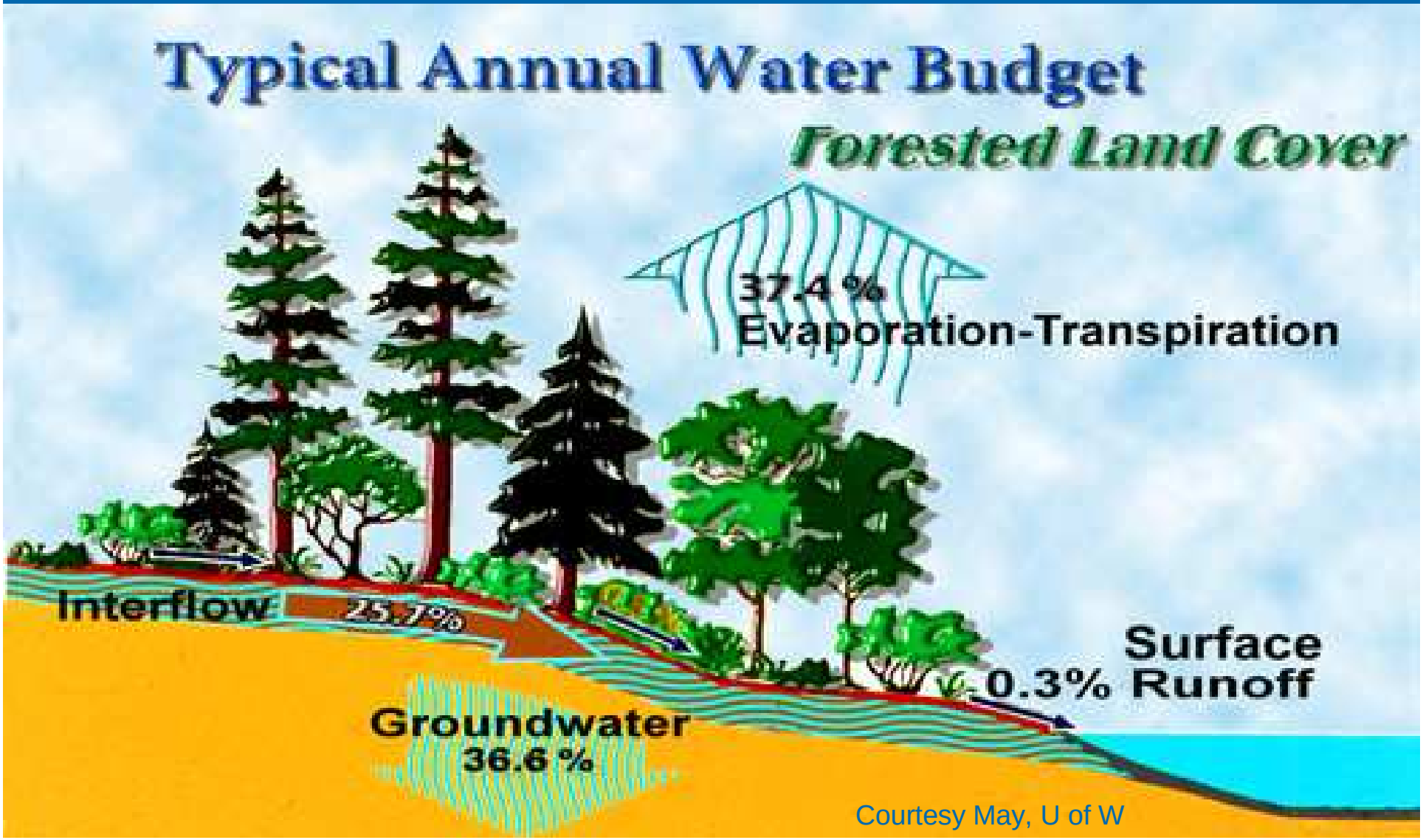
Stomata

Groundwater
Zone of Saturation

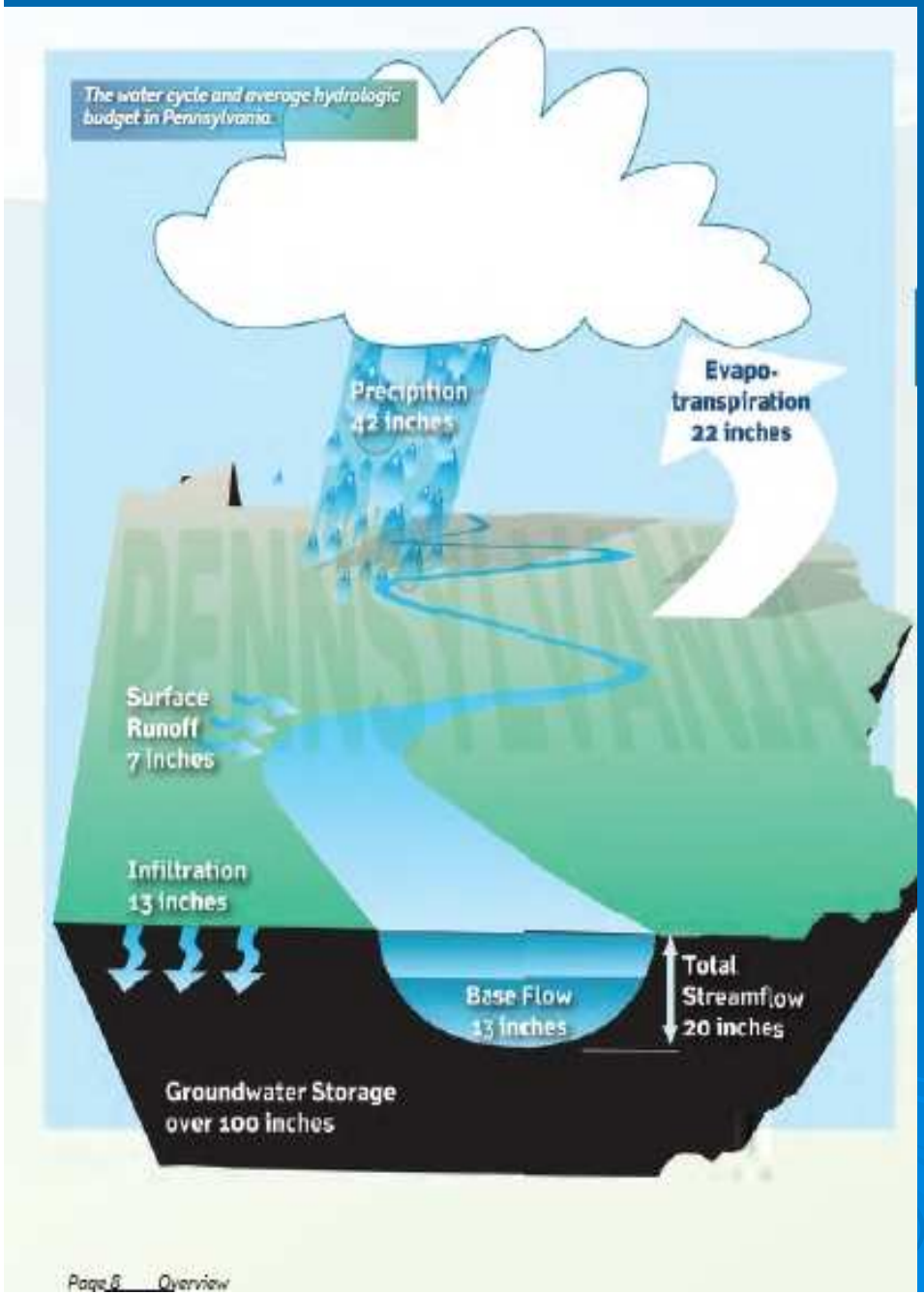




Hydrology Under Natural Conditions



Courtesy May, U of W



Water Budget for PA

In

Precipitation – 42 inches

Out

Evapotranspiration – 22”

Total Streamflow – 20”

- Baseflow – 13”
- Surface Runoff – 7”

Therefore, 65% of streamflow is groundwater discharge.

Other

Storage in Groundwater

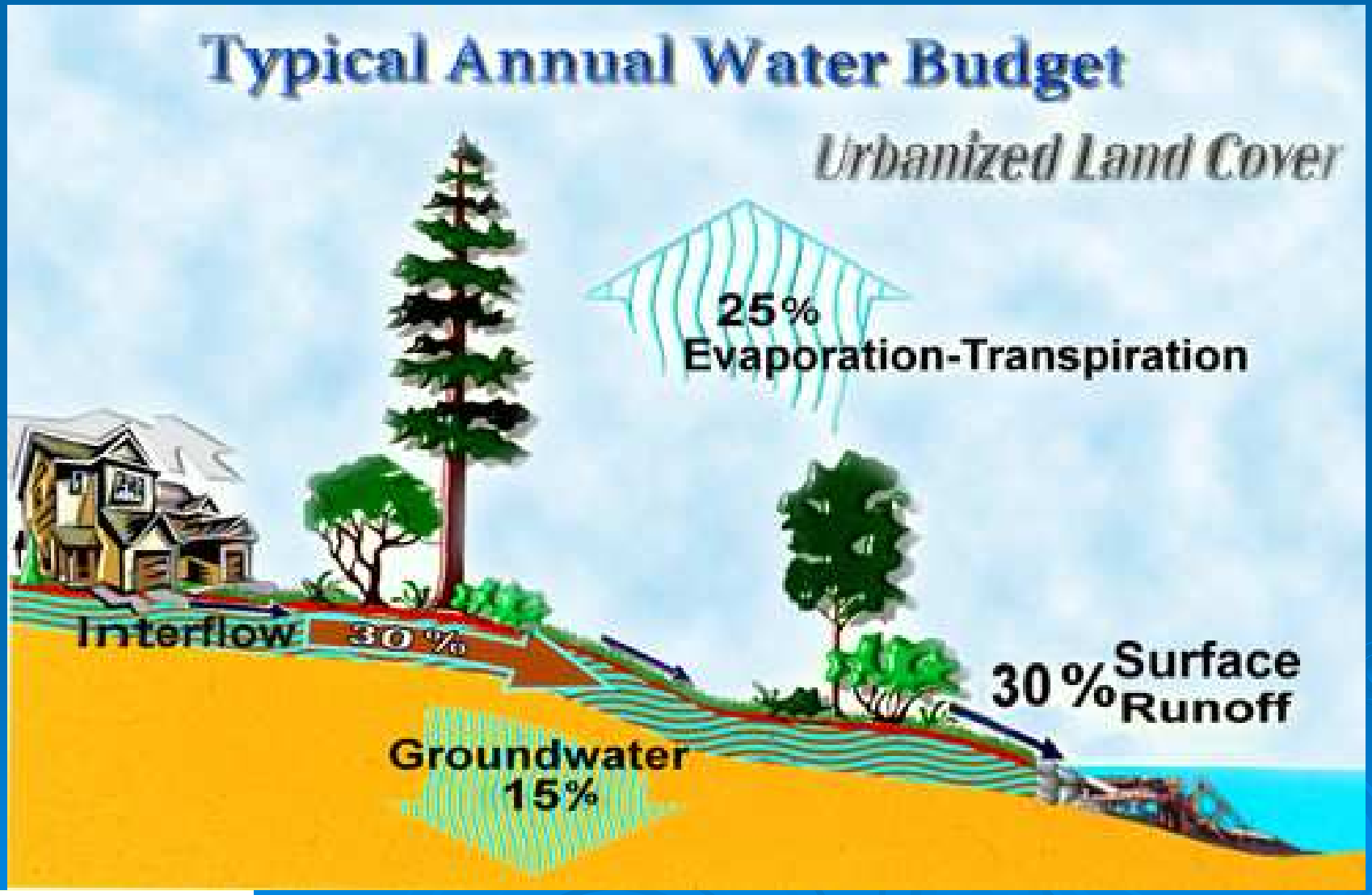
Aquifers over 100 inches*

* This is our “Water” Cushion.

Runoff / Overland Flow and Land-Use

When Rainfall Rate Exceeds Infiltration
More Runoff and Less Groundwater Recharge.

Developed Conditions



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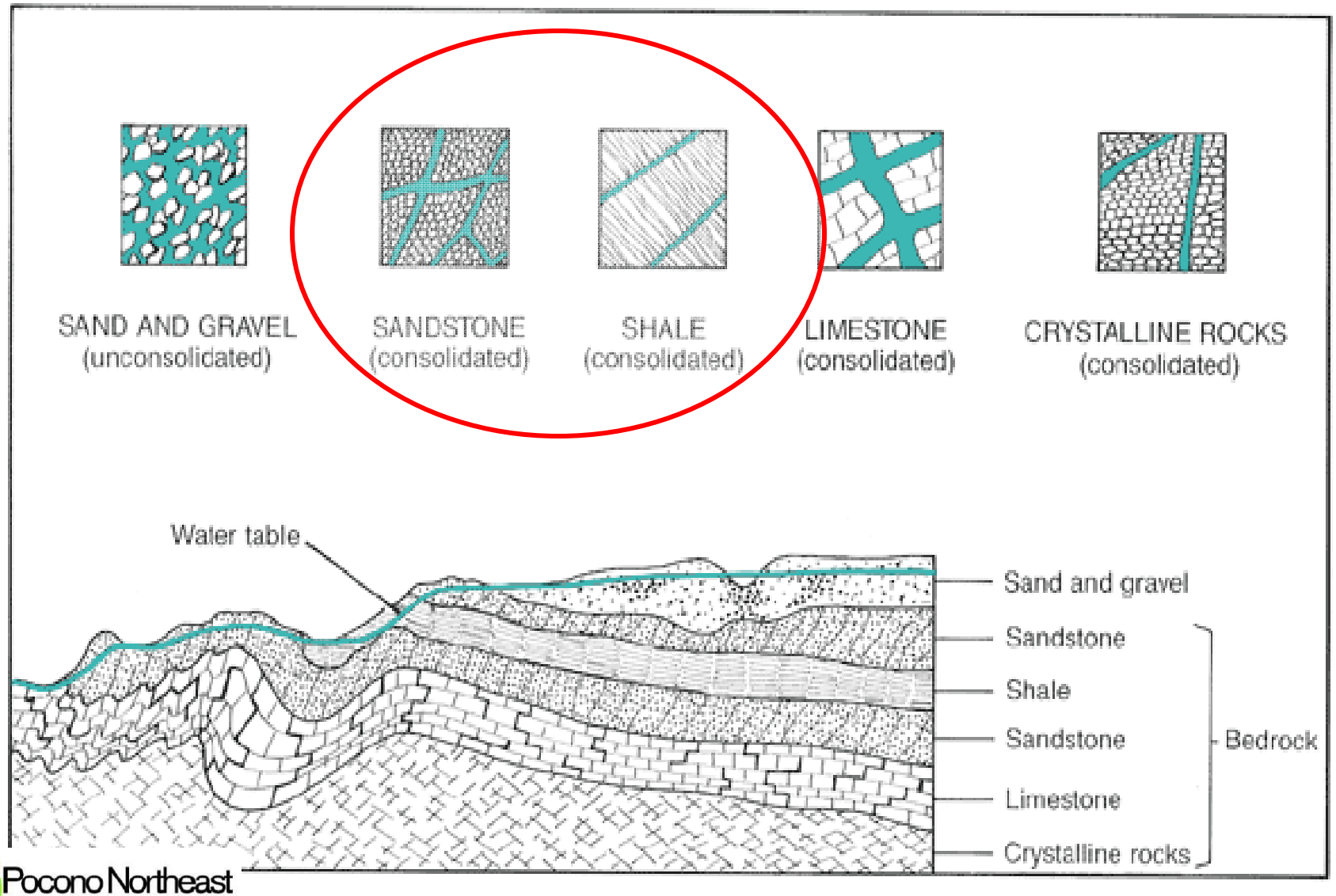
Courtesy May, U of W

Primary Aquifers in PA



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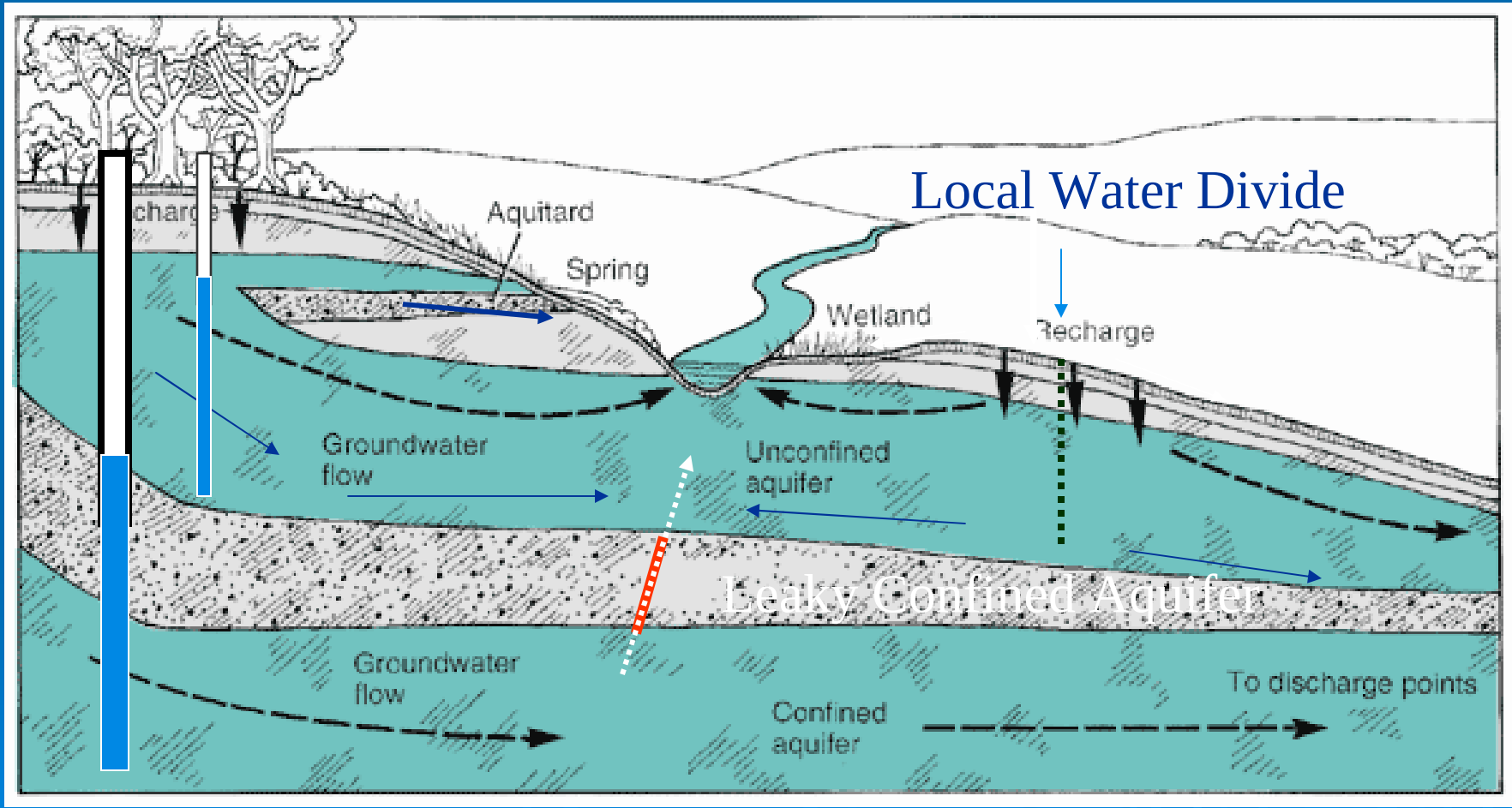
Surface Water & Groundwater
They Are Related and Connected !



Groundwater Discharge – Supports Stream Baseflow

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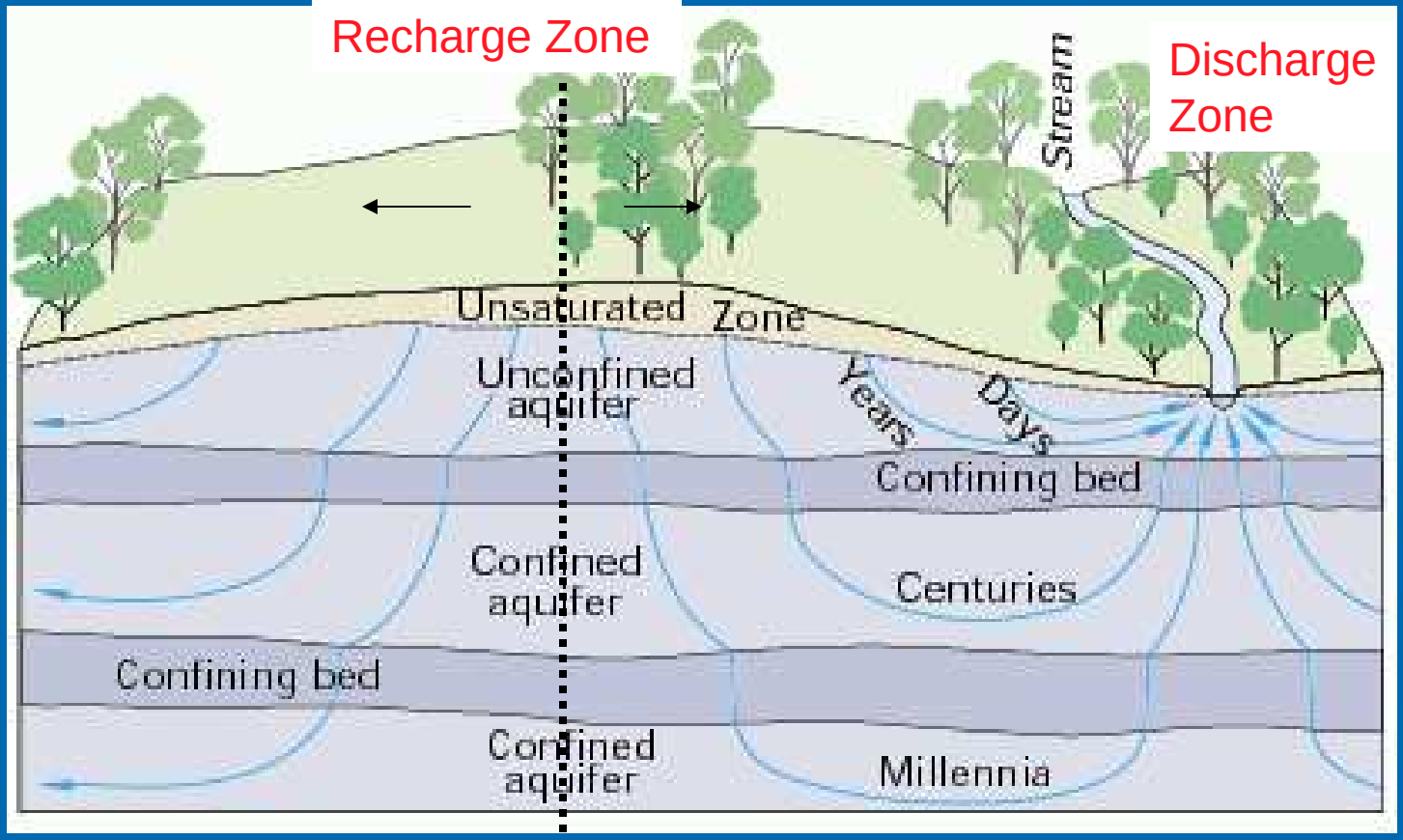
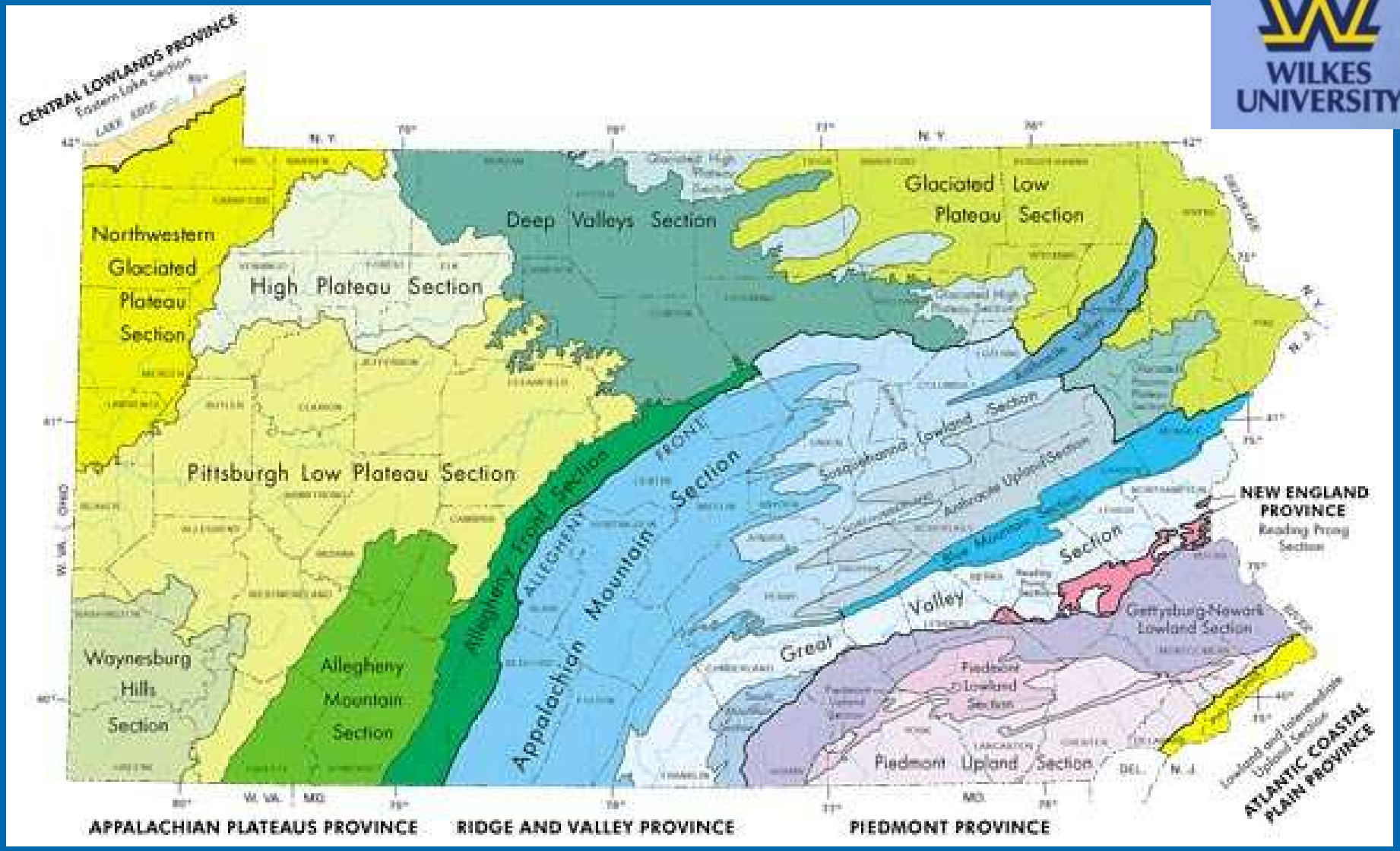
Groundwater Moves Slowly- feet per year



Yes We Have a Lot of Groundwater in Storage, but it have taken centuries or longer to fill up the system.



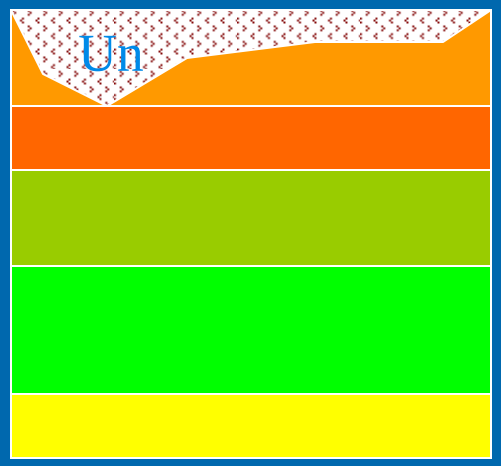
Monroe County within the Appalachian and Ridge and Valley

Source: DCNR - http://www.dcnr.state.pa.us/topogeo/map13/map13.aspx

Appalachian Plateau Province

- Broad to Narrow Valleys
- Rounded Hills and Valleys Associated with Glaciation
- Valleys filled by glacial fluvial material

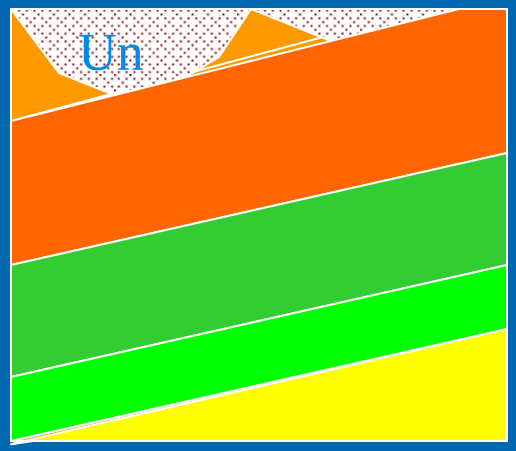
Unconsolidated Material (Un)



Younger (Y)

Older (O)

Y ← O

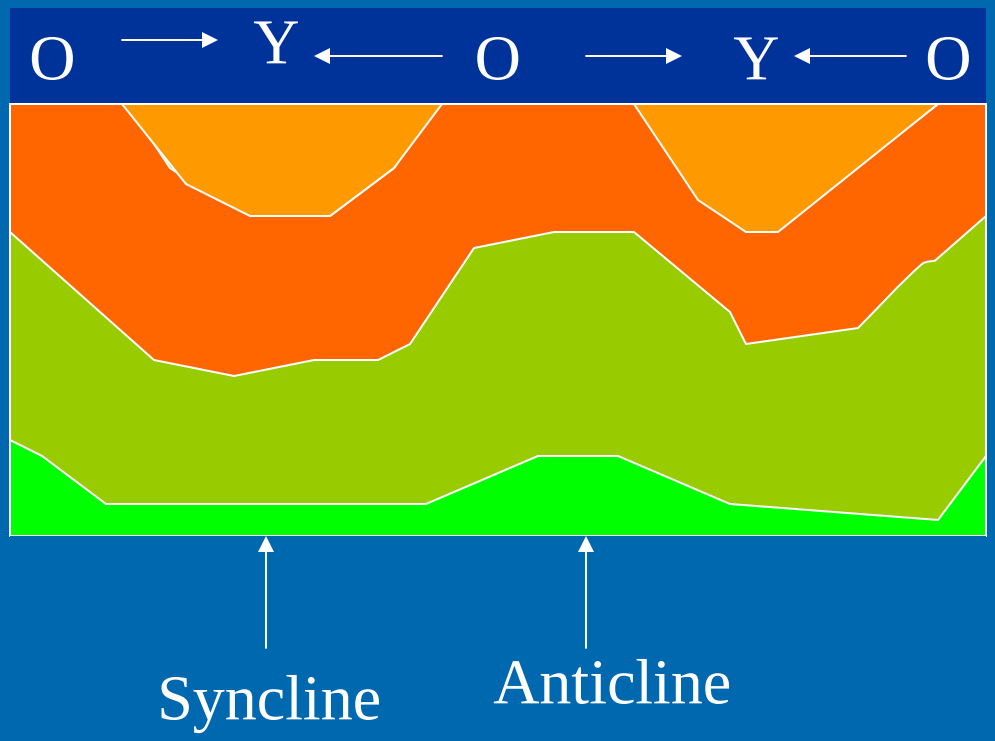


Y

O

Ridge and Valley Province

- Bedrock has been folded into a series of anticline and synclinal structures.

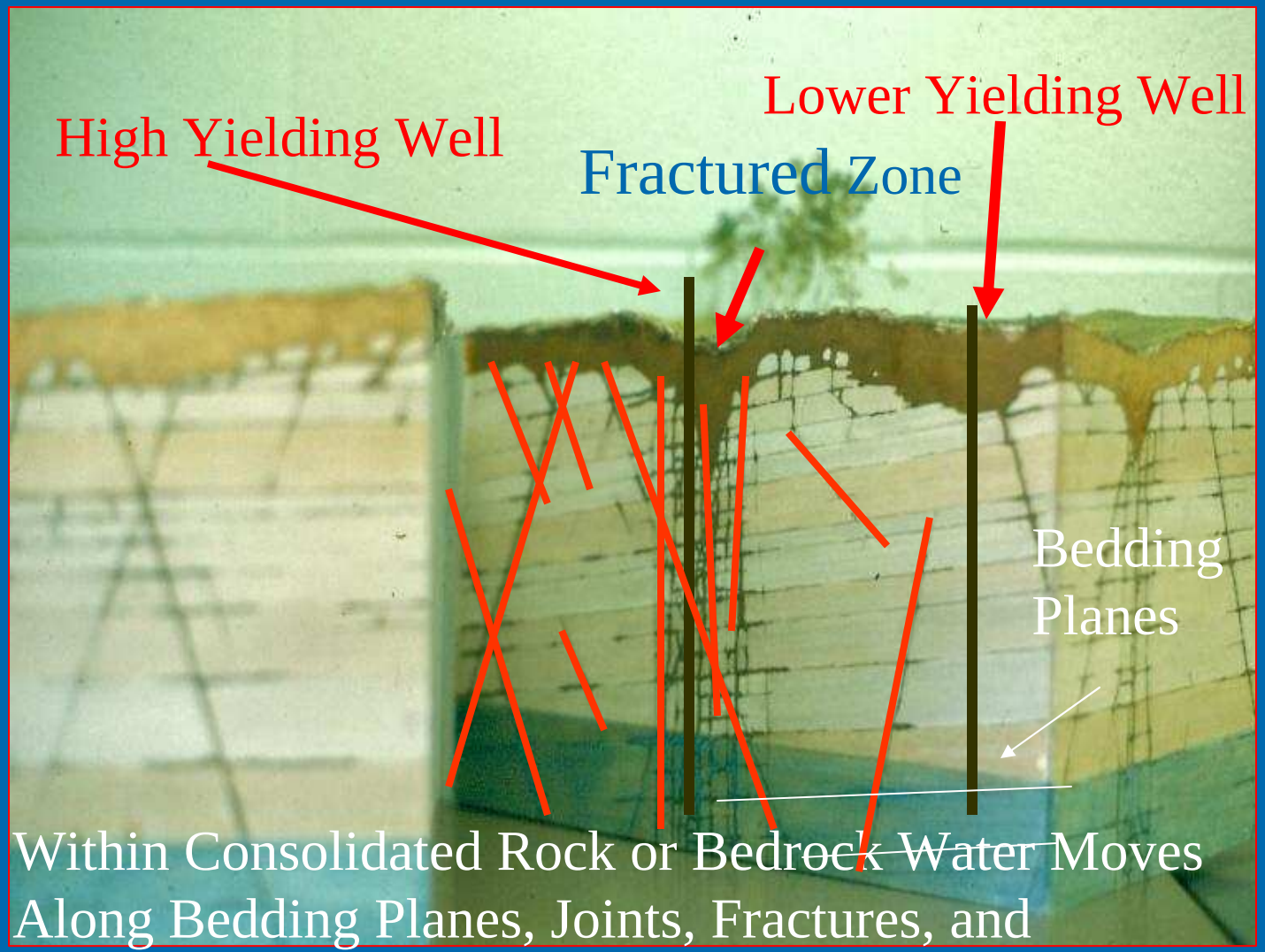


Geological Sequence – Northeast PA

OLDER

Time	Period	Deposit or Rock Type
0 to 1.8 million years	Quaternary – Glaciation	sand, silt, clay, and gravel
1.8 to 290 million	Tertiary to Permian	**Not present (eroded and weathered)**
290 – 320 million	Pennsylvanian	**Llewellyn (coal) and Pottsville (minor coal)**
320 – 354 million	Mississippian	**Mauch Chunk Pocono and Spechty Kopf**
354 - 417 million	Devonian	Catskill Formation **Trimmers Rock Formation Mahantango Formation Marcellus Formation (Black Shale)- Target Onondaga Formation (calcareous sandy shale)**
417 – 443 million	Silurian	

Bedrock Planes and Fractured Zones



Within Consolidated Rock or Bedrock Water Moves Along Bedding Planes, Joints, Fractures, and Faults.

Edge Ridge and Valley Province – Rt 309- Dallas, PA

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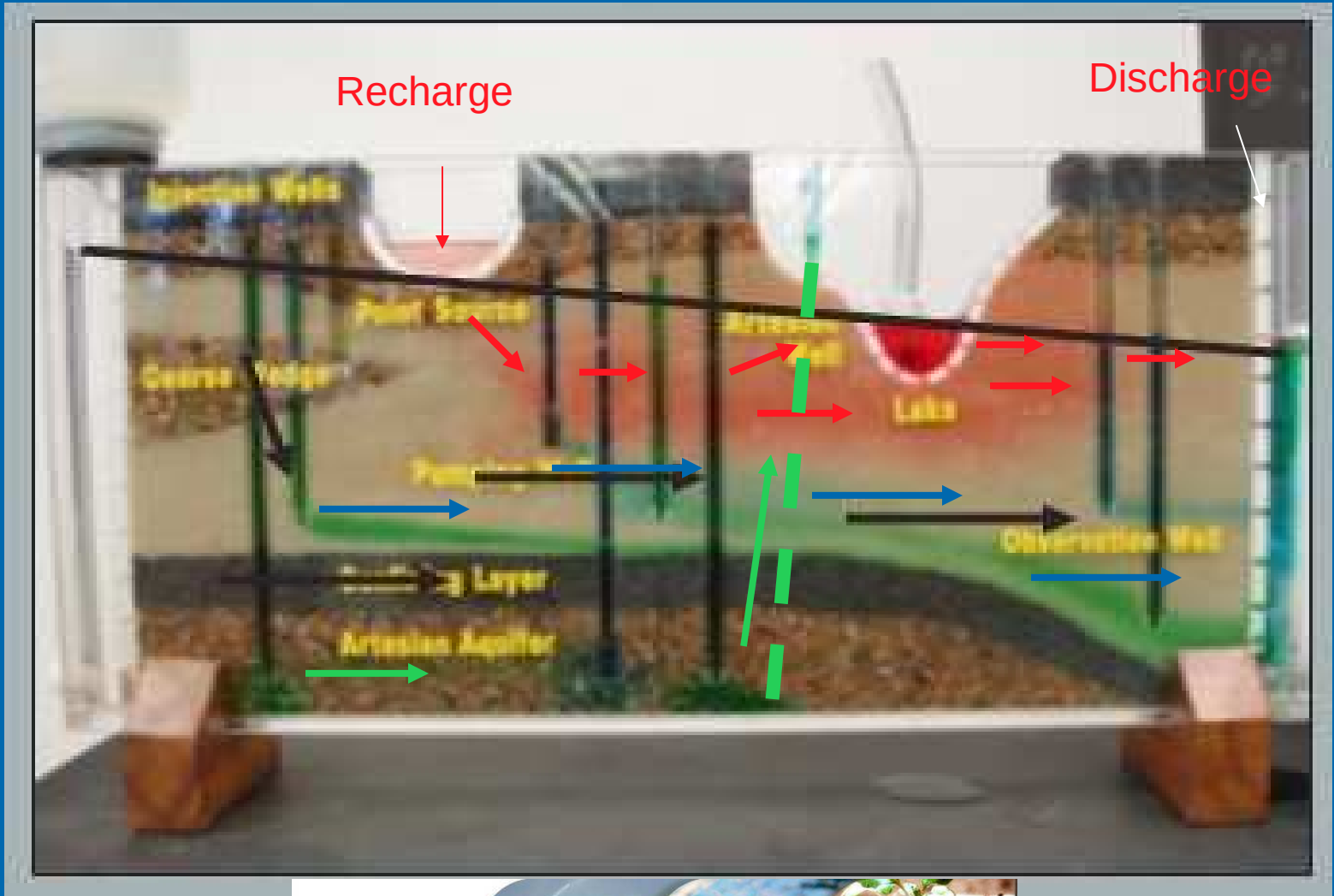
Environmental Scientists, Hydrogeologists, & Environmental Education Specialists
Located in Northeastern Pennsylvania
water reuse hydrogeology soil testing

Groundwater and Surfacewater is Connected



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Conclusions

- Groundwater and Surfacewater are Connected.
- Groundwater moves feet per year;
- Surfacewater moves feet per second;
- To maintain our drinking water aquifers, we need to maintain recharge and infiltration;
- Water in Groundwater Moves along fractures, joints, and bedding planes (not subsurface rivers).

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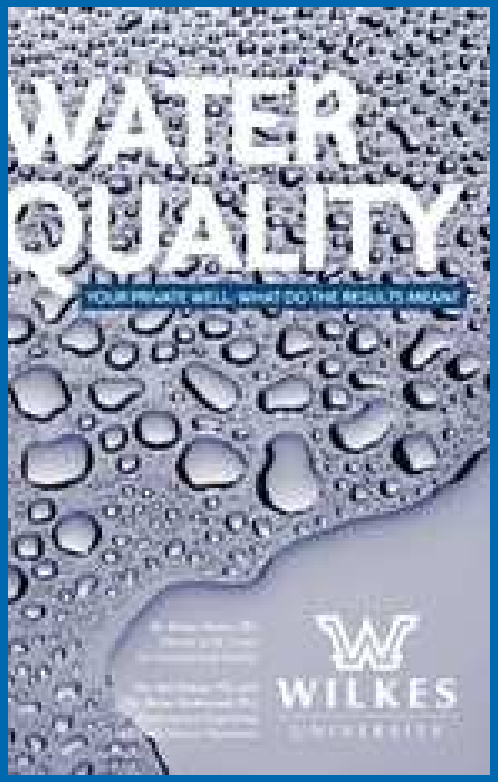
New Community Resource



Download a Free Copy (pdf) or Link to a copy at http://www.wilkes.edu/water

1. We are Working on a Regional Citizen Water Quality (Groundwater and Surfacewater) Database.

Add Your Data to the Citizen Database
Request a Consent Form
http://www.wilkes.edu/water

Vision of the Council

- The Vision of the Council is to become a recognized leader and advocate of natural resource and community sustainability in northeastern Pennsylvania.

- http://www.pnercd.org

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