

Indian Creek Watershed Association

Dedicated to the preservation and protection of Monroe County's abundant, pure water.

YEAR ^{OF THE} 2012 KARST

Aerial view of Monroe County by Rocky Parsons

Driving through Monroe County is a constant treat for the eyes.

Rolling pastures meet tree-covered hillsides. Spectacular long views give way to picture-perfect close-ups. Free-running streams like Indian Creek loop through fields and meander close to the roadways.



In Scott Hollow Cave by Ed McCarthy

What we see above ground is only part of what makes Monroe County unique.

Extensive cave systems and channels lie hidden underground. Sinkholes, sinking rivers and springs are surface clues to what is happening underground. In fact, while we have beautiful creeks, there are surprisingly few surface streams running through our pastures and down our hillsides.

Why does Monroe County have these unusual features? Karst is a big part of the answer.

Karst is eroded limestone riddled with caves and channels. Water moves through karst very differently than through typical soil and rock formations. Much of Monroe County lies on or near karst formations.

For the “Year of the Karst” Indian Creek Watershed Association (ICWA) is promoting greater understanding of:

- what karst is
- how it affects our water
- what we can do to protect our water quality now and into the future

Watch for workshops and presentations throughout the year, as well as regular articles in the Monroe Watchman and displays at Farmer's Day and at the Autumn Festival.

In many of our activities we will partner with Friends of THE Second Creek, the Rural Heritage Group and other conservation, education and community organizations in the region. Also, this year the caving enthusiasts of the National Speleological Society (NSS) hold their annual convention in the Greenbrier Valley, June 25-29, and we plan to join forces to learn and share more about karst and caves.

We invite you to join us in this yearlong adventure!

For more information, or to order copies of the 2012 ICWA “Year of the Karst” calendar, please contact: info@indiancreekwatershedassociation.org • www.IndianCreekWatershedAssociation.org

Indian Creek Watershed Association, P.O. Box 711, Union, WV 24983

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Karst is highly eroded limestone.

On the surface it is characterized by sinkholes, sinking streams and springs.

Underground it is riddled with channels and caves.

Surface streams from overlying formations can “sink” into the limestone cracks and conduits.

Sinkholes form over time as water seeping into cracks dissolves the limestone. Cave entrances and direct conduits into the karst aquifer are often found in sinkholes. Water and pollutants flowing into sinkholes dump directly into the karst.

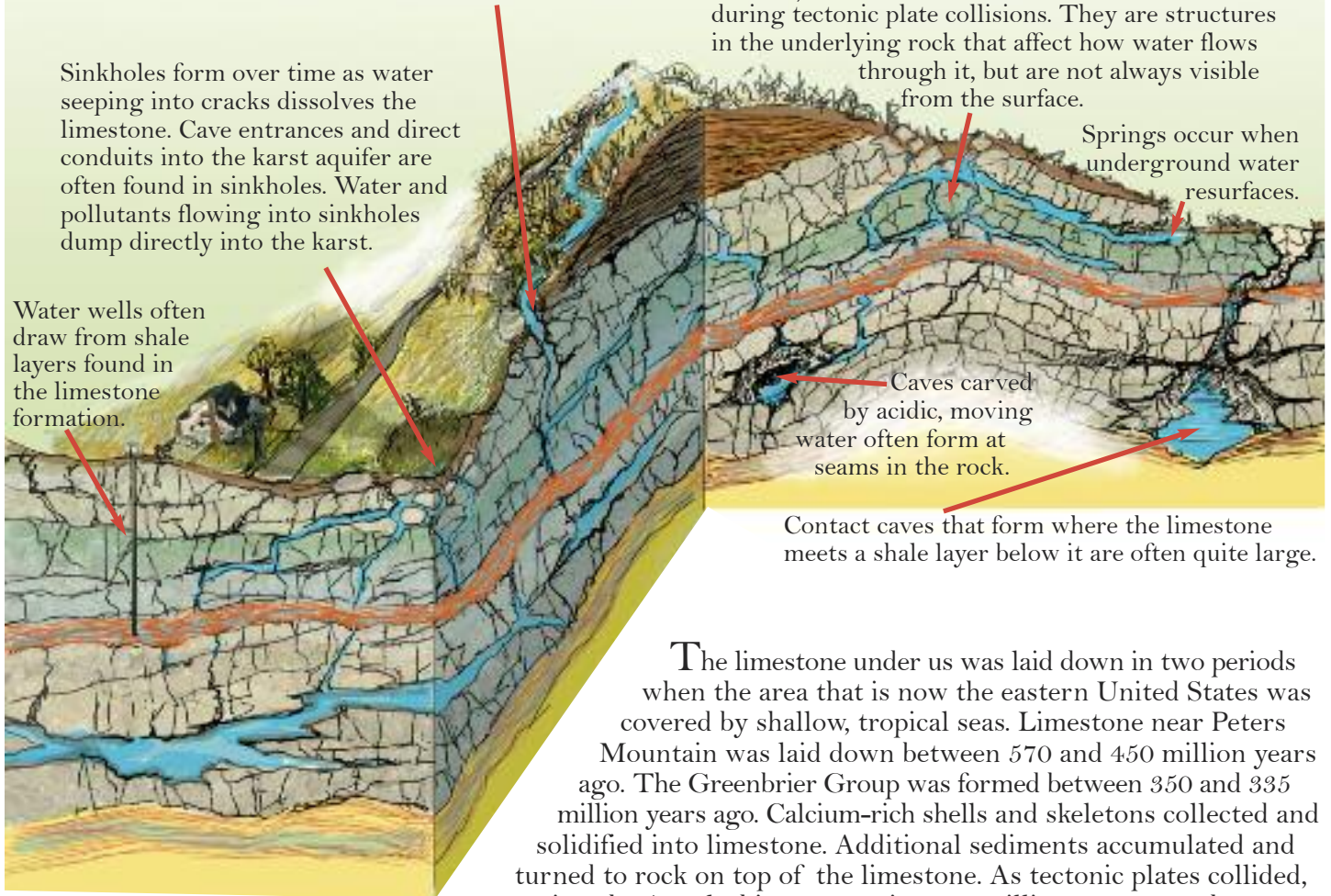
Water wells often draw from shale layers found in the limestone formation.

Anticlines (structural hills) and synclines (structural hollows) are formed when the limestone is wrinkled during tectonic plate collisions. They are structures in the underlying rock that affect how water flows through it, but are not always visible from the surface.

Springs occur when underground water resurfaces.

Caves carved by acidic, moving water often form at seams in the rock.

Contact caves that form where the limestone meets a shale layer below it are often quite large.



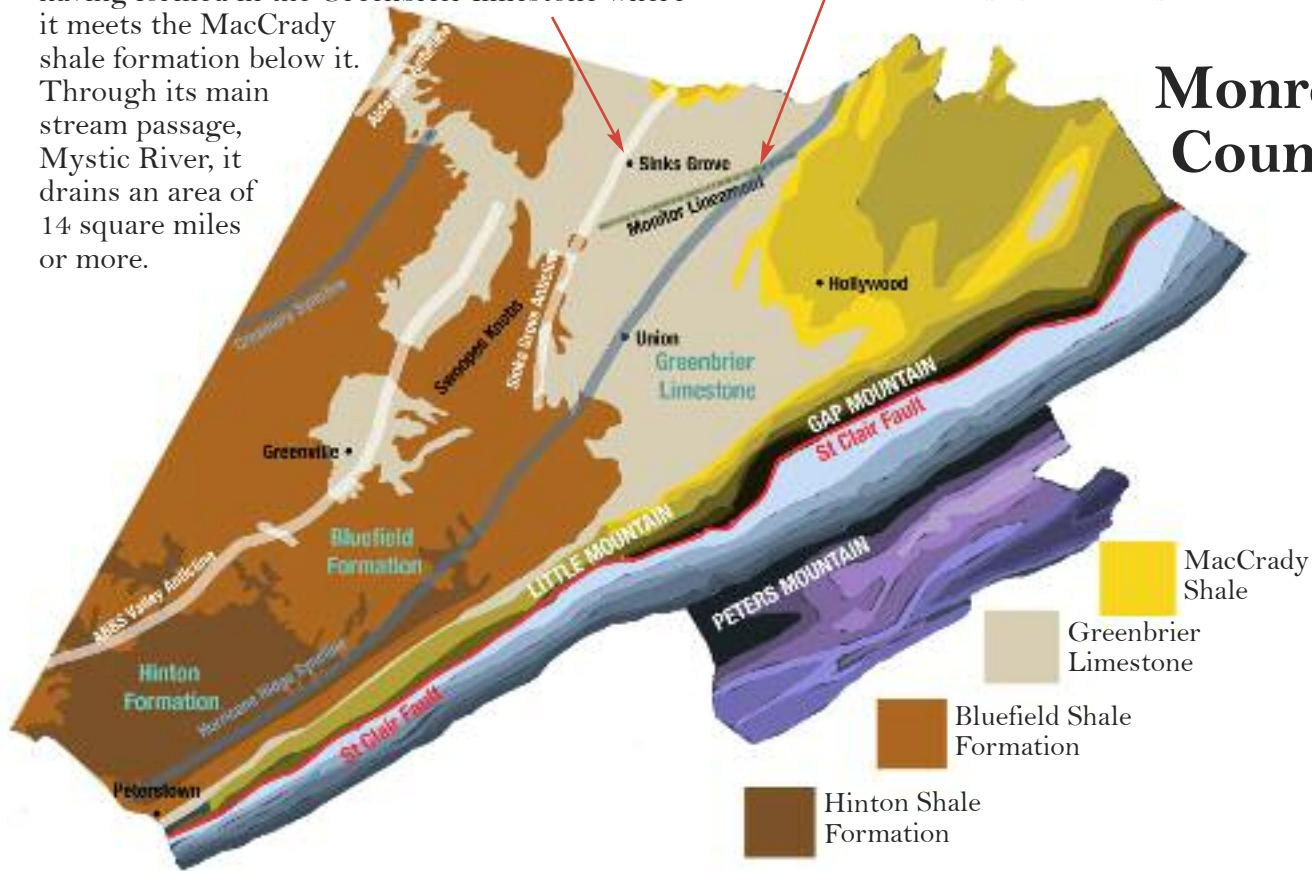
The limestone under us was laid down in two periods when the area that is now the eastern United States was covered by shallow, tropical seas. Limestone near Peters Mountain was laid down between 570 and 450 million years ago. The Greenbrier Group was formed between 350 and 335 million years ago. Calcium-rich shells and skeletons collected and solidified into limestone. Additional sediments accumulated and turned to rock on top of the limestone. As tectonic plates collided, creating the Appalachian mountains 260 million years ago, the limestone was alternately buried, uplifted, faulted, folded and fractured.

Limestone is relatively impermeable. Water cannot flow through it like it flows through sandstone. Over millions of years groundwater, slightly acidified by organic material in the soil, seeped into cracks in the limestone dissolving it and carving caves, conduits, pipes and channels. Water flows through the dissolved openings in the rock.

In other areas water is filtered as it seeps through soil and sandstone, moving only a few feet in a week. In karst areas the water and any pollutants in it can dump directly into the limestone cracks and conduits and move miles in days. Most water wells in this area draw their water from layers of shale found within the Greenbrier limestone formation or from the MacCrady shale below it. Because it is so vulnerable to pollutants, much of the water flowing through open karst carries pollutants and is not suitable for drinking. Drilling wells through karst areas can create new pathways for polluted water to seep into potable (drinkable) water aquifers.

Scott Hollow Cave was discovered in 1984 in the Sinks Grove area. It has a network of over 28 miles of passages mapped so far. It is a contact cave, having formed in the Greenbrier limestone where it meets the MacCraday shale formation below it. Through its main stream passage, Mystic River, it drains an area of 14 square miles or more.

The Monitor Lineament, visible from space, is an over 4 mile long, straight line of sinkholes that probably formed on a fracture in the limestone.



Monroe County

Two tectonic plates collided around 260 million years ago. The St. Clair Fault, near the southeast boundary of the county, is the western limit of a broad collision zone that extends out to the middle of the piedmont of Virginia. That impact fractured the Greenbrier limestone and wrinkled it creating synclines (structural hollows) and anticlines (structural hills) that are not always visible on the surface. These affect how caves form and how water flows through the karst formation today.

North and west of the St. Clair Fault, the Greenbrier limestone formation is close to the surface in much of Monroe County. Swoopes Knobs is a remnant of the Bluefield shale formation that once covered it. In the far northeastern part of the county the limestone has been completely eroded away. In the southwestern area around Peterstown it is buried below the Bluefield and Hinton shale formations. A much older, Ordovician period limestone runs along Peters Mountain.

Ways to Protect Our Water

- Maintain woodlands along streams and rivers.
- Keep streams free from trash and pollutants.
- Avoid dumping in sinkholes.
- Clean out sinkholes that have been used for dumping.
- Create natural buffers around caves and sinkholes.
- Limit logging along streams, wetlands and steep slopes.
- Keep livestock away from streams, wetlands and sinkholes.
- Maintain septic systems every 2 years.
- Replace lawns with meadows and woods.
- Learn about your own watershed and water source.

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WV DEP programs support protection of water quality

To contact DEP, call either Water and Waste Management or the Environmental Advocate's office, both at 1-800-322-5530.

WV REAP (Rehabilitation Environmental Action Plan)
1-800-322-5530 or 304-926-0440 — <http://www.dep.wv.gov/dlr/reap>

REAP
Rehabilitation Environmental Action Plan



Sinkhole cleanup photo by Rocky Parsons

DO YOU HAVE A SINKHOLE OR OPEN DUMP YOU WOULD LIKE CLEANED UP?

The **Pollution Prevention and Open Dump Cleanup Program** (PPOD) uses landfill fees to clean up illegal dumps and to gather evidence to prosecute illegal dumping activity. The program reclaims, cleans up, and remedies open dump sites while minimizing or eliminating damage to the environment.

WOULD YOU LIKE TO VOLUNTEER TO PICK UP TRASH IN STREAMS OR ON HIGHWAYS?

The **WV Make It Shine Program** supports groups of volunteers, businesses, community organizations and local governments who want to clean up roadways and streams. DEP provides gloves, bags, hauling (in conjunction with the DOH), and landfill fees.

WOULD YOU LIKE TO MONITOR THE WATER QUALITY AT YOUR FAVORITE SPOT ON A CREEK?



The **Save Our Streams** program trains volunteers how to monitor their local wadeable streams and rivers. The program uses a biosurvey approach to stream study, which includes the collection and evaluation of macroinvertebrates and an assessment of the stream's physiochemical conditions.

For more information call 1-800-926-0499 or
<http://www.dep.wv.gov/WWE/getinvolved/sos>

Would you like to get more involved or would you like more information?

There are two watershed associations in Monroe County that are active in the preservation of the quality and quantity of Monroe County water.



Indian Creek Watershed Association:
<http://indiancreekwatershedassociation.org/>



Friends of THE Second Creek:
<http://secondcreekwv.tripod.com/>



Mayacon logo
by local artist Brian Dense

NSS is the country's premier caving organization, promoting environmentally and legally responsible cave exploration; maintaining working relationships with the federal, state and local governments for matters pertaining to caves and karst; and issuing scientific papers and books on cave related topics.

THE NATIONAL SPELEOLOGICAL SOCIETY CAVING CONVENTION

MAYACON 2012

June 25-29

Lewisburg and the Greenbrier Valley

- **Informative educational opportunities (many of them free) open to non-members are expected to include:**
 - A 3D slide-show
 - A presentation about bats and White Nose Syndrome
 - Many visual and audio art presentations
 - Thursday evening awards presentation
- **Workshops and sessions for members**

Information regarding the events that are available to the public will be released in the local media and on the NSS website (www.nss2012.com) in late spring and early summer.

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