
Michelle McGregor – Sr. Oil and Gas Development Advisor
Beth Wheatley – Director External Affairs
The Nature Conservancy
The Nature Conservancy

Overview of The Nature Conservancy’s Conservation Approach
• Energy by Design
  – Examples Appalachian Shale Gas Development Products
    • Energy Impacts Assessments
    • LEEP – Shale Infrastructure Siting Tool
• Conserving our Natural Assets

West Virginia’s Energy and Natural Assets - Key to Our Economic Future
Who We Are

We're working with you to make a positive impact around the world in more than 30 countries, all 50 United States and your backyard.

- Since 1951
- 3600+ staff, 700+ Scientists
- >1 million members

We've protected
- >119 million acres of land
- >5000 miles of rivers
- >100 marine conservation projects
Energy by Design

- **AVOID** conflicts between development impacts and areas of high biodiversity or conservation value

Where development occurs:

- **MINIMIZE** impacts as much as possible, using appropriate siting guidelines and Best Management Practices for operations

- **MITIGATE** impacts as appropriate (most common for wetlands)
Energy sprawl is (by far) biggest driver of habitat loss in the United States

Energy development is expanding into many areas that previously were not at risk

Significant opportunities for improved siting and mitigation

*Source: Fargione et al 2016*

**Some examples of TNC Science and Technology Based approaches to developing products and solutions for Energy Development**

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Energy Impacts Assessment Goals

• Using Science and Technology to Develop Products & Solutions for Energy by Design

• Visualize future energy development

• Highlight potential conflicts between energy development and other important values

• Initiate dialogue among industry, policy makers, NGOs, and public
1. **SPATIAL FOOTPRINT** of existing energy development:
   - 8.8 acres of forest directly cleared per well pad, on average (including associated infrastructure)
   - Additional 21.2 acres of new edge habitat per pad

2. **PROJECTIONS**: How much energy infrastructure might be developed by 2030 and where is it likely to occur?
   - 60,000 new wells drilled by 2030
   - 6,000 to 15,000 new well pads by 2030
   - 10,000 to 25,000 miles of new gathering pipeline by 2030
     - 1.6 miles of gathering pipeline per well pad

3. **NATURAL HABITAT IMPACTS** from development:
   - Forest habitat
   - Forest Fragmentation
   - Pathways for Invasive Species
   - Noise Pollution
   - Artificial Light
   - Brook trout
   - Rare species
Tools to Reduce Impacts

LEEP – Landscape Environmental Energy Planning Tool

The ArcGIS-based tool:

• Generates optimized layouts for shale oil/gas well pads, access roads, and gathering pipelines

• Incorporates existing environmental regulations and encourages exclusions and setbacks beyond regulatory minimums

Photo: Mark Godfrey - TNC
LEEP Applications

• Reduce surface impacts and minimize risks by going beyond regulatory compliance

• Identify optimized infrastructure layouts for many well pads at the same time

• Compare individual layouts in terms of environmental impacts and financial costs

• Site only linear infrastructure (with known pad locations)
LEEP Outputs: Comparing Layouts

Layout A

Layout B

Layout C

For each proposed infrastructure layout, the tool:

- Calculates environmental impact metrics
- Estimates development costs
LEEP Outputs

- Assesses trade-offs between environmental impacts and infrastructure development costs
Advancing the Next Generation of Environmental Practices for Shale Development

May 2015

Coordinated by:

• The Nature Conservancy
• Carnegie Mellon University
  ▪ Wilton E. Scott Institute for Energy Innovation
  ▪ Steinbrenner Institute for Environmental Education and Research

Supported by the Colcom Foundation
Workshop Overview

Workshop Goals

• Leverage cross-sector collaboration to tackle complex environmental challenge areas (listed on next slide)

• Increase visibility of available solutions and catalyze new ones

Workshop Report summarizes:

• ‘State of the Challenge’, in terms of current science, technology, practice, and policy for each challenge area

• Prioritized recommended solutions

Who Participated?
140 Energy Experts

Federal, State, and Local Governments from PA, WV, and OH

Oil & Gas Industry

Consulting Firms

Non-Governmental Organizations

Research Institutions

Foundations
Environmental challenges are massive in scale and have solutions that depend on multiple stakeholders and multiple disciplines all working in tandem with each other;

Knowledge gaps between stakeholders regarding current research, regulatory changes, and on-the-ground practices;

A number of environmental challenges associated with shale development are also relevant with other forms of energy and infrastructure development, with opportunities to learn across sectors; LANDSCAPE SCALE PLANNING AND SITING

Many solutions to a number of challenges already exist.
  - Example: Best-in-Class Operators and their standard operating practices and use of leading innovations. How to get broad adoption across the Industry. CSSD Standards as an Example
### Landscape Scale Planning and Siting Roundtable Participants 2016

- Anadarko
- Benedum Foundation
- Chevron
- Center for Sustainable Shale Development
- Clean Air Task Force
- CMU
- Colcom Foundation
- CONSOL
- Dominion
- Eckert Seamans
- Environmental Defense Fund
- EQT
- Local Government Academy
- Pennsylvania Environmental Council
- Range Resources
- Richard King Mellon Foundation
- Shell
- Southwestern Energy
- Tioga County, PA
- TNC
- Triana Energy
- Washington County, PA
- Williams Energy

*Roundtable organized by the Center for Sustainable Shale Development, The Nature Conservancy, and Carnegie Mellon University*
Siting Program Goals
(revised during 2nd Roundtable Discussion)

• **Promote responsible siting of shale infrastructure** that minimizes adverse local and landscape impacts to environmental and cultural resources.

• **Reduce the surface footprint of infrastructure development** through such actions as co-locating infrastructure (subject to legal and safety constraints), building cooperative relationships with municipalities and other entities, etc.

• **Integrate ecological and community considerations with geologic and economic factors** at the earliest possible planning stage. Consider a multitude of factors and determine how best to balance them in infrastructure placement decisions, based on regional context and site-specific conditions.
COMMUNITY

LAND

HABITAT

WATER

Categories
Why We're Successful

Everything we do is rooted in good science — aided by our hundreds of staff scientists.

We pursue non-confrontational, pragmatic solutions to conservation challenges.

We partner with indigenous communities, businesses, governments, multilateral institutions, and other non-profits.

We have the support of more than 1 million members who enable us to continue working on a scale that matters and implement solutions that endure.
1.2 MILLION West Virginia residents and nonresidents fished, hunted or wildlife watched in West Virginia in 2011.

Hunters in West Virginia spent $422 MILLION on retail sales.

Anglers and wildlife participants spent $429 MILLION and $326 MILLION respectively.
Healthy Human Communities

Ecosystem Services that Benefit People
- Public Health
- Carbon Sequestration
- Clean Water Supply
- Flood Control
- Mitigation

Sustainable Economic Development
- Nature Based Tourism
- Forest Products

High Quality of Life
- Cultural Continuance
- Recreation
- Scenic Landscapes

Healthy Natural Communities
- Forests
- Habitats
- Rivers and Streams
- Caves and Karst

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The Nature Conservancy in West Virginia

TNC Preserves Open to the Public

Other TNC Preserves & Conservation Easements

Lands Protected with TNC Help

National Forest Boundaries

With their donation of 3.4 acres of land in 1977, James and Harriet Murphy wanted to ensure there would always be a place where people could quietly study and enjoy nature. The 3.4-acre preserve is noted for its old-growth forests in a rolling topography of hills and coves, making it one of the highest-quality natural areas in Ritchie County.

 Hungry Beech

Protected with the help of the Garden Club of the state, this 2.6-acre preserve in Ritchie County has rich forested areas, historic hay fields along the ridge often a diverse edge habitat that is good for birdwatching. Heart and flowering plants make this preserve a spring wilderness garden.

 Brush Creek

Stone walls throughout its 2.7-acre preserve in Harper County extend from just below the falls of Brush Creek, down into a dramatic canyon to the Ohio River. A path leads through a forest noted for its diverse flora and superb birdwatching.

Craneville Swamp

The crane swamp is a 2.7-acre preserve located in Preston County, north of Elsion. It is found in a unique flat area surrounded by steep ridges, including a 200-foot drop that enters the swamp.

Ice Mountain

The 20.8-acre preserve is located in Berkeley County, north of the Potomac River. The Potomac Valley Audubon Society manages the property and encourages its use for quiet exploration, nature study, and education. It is a prime spot for birdwatching and wildlife viewing.

Mount Porte Crayon

This 10.9-acre preserve in southeast Pendleton County is on the north side of Mount Porte Crayon. It is the highest TNC preserve in the state and offers the best view of the Potomac River and the mountains surrounding it.

Upper Shavers Fork

This 1.2-acre preserves is located along the Shavers Fork in Randolph County, which is adjacent to the historical Cloud Mountain Club. It offers a unique opportunity to observe rare flora and fauna.

Mountainside Preserve

This 1.2-acre preserve in Mineral County offers views of the Potomac River and is ideal for birdwatching.

Barb Rocks

Providing spectacular views of the Allegheny Mountains, this 1.2-acre preserve in Preston County has a mountainous landscape with a great view of the surrounding mountains.

Pike Knob

Noted for its remarkable beauty, this 1.2-acre preserve is located at the base of North Fork Mountain in Pendleton County. It is the highest TNC preserve in Pendleton County and offers views of the Potomac River.
Tourism to national parks of Southern West Virginia created $64.1 million in economic benefits in 2015
Conservation Hub

- Economic Activities
  - Forestry
    - Renewable Energy Production
  - Agriculture
  - Restoration
  - Tourism & Local Use
    - Skills Training
    - Education & Outreach
    - Demonstration Research
    - Regional Marketing
  - Regional Marketing

- Programming
  - Non-Timber Forest Products
  - Ecological Services
    - Outdoor Recreation
    - Soil Remediation
    - Wildlife Watching
    - Timber
    - Hunting & Fishing
    - Wind
    - Solar
    - Food Crops
    - Animal Husbandry
    - Plant & Wildlife Habitat
    - Carbon Sequestration
    - Clean Water
    - Clean Air
    - Flood Mitigation
    - Community Enjoyment
Thank you!

michelle.mcgregor@tnc.org
ewheatley@tnc.org

Photo Credit: © Penn State Outreach and Online Education, Marcellus Shale photo album, Gas rig, via Tom Murphy