Appalachian Community & Ecosystems Health Collaborative Summit

April 10 – 12, 2011

Facilitation Services Provided by the Facilitation Center at EKU
www.facilitation.eku.edu
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<td>Erin Haynes</td>
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<td>Michael Hendryx</td>
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Meeting Facilitators

Karen Russell  
Facilitation Center at EKU

Stefanie Ashley  
Facilitation Center at EKU

Research Audience

Participants discussed the various audiences for the identified research, which included:

**Audiences of Community Based Research:**
- Businesses
- Coal companies
- Community
- Faith-based groups
- Funding agencies
- Healthcare providers
- Judges/attorneys (unbiased studies)
- Media
- Policymakers
- Regulators
- Researchers

Research Background

The group identified the following key background facts:

1. **The research would be:**
   - Community Based Research
   - Peer Reviewed Research that can be used for dissemination into the communities

2. **Who are we doing research with?**
   - Communities of interest
   - Geographic communities
Theme Team 1: Cradle to Grave Resource Contaminant Assessment

Team Members

Bill Orem (Team Leader)
Jen O’Keefe
Scott Simonton
Calin Tatu

Original Questions

Below are the original questions identified by participants as potential research questions, based on online submissions prior to the event, as well as, participant additions and edits made on April 11, 2011.

a. Fate and transport of contaminants after release. Collect data and create databases of potential natural pollutants. This role belongs to the earth and biological scientists.

b. How do polyacrylamides degrade over time in coal prep?

c. Do we understand the relationship between increased conductivity and ecological health?

d. GAP: Information availability to de-bunk the ‘clean coal’ myth.

e. What toxicological research (for chronic and/or acute exposure) already exists from other communities with the same or similar industrial exposures that may apply to coal mining communities?

f. Complete siting of existing coal ash fills; including surface mine sites backfilled with coal ash and deep well injections, and analysis of their impact on groundwater.

g. Complete siting of coal slurry deep well injection sites and analysis of their impact on groundwater.

h. Complete siting of coal sludge dams and their impact on community safety.

i. Is there a definition of “clean coal” that encourages better methods of extraction?

j. Impacts to Appalachia from global climate changeNeo-formed contaminants from fire-impacted AML’s and gob-burns.

k. Impact of coal combustion (mine fires, esp.) on global greenhouse gas levels.

l. Impacts of mining, transport and combustion on air quality.

m. Air quality/health impacts from dust-expanded studies.
Revised Questions

The theme team was asked to make more specific edits and finalize the questions that will be added to the research agenda. Questions were prioritized by the team and are listed in priority order for the final research agenda.

1. How do point sources from resource extraction/beneficiation/transportation/utilization activities impact air quality and health?
2. How do point sources from resource extraction/beneficiation/transportation/utilization activities impact water quality and health?

Prioritization Criteria

The theme team was asked to identify the criteria they used to prioritize their research agenda questions. The criterion used by this team was:

1. What could have the greatest impact on people?
2. What do we know least about?
3. What can you “sell” to a funding agency?

Existing Research/Data, Gaps & Resources

1. How do point sources from resource extraction/beneficiation/transportation/utilization activities impact air quality and health?

Existing Research/Data:

- Little to none
  - A little epidemiological data
  - Black lung
  - National Institute for Occupational Safety & Health/Occupational Safety & Health Administration/Mine Safety & Health Administration limits

Gaps:

- Many and wide
  - Coal transport
  - Deep mine ventilation
  - Load out/docks
  - Mine/gob fires
  - Mountain top removal
  - Prep plants
- **Needs**
  - Particle size & concentration
  - Particle type speciation
  - Acute vs. chronic exposure levels
  - Plume size & volume distribution

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2. How do point sources from resource extraction/beneficiation/transportation/utilization activities impact water quality and health?

**Existing Research/Data:**
- AMD
- ATSOR
- KY Project WET materials
- Published stream data – USGS, NSEPA metal chemistry
- Watershed watch data

**Gaps:**
- Ash disposal
- Changed hydrodynamics of valley fills
- Fire mineral/tar leachate
- Fracking  
  - Hydro  
  - Nitro/sand
- Produced waters  
  - O & G  
  - Mining
- Slurry disposal

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Teams were asked to develop an action plan for their project(s), which are outlined below.

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<th>Proposal Status</th>
<th>Question</th>
<th>Action Step</th>
<th>Who will Lead?</th>
<th>Who will Assist?</th>
<th>Target Completion?</th>
<th>Support &amp; Resources</th>
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| Done (?)        | 1        | Air 1uality monitoring – Prep plants | WVU/USGS  
- Mike Hendryx  
- Bill Orem | 2013 | Community involvement  
- Epidemiology  
- Sampling Access  
- Local Health Professionals |
| Done            | 1        | Coal fire emissions monitoring – KY & WV | UK- CAER  
- Hower  
- MSU  
- O’Keefe | 2015 | None at moment  
- KYSGC funding just ended  
- NSF funding “pending…”  
- Looking for more!  
- Epidemiological studies |
| Done (?)        | 2        | Coal slurry injection | Ben Stout (?) | Ongoing – access issue | Access**  
- Community involvement – access to wells |
| (?)             | 2        | Fracking | EPA  
- Troy Jordan,  
304-234-0261,  
jordan.troy@epa.gov | Ongoing – access issue | Access**  
- Community involvement – access to wells |
| Done            | 2        | Stoker Ash Chemistry and Leaching Behavior | MSU  
- J. O’Keefe/Coker | 2012 | USGS NCRDS through Aug 2011  
- NEED Community access to ash fill sites & water wells  
- Epidemiological studies |
| To write        | 1        | Air Quality Monitoring  
- Transportation Sites  
- RR’s  
- Docks, etc. | Scott Simonton | 2015 | |
| Adapt from existing for KY | 1        | Coal fire emissions monitoring – WV | Jen O’Keefe (?) | 2015 (?) | Access**  
- & WV collaboration |
| Not Started     | ½       | Database of existing information |  | ASAP | Someone to do it! |
Below are the additional notes made by the team as they processed information:

**Data Gaps:**
- Air quality association with mining, fires, transport, combustion
- Ash pond-bourne contaminants
- Beneficiation – caused/sourced contaminants
- Coal fires emissions (natural)
- Dust exposures/MTR
- Hydrofracking/nitrofracking
- O & G production and produced waters
- Slurry-bourne contaminants
Theme Team 2: Creating Diverse Economies That Sustain Communities

“We must win the jobs and economy debate in order to win the health debate.”

Team Members

Nancy Reinhart (Interim Team Leader)
Sam Adams
David Carrier
Mary Ellen Cassidy
Aimee Erickson
Jill Kriesky
Rebecca Roth
John Rausch
Roy Silver

Original Questions

Below are the original questions identified by participants as potential research questions, based on online submissions prior to the event, as well as, participant additions and edits made on April 11, 2011.

a. Current and future value of Appalachian water supply (price, natural value, etc.).
b. How can alternative economic development opportunities be developed for coal communities?
c. How do funding trends for environmental protection reflect on or relate to health?
d. Gap: Revocation of status of corporations as equal to individuals in a court of law.
e. Impact of economy due to coal mining. - Of the "coal counties" in Central Appalachian region, these counties are traditionally the poorest and least developed, economically, in the state. How is coal mining helping the economy in these counties? Other than providing jobs, the economy hasn't made significant improvements. Even with the provided jobs, economical development hasn't shown improvement.
f. Research: Promotion of research, economic incentives, and applications of ‘alternative energy’ for industry as well as citizens. Re-think the label of ‘alternative’ to include ‘supplemental’.
g. Political barriers blocking development of alternative economies – moving beyond the mono-extraction-economy.
h. Analysis of successful economic shifts away from individual mono-extraction-economies toward sustainable, expansive multi-economies.
i. Can cleanup of existing pollutants generate money to help pay for itself? (Example: Iron Oxide)
j. If (2d) “Is there a definition of “clean coal” that encourages better methods of extraction?” is moved to a different theme, then this group should still deal with the apparent inability of our political representatives to distinguish between less socially-responsible extraction companies and more socially responsible extraction companies. This inability (or deliberate obfuscation) prevents political appointees in environmental agencies from performing enforcement duties.
k. Make solar, wind, geothermal, etc. energy sources the base or primary energy sources. Gas, coal, etc. become secondary or alternative sources.

l. Establish a mandatory heritage fund for alternative (sustainable) development.

m. True cost of coal?

n. Peak coal.

o. How do you replace dec. coal?

Revised Questions

The theme team was asked to make more specific edits and finalize the questions that will be added to the research agenda. Questions were prioritized by the team and are listed in priority order for the final research agenda.

1. How do you create a sustainable* and diverse economy in the region/in regional communities? What will create the most sustainable* jobs?
   * By sustainable, we mean creating businesses and jobs that offer competitive wages are healthy and, in some cases, would address existing problems resulting from the existing extraction economy. Sustain place and people. Social wages.

2. What is the feasibility and impact of renewables and efficiency in the region / in regional communities?

3. What is the true cost of coal?

4. What is “peak coal”?

5. What do people think and know about these issues? (region-specific polling and opinion research)

Prioritization Criteria

The theme team was asked to identify the criteria they used to prioritize their research agenda questions. The criterion used by this team was:

- Gives information that community members want/need
- Most influential to (federal, state, local) key legislators and decision-makers
- Is solutions-oriented
- Can be framed in economic terms that respond to the needs of community members (identify costs, benefits, bust myths, diversification)
- Elevates the link between social determinants of health/ health outcomes and the economy
Existing Research/Data, Gaps & Resources

1. How do you create a sustainable* and diverse economy in the region/in regional communities? What will create the most sustainable* jobs?

Existing Research/Data:
- Regional
  - ARC study – “energy workforce trends and gaps in Appalachia”
  - U of K – impact of training on job training versus industry tax breaks
  - Land ownership study
- National
  - Tupelo study – Vaughn Grisham
  - Department of Labor – industries with largest job creation

Gaps:
- Updated land ownership study
- Lack of study on businesses with fewer than 50 employees

Resources:

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**Action Plan:**
*Teams were asked to develop an action plan for their project(s), which are outlined below.*

- Assess regional assets
- Study international best practices for small and large-scale economic models, including best models for incentives (i.e. heritage fund) and jobs and recommend those that would be most viable in this region/in regional communities
- Examples could include – tourism, agriculture, etc.
- Analysis existing obstacles (economic incentive structure, education, etc.)
- Consideration of benefits of these economic models, including health and wellbeing benefits
- Identify policy recommendations flowing from these questions

2. **What is the feasibility and impact of renewables and efficiency in the region/in regional communities?**

**Existing Research/Data:**
- Regional
  - Downstream Strategies Kentucky study on small-scale renewables
  - ARC – potential for efficiency and job creation in Appalachia
  - META analysis by Georgia Tech
  - Solar studies in Ohio
- National
  - NRDC on state based job potential
  - Pew study on state based job potential
  - Apollo Alliance
  - McKenzie

**Gaps:**
- Localized wind patterns in Kentucky (non-proprietary)
- Job potential of small-scale projects
- Distributed energy potential in WV

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**Action Plan:**

*Teams were asked to develop an action plan for their project(s), which are outlined below.*

- Identify feasibility and job potential, micro and macro
- Study international best practices in this area and make recommendations suitable to the region, considering cost-benefit ratio/risk analysis
- Explore the technical issues in regular terms (bust the myths that it won’t work)
- Recommend economic incentives to capitalize on the potential
- Consideration of benefits, including health and wellbeing benefits (i.e., benefits of widespread residential retrofits)
- Identify policy recommendations flowing from these questions

### 3. What is the true cost of coal?

**Existing Research/Data:**

- **Regional**
  - Downstream Strategies and MACED reports on economic costs
  - Hendryx studies on health

- **National**
  - National Academy of Sciences
  - Harvard study – full accounting of the cost of coal
  - NRDC and MIT study
  - Sierra Club study
  - Greenpeace study
  - PSR health study

**Gaps:**

- Hendryx-type health cost studies in Kentucky
- Occupational health and safety studies specific to the region
- More complete economic analysis – assessment of the full costs of permitting, what are the companies paying for this process

**Resources:**

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<td>True Cost of Coal Ken Ward</td>
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Action Plan:
Teams were asked to develop an action plan for their project(s), which are outlined below.

- What research exists?
- Identify the gaps in research – all costs, including region-specific occupational and community costs
- What are the top priorities for going forward?
- Identify opportunity costs in every area

4. What is “peak coal”?

Existing Research/Data:
- Regional
  - USGS study – national coal assessment
  - Coal associations
  - Appalachian voices
- National
  - Energy Information Administration
  - Coal associations
  - Energy watch group

Gaps:
- Comprehensive review of existing research and understandable and comparable (apples to apples) comparison; possibly new studies needed given changing recent conditions

Resources:
None identified at this time.

Action Plan:
Teams were asked to develop an action plan for their project(s), which are outlined below.

- Clarify and distill existing research
- Identify if additional research or estimations are needed given the current changing economic and regulatory conditions
- Explain the potential implications of peak coal for the region, both in economic and in social / community terms
- Reconcile this with industry estimations
5. What do people think and know about these issues? (region-specific polling and opinion research)

Existing Research/Data:
- Regional
  - Kentucky – Opinion Resource Corporation
- National
  - Resource Media study

Gaps:
- Professionally administered and designed survey throughout Central Appalachia

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Action Plan:
*Teams were asked to develop an action plan for their project(s), which are outlined below.*

- The future of the region
- Energy and coal
- Renewables and efficiency
- Jobs
- Health and well-being
- Effective messages
Below are the additional notes made by the team as they processed information:

**Additional Overall Actions:**

- Look into whether there are other green alliances in Appalachia and ask them if they have information that we could use: Mary Ellen

- Determine what the next steps are over email – possibly schedule a call within a month, check-in call one time per month: Nancy will email to schedule

- Possible long-term steps:
  - Divide up questions and information gathering if we feel like there is a vision for this
  - Recruit others to get involved
  - Send larger group quarterly updates about our group progress
  - Meet again at next year’s ASA conference and update the research agenda at that point

**What do we think about the next meeting/iteration of this collaborative is?**

- We do think it would be useful to continue a connection

- Consider making this connected to next year’s ASA conference

- Small group meetings by Skype in the interim

**Support and resources we need:**

- We need a better understanding about whether a collaborative, shared, accessible database/information space is possible and fund-able. If yes, an answer to whether the home for this is the conference website.
Theme Team 3: Exposure Pathways & Health Consequences

Team Members

Team Leader Unknown
Diane Anestis
Elizabeth Crowe
Flow Fulk
Erin Haynes
Michael Hendryx
Bev May
Chris Ray
Joe Stanley
Ted Withrow

Original Questions

Below are the original questions identified by participants as potential research questions, based on online submissions prior to the event, as well as participant additions and edits made on April 11, 2011.

a. LOOK INTO GAS DRILLING HEALTH CONSEQUENCES.

b. Develop conceptual map of health outcomes.

c. Does air/water pollution cause cancer, heart disease, etc.?

d. Understanding "Cancer Hollers" and what causes them.

e. Proximal and distal determinants of health in Appalachia.

f. Should floods & droughts be considered major health impacts?

g. How to move from correlation to causation with specific diseases in mining environments?

h. Which pollutants might be the causative factors for the following: Does pollution cause or exacerbate mental illness? Is there a higher rate of mental illness in areas with greater pollution in the water and/or air?

i. Stress – Class & Coal.

j. Coal slurry pathway study (federal/nationally funded – not conducted by state).
   • Where does it go and how does it impact health when exposure occurs?

k. Address all lifecycle impacts of energy production from lifecycle coal in Central Appalachia.

l. What are the health impacts of legacy mining pollutants and active mining pollutants affecting water quality – how do you determine what activity causes health effects when communities have been exposed to contaminated water for decades?

m. What study populations (age) are best to research for the greatest health significance? Most susceptible populations.
n. How can we use qualitative and quantitative research to understand disproportionate impacts of persistent, toxic chemicals in our region? Especially from exposure through products, manufacturing.

o. Use available science to follow toxic chemicals thru the environmental stream to include chemicals whose parent compounds may not be toxic but they have toxic products.

p. Potential radiation exposure to environment and human population from (Marcellus Shale [broaden]) gas development.
   - How do we quantify/regulate?

**Revised Questions**

*The theme team was asked to make more specific edits and finalize the questions that will be added to the research agenda. Questions were prioritized by the team and are listed in priority order for the final research agenda.*

1. What are children exposed to?
2. How are they exposed?
3. What is the dose? (BIOMARKER)
4. What are the health consequences?
5. What are the critical exposure windows?
6. What are the additive synergistic effects?

**Prioritization Criteria**

*The theme team was asked to identify the criteria they used to prioritize their research agenda questions. The criterion used by this team was:*

- Political influence
- Funding
- Community engagement
- Research gap
- Topic population: children; elderly
- Multiple exposures
- Funding available?
- Long time frame
Existing Research/Data, Gaps & Resources

Existing Research/Data:
- Stream data
  - EPA/USGS water data
- Birth data
- Test scores
- Developmental disability rates
- Health departments?
- WIC?
- Wilma Subra & Theo Colborn
  - Gas Drilling Health Impacts in West & Texas

Gaps:
- Individual level exposure, dose and outcome

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<td></td>
</tr>
<tr>
<td>KFTC</td>
<td>OVEC</td>
<td>Keyser</td>
<td></td>
</tr>
<tr>
<td>KEF</td>
<td>WVU</td>
<td>NIGH</td>
<td></td>
</tr>
<tr>
<td>U Cinn</td>
<td></td>
<td>Others with Children’s Focus</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passport Foundation (KEF)</td>
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</tr>
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<td></td>
<td></td>
<td>Environmental Justice</td>
<td></td>
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<tr>
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<td>NIH Health Disparities</td>
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</tr>
</tbody>
</table>
Action Plan

Teams were asked to develop an action plan for their project(s), which are outlined below.

<table>
<thead>
<tr>
<th>Action Step</th>
<th>Who will Lead?</th>
<th>Who will Assist?</th>
<th>Target Completion?</th>
<th>Support &amp; Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write NIH Grants</td>
<td>Erin H., et. all</td>
<td>M. Hendryx, KEF, CRMW, OVEC, KFTC, USGS(?)</td>
<td>June 2011 October 2011</td>
<td>Community recruitment</td>
</tr>
<tr>
<td>Preliminary data analysis</td>
<td>M. Hendryx, et. all</td>
<td>Erin</td>
<td>May 2011</td>
<td>Money for hair analysis (70x20=1,400)</td>
</tr>
<tr>
<td>Analyze existing data (children)</td>
<td>M. Hendryx, et. all</td>
<td>Grad student</td>
<td>Paper and public document by end of 2011</td>
<td>Mental Health advocacy group (KEF)</td>
</tr>
</tbody>
</table>
| Create public summary document of existing research     | M. Hendryx, KEF to coordinate other community organizations on briefing organizing strategies on health reports | • U Cinn  
• NIEHS Center  
• App Voices  
• Elizabeth HIA Bibliography  
• ATSDR | October 2011  
○ before election  
Bibliography, April 2011 | About $2,000 for each organization |
| Literature search: human health and the life cycle of coal | Published, peer reviewed, Flo’s chart, Diane, Chris | | September 2011 | |
| Investigate Biomonitoring – cord blood, etc. Conference Call | M. Hendryx & E. Crowe | | May 2011 | |
| Repeat for gas toil                                     |                        |                        |                          |                                           |

Notes

Below are the additional notes made by the team as they processed information:

- Effective communication
- Exposure pathways: water, air, food, products, soil
- Think about short-term research
- Use existing data (e.g., EPA or USGS water quality data, or ARC)  
  ○ Link Stream Data to LBW or Test Scores
- We can identify the impacted streams, plus link to water plants – use this to identify areas to sample children – blood, hair, testing, water
Theme Team 4: Emerging Methodology/Research Infrastructure

Team Members

Patricia Feeney (Team Leader)
Evan Anderson
Katie Brown
Cynthia Cole
Liz Knapp
Deborah Payne
Cindy Rank

Original Questions

Below are the original questions identified by participants as potential research questions, based on online submissions prior to the event, as well as, participant additions and edits made on April 11, 2011.

a. Cheap “red flag” tests that focus or target further studies for air quality, water quality & health.

b. How can community-based research gain credibility through collaboration with academics and vice versa?

c. How to move from correlation to causation with specific diseases in Appalachia.

d. Who can develop new epidemiological approaches to deal with the small sample size problem?

e. Create a web site for distribution of scientifically researched topics on the issues at hand.

f. There is a gap in knowledge regarding how other nations address the question of community-based research to answer society’s science-based questions. Need for research on the international model of “science shops” which help community members collaborate with independent and university-based researchers to design community-based, participatory research. (See for example: http://www.scienceshops.org/).

g. Need for a continually-updated online database of funding sources for research on these subjects.

h. Methods and Workforce.

i. What are the opportunities for “Green Chemistry” (a non-toxic chemical industry) research regarding petrochemicals and manufacturing and clean-up – less toxic emissions and exposures? (Elizabeth Crowe)

j. How can we use Precautionary Principle and Alternatives Assessment methodologies to shift burden-of-proof and more easily identify solutions. (Elizabeth Crowe)

k. Community outreach beyond (in addition to) a website.

l. Research by whom and for whom, and to what end (e.g., policy change, scientific understanding, political action, legal defense, etc...).

m. Communication: Know the audience and language, easily digestible/understandable; variety of “media”.

n. Human Health Status BIOMARKERS?

o. Develop systems to increase workforce (e.g., students at all levels are required to learn research methods doing studies in and with communities. Make results available through Internet.
Revised Questions

The theme team was asked to make more specific edits and finalize the questions that will be added to the research agenda. Questions were prioritized by the team and are listed in priority order for the final research agenda.

1. How can “Red Flags*” (e.g. biomarkers, etc.) be used to identify research priorities of community concern and significance?

2. How can we develop new methods which address health concerns of small communities of small sample size? (e.g. cancer hollars)

3. How can we achieve broad based input in setting our research priorities so that findings are relevant to improving public, ecological and human health?**

4. How can we disseminate research findings to effect change among diverse stakeholders?***

* Screening tools for ecological and/or human health.
** Will be included in the process for each question.
*** This will be a component of each question.

Prioritization Criteria

The theme team was asked to identify the criteria they used to prioritize their research agenda questions. The criterion used by this team was:

- Broad-based inputs
- Faster feedback
- Local impacts
1. How can “Red Flags*” (e.g. biomarkers, etc.) be used to identify research priorities of community concern and significance?

**Existing Research/Data:**
- Bucket Brigade (Air Quality)
- Isaac Walton League (H2O) (Pennsylvania)
- Syndromic Surveillance (H1N1)
- Mountain Stream Monitors
- River Keepers
- Strip Dip Testing
- Selenity Testing
- Community Health Assessments
- Cell Phone Collection Methods (an “App for that”)
- Patient Screening
- Biomonitoring
- Invertebrate (Species) Indicators
- Analysis of Community Billings Codes for Health Conditions

**Gaps:**
- Affordability
- Inaccessible or unavailable tests
- Lack of knowledge about indicator contaminants
### Resources:

<table>
<thead>
<tr>
<th>People</th>
<th>Organizations</th>
<th>Funding</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>University researchers</td>
<td>Local 501(c)3’s</td>
<td>NIH</td>
<td>Private Sources</td>
</tr>
<tr>
<td>Toxicologists</td>
<td>Occupational Health Practitioners</td>
<td>Venture Capitalists</td>
<td></td>
</tr>
<tr>
<td>Community Health Centers</td>
<td>Health Providers</td>
<td></td>
<td></td>
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<tr>
<td>Manufacturers</td>
<td>Manufacturers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>What do they know about their products and testing their impacts?</td>
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<tr>
<td>State Agencies</td>
<td>State Agencies</td>
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<tr>
<td>Research Foundations</td>
<td>Research Foundations</td>
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</tr>
</tbody>
</table>

2. **How can we develop new methods which address health concerns of small communities of small sample size? (e.g. cancer hollars)**

**Existing Research/Data:**

- **Example:**
  - Vision 2020 – Perry County, KY (small community)
  - P32 – Pittsburg, PA, grant program at NIH (broad-based)

- Community Action for Renewed Environment (CARE) Grant Structure
  - Lead by community, business participation, government sign-on

- NIEHS – Environmental Justice
  - Putting methods into action

**Gaps:**

- Add community members to research review panels
- Community advisory groups
- Community surveys to identify needs
- Need paradigm shift from lab research to service learning
3. How can we achieve broad based input in setting our research priorities so that findings are relevant to improving public, ecological and human health?**

**Existing Research/Data:**
- Small Area Size Methodology
- Bucket Brigade (Air Quality)
- Isaac Walton League (H2O) (Pennsylvania)
- Syndromic Surveillance (H1N1)
- Mountain Stream Monitors
- River Keepers
- Strip Dip Testing
- Selenity Testing
- Community Health Assessments
- Cell Phone Collection Methods (an “App for that”)
- Patient Screening
- Biomonitoring
- Invertebrate (Species) Indicators
- Analysis of Community Billings Codes for Health Conditions
Gaps:
- Catalyzing people to develop methodology
- Publicize issue to get existing researchers on board
- Can we use lawyers/former lawsuits to encourage companies to open their pooles on releases
- There are multiple difficulties in identifying toxic exposures that affect Human Health in small areas; we need new epidemiological methods that Involve Epidemiologists, Statisticians, Qualitative Researchers

Resources:

<table>
<thead>
<tr>
<th>People</th>
<th>Organizations</th>
<th>Funding</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Agencies (?)</td>
<td>Universities (?)</td>
<td>Lawyer</td>
<td>Wording to federal research agencies should be “There is Significant Value in Small Sample Size Research”</td>
</tr>
</tbody>
</table>

4. How can we disseminate research findings to effect change among diverse stakeholders?***

Existing Research/Data:
- Government reports
  - President’s report on cancer
- Public radio/talk radio
- Trainings for researchers in communicating/pitching their work to everyday people
- School Air Toxics Program (EPA – online and in schools sharing information)
  - “Democratizing Data”
- Community members presenting alongside researchers at conferences, etc.
- NIEHS evaluating models for disseminating information
- Community campus partners for health
- Promoters – Lay Community Health Workers
- Facebook/Twitter
- Community art
Gaps:
- Prepare scientists and community members for joint activities
- Qualitative research
  - Where and how people get their information
- How people use that information
- How many times must they hear/be exposed to information before acting
- What is the best way to involve businesses

Resources:

<table>
<thead>
<tr>
<th>People</th>
<th>Organizations</th>
<th>Funding</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Children’s Theater</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Action Plan

Teams were asked to develop an action plan for their project(s), which are outlined below.

<table>
<thead>
<tr>
<th>Action Step</th>
<th>Who will Lead?</th>
<th>Who will Assist?</th>
<th>Target Completion?</th>
<th>Support &amp; Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define red flag tests along the line of the coal process from extraction to burning and other extractive tests for both human health and ecosystems • Include affordability/cost • Who’s currently using the test</td>
<td>Deborah Payne</td>
<td>Group 8 – Water, Cindy Rank, EPA, Ben Stout, Doug Wood, Petra Wood, Flo, David Ryder</td>
<td>April 29, 2011</td>
<td>See two groups who will assist</td>
</tr>
<tr>
<td>Literature search on research gap and challenge</td>
<td>• Evan Anderson</td>
<td>• Tricia Feely</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Tricia Feely</td>
<td>• Tricia Feely</td>
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<tr>
<td></td>
<td>• Mary Ellen Cassidy</td>
<td>• Steve Browning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Michael Hendryx</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify methods experts working on this issue</td>
<td>• Evan Anderson</td>
<td>• Tricia Feely</td>
<td>May 13, 2011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Tricia Feely</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flush out stakeholder for dissemination based on table and red flags</td>
<td></td>
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</tr>
</tbody>
</table>
Notes

Below are the additional notes made by the team as they processed information:

- Funding – (centralized database source)
- Development of “red flag” tools
- Different methods of research
  - Participatory Research with students, others in community
  - Development of “red flag” research methods
  - Method development for small sample sizes
  - Appropriate community language/methodology, tools
- Appropriate information distribution
- Good knowledge transfer
  - Paradigm shift
  - Community ↔ Scientists
- Keep research pertinent to scientists and community members
- Shift focus to precautionary principle
Theme Team 5: Social Behavioral Determinants of Health and Environmental Effect on Social Health of Appalachia

Team Members

Bill Price (Team Leader)
Melanie Adams-Johnson
Maria Bunnoe
Todd Garland
Joel Halverson
Phil Obermiller
Luther Payne
Diana Richardson
Lorelei Scarbro
Tanya Turner
Stephanie Tyree

Original Questions

*Below are the original questions identified by participants as potential research questions, based on online submissions prior to the event, as well as, participant additions and edits made on April 11, 2011.*

a. How can we respect the attachment to place with environmental degradation in Appalachia?

b. What are the social determinants of health in Appalachia?

c. What are the psychological effects/mental health costs of environmental degradation on the people of Appalachia?

d. Identify synergisms among social habits (e.g. smoking, alcohol, etc.) and potential, naturally occurring pollutants with respect to human health. This role belongs to the medical/toxicology specialists.

e. Emotional implications.

f. How does the industry of coal mining affect the social health of the Appalachian communities in which it takes place? Does the presence of the industry affect diversity of vocational opportunities, community infrastructure and public space, gap between social classes, access to education, level of social or civic involvement of citizens, crime rates, or general morale of community members?

g. How does the migration of young people out of coal communities affect the remaining population?

h. Does pollution cause or exacerbate mental illness? Is there a higher rate of mental illness in areas with greater pollution in the water and/or air?

i. How do social factors (loss of land, destruction of streams and beauty, dissension among people in a community) related to poor environmental practices affect mental health?
j. What do the citizens of Appalachia really want? There is little study based on the actual needs of community members. There is little study by way of interviews, storytelling, and documentation of the people directly and immediately impacted by resources extraction in the region. Systematic interviews and documentation (audio/video) should be used to capture the voice of the people, to truly understand their needs from their perspectives, not just the scientists, policy makers, activists and so on.

k. Understanding the relationship between population/economic disparity and environmental disparity!

l. Preventative/positive factors of Appalachian health – contributes to understanding of what is being lost (i.e., social capital, etc.).

m. How does the out-migration of Appalachian youth affect them and their new community?

n. This whole effort in determining research questions needs input from anthropologists. 6E (Emotional Implications) is perhaps the most important research question among all in all themes because it integrates social issues with environmental issues with political issues. QUESTION: How can we empower citizen voters within Appalachia to defeat, (within the political arena) powerful corporate interests who have equal standing in legal processes. While wielding unlimited monetary power in those legal processes and unlimited financial power in the political process (campaign contributions can be unlimited thanks to U.S. Supreme Court).

o. Children Health Issues?

**Revised Questions**

*The theme team was asked to make more specific edits and finalize the questions that will be added to the research agenda. Questions were prioritized by the team and are listed in priority order for the final research agenda.*

1. What are the physical and mental health impacts on children from pre-natal through adolescents in heavy extraction areas?

2. How does the out-migration from coal communities affect the remaining population and those who have left?

3. How does the tension between the attachment to place in Appalachia and the destruction of that place impact the health of residents (both those who stay and who leave)?

**Remaining Questions Not Prioritized**

- How does the industry of coal mining affect the social health of the Appalachian communities in which it takes place? Does the presence of the industry affect diversity of vocational opportunities, community infrastructure and public space, gap between social classes, access to education, level of social or civic involvement of citizens, crime rates, or general morale of community members?

- What are the psychological, emotional and mental health impacts of environmental degradation on the people of Appalachia?

- Are there higher instances of adverse social behavior (smoking, alcohol abuse, drug abuse, obesity, etc.) in areas impacted by the cycle of coal?

- What are the social and health costs of the loss of sustainable communities due to extractive industries?
Prioritization Criteria

The theme team was asked to identify the criteria they used to prioritize their research agenda questions. The criterion used by this team was:

- Politically relevant
- Root issues & systemic causes
  - Achievable
- Politically impactful
- Urgency of health impacts (full spectrum)
  - Cross-generational
  - Related to particularly vulnerable populations in Appalachia
  - Engages community

Existing Research/Data, Gaps & Resources

1. What are the physical and mental health impacts on children from pre-natal through adolescents in heavy extraction areas?

Existing Research/Data:

- None Known
- The National Children’s Study
- Lead Study EPA/CDC

Gaps:

None identified at this time.

Resources:

<table>
<thead>
<tr>
<th>People</th>
<th>Organizations</th>
<th>Funding</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruth Ann Shepherd</td>
<td>March of Dimes</td>
<td>Annie Casey Foundation</td>
<td>Kids Count</td>
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<tr>
<td>Steve Davis</td>
<td>ARH</td>
<td>Foundation for Healthy Kentucky</td>
<td>YBRSS</td>
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<tr>
<td>Renate Poore</td>
<td>Free Health Clinics</td>
<td>RWJF</td>
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<tr>
<td></td>
<td>Healthy Kids Coalition</td>
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</tbody>
</table>
2. How does the out-migration from coal communities affect the remaining population and those who have left?

**Existing Research/Data:**
- 50-60’s Era “Great Migration”
- 70’s migration
- Ron D. Eller
- Chad Berry
- Phil Obermiller (2000 Census)
- Bill Turner

**Gaps:**
- What happened to the donor community?
- Personal stories
- Young adult

**Resources:**

<table>
<thead>
<tr>
<th>People</th>
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<th>Funding</th>
<th>Miscellaneous</th>
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<tr>
<td>Ron Eller</td>
<td>S.T.A.Y.</td>
<td>ACF</td>
<td>2010 Census</td>
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<td>Chad Berry</td>
<td>Highlander</td>
<td>ARC</td>
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</tr>
<tr>
<td>Bill Turner</td>
<td>Center for Rural Development</td>
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<td>Phil Obermiller</td>
<td>ARC</td>
<td></td>
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<tr>
<td>Ada Smith</td>
<td>AR</td>
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<td>App Centers</td>
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<td></td>
<td>D.S. Strategies</td>
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</tbody>
</table>
3. How does the tension between the attachment to place in Appalachia and the destruction of that place impact the health of residents (both those who stay and who leave)?

**Existing Research/Data:**

*None known at this time.*

**Gaps:**

*None identified at this time.*

**Resources:**

<table>
<thead>
<tr>
<th>People</th>
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<th>Funding</th>
<th>Miscellaneous</th>
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</thead>
<tbody>
<tr>
<td>Joel H.</td>
<td>County and State Health Departments</td>
<td>ARC</td>
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<tr>
<td>Pat Beaver</td>
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<td>Benedum</td>
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<td>Melinda Wagner</td>
<td></td>
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<tr>
<td>Susan E. Meefe</td>
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<td></td>
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</tr>
<tr>
<td>Dustin White in reference to existing study</td>
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</tbody>
</table>
### Action Plan

*Teams were asked to develop an action plan for their project(s), which are outlined below.*

<table>
<thead>
<tr>
<th>Action Step</th>
<th>Who will Lead?</th>
<th>Who will Assist?</th>
<th>Target Completion?</th>
<th>Support &amp; Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Nail Children’s Study</td>
<td>• Joel</td>
<td></td>
<td>Joel:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maria Gathers informal health studies</td>
<td></td>
<td>April 18, 2011</td>
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<tr>
<td></td>
<td>• Lorelei WV Extension Service</td>
<td></td>
<td>Maria and Lorelei:</td>
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<td></td>
<td></td>
<td>April 24, 2011</td>
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<tr>
<td>Research</td>
<td>• Melanie Lead study – Healthy KY Foundation</td>
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<td>Melanie:</td>
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<td></td>
<td>• Todd Annie E. Casey</td>
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<td>April 18, 2011</td>
<td></td>
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<tr>
<td></td>
<td>• Diana Existing research on kids and environmental impact</td>
<td></td>
<td>Todd:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Phil Global lit search</td>
<td></td>
<td>Diana:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>April 22, 2011</td>
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<td></td>
<td></td>
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<td>Phil:</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>June 15, 2011</td>
<td></td>
</tr>
<tr>
<td>Outreach to potential partners</td>
<td>• Bill Renata Pore, VA people, outreach to Alliance, BO’s health study</td>
<td>Bill:</td>
<td>April 21, 2011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Steph Jeff Allen, Healthy Kids Coalition</td>
<td>Steph:</td>
<td>April 28, 2011</td>
<td></td>
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<tr>
<td></td>
<td>• Joel Michael Hendryx</td>
<td>Joel:</td>
<td>April 28, 2011</td>
<td></td>
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<tr>
<td>Based on research, identify a fundable proposal</td>
<td>• Steph</td>
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<td>June 6, 2011</td>
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<tr>
<td></td>
<td>• Lorelei</td>
<td></td>
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<td></td>
<td>• Maria</td>
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<td></td>
<td>• Todd</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Identify potential community partners</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Process – making sure we move forward</td>
<td>• Steph Calendar keeper</td>
<td>Maria</td>
<td>Lorelei:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bill Set up distribution list</td>
<td></td>
<td>April 24, 2011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Lorelei Create list of coal producing cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discuss remaining questions and how to tackle them</td>
<td>•</td>
<td>August 15, 2011</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Theme Team 6: Changes in Landscape & Ecosystem Services

**Team Members**

Vivian Stockman *(Team Leader)*  
Frank Borsuk  
Tom Ford  
Galadriel Jaffe  
Janet Keating  
Eric Merriam  
Eric Miller  
David Rider  
Carol Warren  
Douglas McClure Wood

**Original Questions**

Below are the original questions identified by participants as potential research questions, based on online submissions prior to the event, as well as participant additions and edits made on April 11, 2011.

- a. Are there cumulative watershed effects of mountaintop removal & valley fills that are a “sum greater than the parts”?
- b. What are the cumulative impacts (spatial, chrono.) of mountaintop removal and valley-fill on aquatic animals in streams and the animals that live in the forest areas and landscape?
- c. What are the compounding effects of legacy mining pollutants and active mining pollutants on the political, sociological, economic, human environment and ecological structure of Appalachia?
- d. What is the climate change future of Appalachia?
- e. What are the emerging trends in research techniques that can help us better understand the bio-dynamics of Appalachian ecosystems?
- f. Mitigation & Restoration. What are the rules/regs for reclaim sites?
- g. Comparisons between lists of species known to thrive in representative 1,000 acre plots of un-mined forest (including ridge top, slope, clifftalus, cove, bottomland, vernal pools, streams: intermittent, first, and second order) and 1,000 acre plots of once similar areas that have undergone mountaintop removal.
- h. Gas drilling.
- i. Know value of ecosystem services.
- j. Marcellus Shale Gas Development – Cumulative effects of multiple well sites – what ‘scale’ should be regulated? Air quality issues – multiple compressor stations treated separately rather than cumulative – Bad Air is Bad Air.
- k. Hydrological alteration.
I. Reclaimed mine sites – What are benchmarks for ecosystem recovery and human health?

m. What are good indicator species for both terrestrial and aquatic ecosystem health in Central Appalachia?

**Revised Questions**

The theme team was asked to make more specific edits and finalize the questions that will be added to the research agenda. Questions were prioritized by the team and are listed in priority order for the final research agenda.

1. Eco-services
   a. What are WV eco-services in Cumberland Mountain Region and who benefits from these services downstream?
   b. What are the species changes?
   c. Comprehensive list of Ecosystem Services lost as a result of resource extraction.
   d. What natural medicinal are being lost?

2. What are the cumulative (spatial and temporal) impacts of resource extraction to the landscape and Ecosystem Services? (Including economic impacts to downstream and surrounding human populations/communities)
   a. Determine intrinsic and extrinsic values and calculate costs of loss.

3. What are the compounding effects of resource extraction on political, sociological, economic and ecological structure of Appalachia?

4. Mitigation and restoration.

5. What are the emerging trends in research techniques that can help us better understand the bio-dynamics of Appalachian ecosystems?

6. What is the climate change future of Appalachia?

**Prioritization Criteria**

The theme team was asked to identify the criteria they used to prioritize their research agenda questions. The criterion used by this team was:

- Biggest bang for the buck
- Greatest benefit for humans/environment for dollars expended
- Support current research vs. new research
- What will inspire people to care and change thinking?
- What has been lost?
- Protect the most at-risk environments: stream, terrestrial, human
- Protect the most vulnerable species, hence the overall environment
- Urgency
Existing Research/Data, Gaps & Resources

1. Eco-services
   a. What are WV eco-services in Cumberland Mountain Region and who benefits from these services downstream?
   b. What are the species changes?
   c. Comprehensive list of Ecosystem Services lost as a result of resource extraction.
   d. What natural medicinal are being lost?

Existing Research/Data:
- EPA – Office Research & Development – Cincy et. al
- Rocky Mountain Institute
- WVU
- NY H2O System (New York Waterworks)
- The Nature Conservancy
- Gund Institute
- St. Vincent
- Costa Rica web-based dissemination
- Downstream Strategies
- Appalachian Studies Association
- Quantity and quality of water; measure for cross-county comparison (by Appalachian Regional Commission) to understand costs and benefits of Downstream Strategies Battner & Hansen

Gaps:
- Public awareness, knowledge transfer, research results dissemination
- “X” number of streams, forested tracts, wetlands provide “X” number of services for “X” number of humans/animals
- How to measure intrinsic value
- !!!Compilation of existing knowledge of Eco-Services and connections with human health and environmental quality/health!!!
Resources:

<table>
<thead>
<tr>
<th>Eco-Services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>People</strong></td>
</tr>
<tr>
<td>Eric Merriam</td>
</tr>
<tr>
<td>Eric Miller</td>
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<tr>
<td>Dr. Todd Petty</td>
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<tr>
<td>Patrick Angel</td>
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</table>

a. What are WV eco-services in Cumberland Mountain Region and who benefits from these services downstream?

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<thead>
<tr>
<th>People</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Evan Hansen</td>
<td>Marshall university</td>
<td>EPA</td>
<td>Methodology: paired w/s and landscape approach including qualitative survey (1,000 acres)</td>
</tr>
<tr>
<td>Fritz Boettner</td>
<td>WVU</td>
<td>DOE (?)</td>
<td></td>
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<tr>
<td></td>
<td>Wheeling Jesuit University (WJU)</td>
<td>USGS 104B Money to Watershed Research Institute (WRI)</td>
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<td></td>
<td>Downstream Strategies</td>
<td>SEP</td>
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<td>Violation Fines</td>
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</table>

b. What are the species changes?

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<tbody>
<tr>
<td>Ben Stout Headwater Streams</td>
<td>All Local Universities</td>
<td>NSF (ecosystems RFP)</td>
<td>Mine ELS; identify gaps in species identification</td>
</tr>
<tr>
<td></td>
<td>Wheeling Jesuit University</td>
<td>SEP</td>
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C. Comprehensive list of Ecosystem Services lost as a result of resource extraction.

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2. What are the cumulative (spatial and temporal) impacts of resource extraction to the landscape and Ecosystem Services? (Including economic impacts to downstream and surrounding human populations/communities)
   a. Determine intrinsic and extrinsic values and calculate costs of loss.

Existing Research/Data:
- Programmatic Environmental Impact Statement has tremendous amount of research results supporting it
- Cumulative Hydrologic Impact Assessment (CHIA) Phoenix Mine complex in Logan County
- WVU Cumulative Effects Assessment (KY & WV involved)
- Chief Logan State Park bio-blitz results
- Kanawha State Forest bio-blitz (plant survey)
- Brooks bird club trend analyses on specific locations

Gaps:
- For model building – certain databases/layers are difficult to come by
- Public awareness (web, newspaper/print, public meetings)
- Higher trophic levels are less understood – how are they impacted?

Resources:
None identified at this time.

3. What are the compounding effects of resource extraction on political, sociological, economic and ecological structure of Appalachia?

Existing Research/Data:
- Mary Hufford “Seasonal Rounds” (Anthropology Research at Library of Congress)
- Mr. Hendryx research, M. Palmer research
- Jen Osha’s Coal River Country – Journey Up Coal River
- Stout research on human and animal impacts
- Petra Wood and Tom Pauley
- Citizen response to the EIS (mentioned previously)

Gaps:
- Impacts of loss of community
- Civic engagement impacted by resource extraction
- Human health compared between remote extraction – impacted regions and regions with modern support services
• Loss of culture
• Loss of eco-services to local and distant communities (environmental justice)

**Resources:**

*None identified at this time.*

### 4. Mitigation and restoration.

#### Existing Research/Data:

- Samir Doshi – charcoal helps reconstitute soil
- O. KY – Dr. Warner – reducing water quality contaminants
- USGS – Se and other toxics, Difficult to define the amount in underlying rocks
- M. Palmer & Emily Burnhart – can headwater streams be restored?

#### Gaps:

- Selenium removal and reducing selenium production from VF
- How to restore headwater streams?
- Evaluate the thousands of mitigation projects

**Resources:**

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<td>Burnhart</td>
<td>Duke University</td>
<td>Arch Coal</td>
<td>Little Coal R. $1.4m</td>
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<tr>
<td>Arch Coal’s</td>
<td>Arch Coal’s Showcase Restored Site</td>
<td>Massey Energy $1.4m via DEP</td>
<td>Massey Energy Offsite Mitigation</td>
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<td>Off-site</td>
<td>WVU Master’s Thesis</td>
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<td>Water Quality Baseline in Vicinity of Gas Drilling</td>
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<td>Eric Miller</td>
<td>USGS &amp; National Energy Technology Laboratory (Department of Energy)</td>
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<td>Todd Petty</td>
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<tr>
<td>Ashley Carroll (WVDEP)</td>
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<td>Dan Soeder</td>
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<tr>
<td>• Involve KY and VAU in project template</td>
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<td></td>
<td>• December 2012</td>
<td></td>
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<tr>
<td>• Connect with ARRI on mitigation research</td>
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<td></td>
<td>• December 2011</td>
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<tr>
<td>• Catalogue of existing projects</td>
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<td>• Ongoing: December 2011</td>
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**Notes**

*Below are the additional notes made by the team as they processed information:*

1. Substitute “Resource Extraction” wherever “MTR” or “Valley Fill” or Mining” used
2. Data gaps:
   - Compile complete list of changes to landscape and Ecosystem Services (Natural Capital)
   - Determine values (intrinsic and extrinsic) and calculate costs of loss
     - Flow regime/extremes/flood-drought
     - Complete loss of water supplies
     - Groundwater recharge
     - Control of toxic materials leaching
     - Groundwater flow paths changes
     - Nutrient cycling (aquatic & terrestrial)
     - Carbon sequestration/climate change
     - Ox production/health atmosphere
     - Stream life (microbes, invertebrates/vertebrates)
     - Terrestrial life (microbes, invertebrates/vertebrates)
     - Forest health
     - Invasive nuisance species
     - H2o treatment costs
     - Human physical health
     - Human mental well-being
     - Human spiritual values/sense of wonder/respectful rev
     - Damaged property from unstable geologic formations
     - Human- nature connection
     - Erosion control
     - Habitat
     - Beauty
     - Sense-of-place/ancestral connection

3. Data gaps:
   - What are the cumulative (spatial and temporal) impacts of resource extraction to the landscape and Ecosystem services?
     - Including economic impacts to downstream and surrounding human populations/communities
Theme Team 7: Water

Team Members

Alice Jones (Team Leader)
Jim Dinger
Delta Merner
Patty Sebok
Ben Stout
John Tolos
Beverly Walkup
Andy Wigginton
Nicholas Zegre

Original Questions

Below are the original questions identified by participants as potential research questions, based on online submissions prior to the event, as well as participant additions and edits made on April 11, 2011.

a. What factors are causing the generally high pH levels in Appalachia streams?
b. How does the fracking of gas wells affect water quality in Appalachia? (ground/surface/hydro)
c. How does the siltation of streams from mining and gas and oil production affect human health through the need for large quantities of flocculent in water treatment facilities?
d. Health of the streams in eastern Kentucky and how to protect the streams that have not already been impacted by mining.
e. Where are the safe/clean drinking water supply systems in Appalachia and which need upgrading?
f. What will it take (technologically, logistically, financially, politically, etc.) to upgrade existing drinking water supply systems, construct new ones and maintain them?
g. Septic sewer waste.
h. Impacts of flooding on Appalachia.
i. Flooding.
j. Is it legal to allow the coal industry to upgrade/develop septic/sewer systems in Appalachian Coalfields as a ‘mitigation’ rather than “re-creating” non-functional stream reaches (i.e. these created streams have WQ issues that prevent functional benefits)? Sewage is one of the stressors in our streams.
k. Clean H₂O system delivery.
l. Cumulative analysis of water quality in Appalachian coal mining areas.
   • Systematic testing of water systems (municipal and private wells) to determine metals and other contaminants already present.
m. Perception of risk (to people, ecosystems) vs. actual documented risk: is it a lack of knowledge about risks to water supplies or a lack of trust in water providers?

n. QUANTITY – no regulation in WV of water withdrawals for gas drilling – affects small streams and local water supplies.

o. How might alternative waste management systems (composting toilets, etc.) reduce cost of water systems?

**Revised Questions**

The theme team was asked to make more specific edits and finalize the questions that will be added to the research agenda. Questions were prioritized by the team and are listed in priority order for the final research agenda.

1. Is the water in Central Appalachia safe for human needs?
2. How does resource extraction effect flooding?
3. How does resource extraction affect water toxicity?
4. Does flooding impact community economy and health?

**Prioritization Criteria**

None identified at this time.

**Existing Research/Data, Gaps & Resources**

1. Is the water in Central Appalachia safe for human needs?

   **AND**

3. How does resource extraction affect water toxicity?

   **Existing Research/Data:**
   - KY Ground H₂O Database
   - Office of Surface Mines (OSM)
   - KY Division of H₂O
   - E.P.A. (on-line)
   - NPDS
   - Industry Research
   - USGS
Gaps:
- Data incomplete in both space and time
- Price of H₂O testing
- Self-reporting by industry (lack of accountability)
- Natural variability
- Baseline data
- Lack of household data
- Health effects causation
- Contaminant pathways
- Methodology & technology

Resources:

### 1. Is the water in Central Appalachia safe for human needs?

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<tbody>
<tr>
<td>Volunteers</td>
<td>H₂O Shed</td>
<td>NIH</td>
<td>National Institute of Environmental Health</td>
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<td>Researchers</td>
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### 3. How does resource extraction affect weather toxicity?

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<tr>
<td>Andy Wigginton</td>
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</tbody>
</table>
2. How does resource extraction effect flooding?

**Existing Research/Data:**
- USGS (both federal and state offices)
- WVU, VT, KYU
- US Forest Service
- US Corps of Engineers
- Consultants (to FEMA)
- National Oceanic and Atmospheric Administration (NOAA)
- Federal Emergency Management Agency (FEMA)

**Gaps:**
- Baseline
- Natural Variability
- Methodology
- Lack of Instrumentation
- Capturing Local Knowledge
- Access

**Resources:**

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<td>Nicholas Zegre</td>
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<td>NSF</td>
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</table>
4. Does flooding impact community economy and health?

Existing Research/Data:
- Census
- Newspapers
- USGS
- FEMA
- State Emergency Management Agencies
- State Health Departments
- Testimonials
- Federal Insurance Database
- Watershed Groups

Gaps:
- Testimonials
- Gag Orders
- Accountable Party

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<td>Delta Merner</td>
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<tr>
<td>· Involve KY and VAU in project template</td>
<td></td>
<td></td>
<td>December 2012</td>
<td></td>
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<tr>
<td>· Connect with ARRI on mitigation research</td>
<td></td>
<td></td>
<td>December 2011</td>
<td></td>
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<tr>
<td>· Catalogue of existing projects</td>
<td></td>
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<td>Ongoing: December 2011</td>
<td></td>
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</tbody>
</table>
Theme Team 8: Education

Team Members

Stephanie Tyree (Team Leader)
Lorelei Scarbro
Tanya Turner
Melanie Adams-Johnson
Maria Bunnoe
Todd Garland
Joel Halverson
Phil Obermiller
Luther Payne
Bill Price
Diana Richardson

Original Questions

*Education was a broad topic area added during the April 11, 2011 meeting.*

Revised Questions

*The theme team was asked to make more specific edits and finalize the questions that will be added to the research agenda.*

*Questions were prioritized by the team and are listed in priority order for the final research agenda.*

1. What are the short and long term effects of systematic educational shortfalls in the areas impacted by the extractive industries?

Existing Research/Data, Gaps & Resources

*Existing Research/Data:*

- Mountain Association for Community Economic Development (MACED)

*Gaps:*

- Property Evaluation (taxes) as it relates to education funding.
- School consolidation
- Identified bias and misinformation
Resources:

<table>
<thead>
<tr>
<th>People</th>
<th>Organizations</th>
<th>Funding</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Challenge WV</td>
<td>• Ford Foundation (?)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Coleman Foundation</td>
<td>• ACF</td>
<td></td>
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<tr>
<td></td>
<td>• State Boards of Education Appalachian Regional Commission</td>
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</table>
**Action Plan**

*Teams were asked to develop an action plan for their project(s), which are outlined below.*

<table>
<thead>
<tr>
<th>Action Step</th>
<th>Who will Lead?</th>
<th>Who will Assist?</th>
<th>Target Completion?</th>
<th>Support &amp; Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Find Systemic Education Shortfalls:</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1. Gather information/ background research</td>
<td>• Lorelei Challenge WX info, coal county maps • Steph Jim Rymer, Downstream strategies (tax structure) • Maria Media research</td>
<td>• Catherine Moore Public Radio</td>
<td>May 15, 2011</td>
<td></td>
</tr>
<tr>
<td>2. Curriculum Survey in West Virginia</td>
<td>• Diana Richardson</td>
<td>• Jen Osha • Lorelei • Maria • Dustin White • Jullian Martin WV Highlands Conservancy</td>
<td>June 15, 2011</td>
<td>• WV State Board of Education • WV Challenge • Janice Nease</td>
</tr>
<tr>
<td>3. Outreach to potential partners</td>
<td>• Phil Outreach to ASA list serve • Steph Catherine Moore, NPR</td>
<td></td>
<td>June 15, 2011</td>
<td>• Alliance for Appalachia</td>
</tr>
<tr>
<td>Outreach to potential funders</td>
<td></td>
<td></td>
<td>April 12, 2011</td>
<td>• Alliance for Appalachia</td>
</tr>
<tr>
<td>Group to discuss research outcomes</td>
<td>• Stephanie</td>
<td>• Maria</td>
<td>August 15, 2011</td>
<td>• Alice • Becca</td>
</tr>
<tr>
<td>Outreach and other groups: linkages</td>
<td>• TBA</td>
<td>• Diana</td>
<td>June 15, 2011</td>
<td>• Other groups</td>
</tr>
</tbody>
</table>
Draft Research Agenda

Cradle to Grave Resource Contaminant Assessment
1. How do point sources from resource extraction/beneficiation/transportation/utilization activities impact air quality and health?
2. How do point sources from resource extraction/beneficiation/transportation/utilization activities impact water quality and health?

Creating Diverse Economies that Sustain Communities
1. How do you create a sustainable* and diverse economy in the region/in regional communities? What will create the most sustainable* jobs?
   * By sustainable, we mean creating businesses and jobs that offer competitive wages are healthy and, in some cases, would address existing problems resulting from the existing extraction economy. Sustain place and people. Social wages.
2. What is the feasibility and impact of renewables and efficiency in the region / in regional communities?
3. What is the true cost of coal?
4. What is “peak coal”?
5. What do people think and know about these issues? (region-specific polling and opinion research)

Exposure Pathways & Health Consequences
1. What are children exposed to?
2. How are they exposed?
3. What is the dose? (BIOMARKER)
4. What are the health consequences?
5. What are the critical exposure windows?
6. What are the additive synergistic effects?

Emerging Methodology/Research Infrastructure
1. How can “Red Flags”* (e.g. biomarkers, etc.) be used to identify research priorities of community concern and significance?
2. How can we develop new methods which address health concerns of small communities of small sample size? (e.g. cancer hollows)
3. How can we achieve broad based input in setting our research priorities so that findings are relevant to improving public, ecological and human health?**
4. How can we disseminate research findings to effect change among diverse stakeholders?***

* Screening tools for ecological and/or human health.
** Will be included in the process for each question.
*** This will be a component of each question.
Social Behavioral Determinants of Health and Environmental Effect on Social Health of Appalachia

1. What are the physical and mental health impacts on children from pre-natal through adolescents in heavy extraction areas?

2. How does the out-migration from coal communities affect the remaining population and those who have left?

3. How does the tension between the attachment to place in Appalachia and the destruction of that place impact the health of residents (both those who stay and who leave)?

Remaining Questions Not Yet Prioritized by the Theme Team

- How does the industry of coal mining affect the social health of the Appalachian communities in which it takes place? Does the presence of the industry affect diversity of vocational opportunities, community infrastructure and public space, gap between social classes, access to education, level of social or civic involvement of citizens, crime rates, or general morale of community members?

- What are the psychological, emotional and mental health impacts of environmental degradation on the people of Appalachia?

- Are there higher instances of adverse social behavior (smoking, alcohol abuse, drug abuse, obesity, etc.) in areas impacted by the cycle of coal?

- What are the social and health costs of the loss of sustainable communities due to extractive industries?

Landscape Changes and Ecosystem Services Changes

1. Eco-services
   a. What are WV eco-services in Cumberland Mountain Region and who benefits from these services downstream?
   b. What are the species changes?
   c. Comprehensive list of Ecosystem Services lost as a result of resource extraction.
   d. What natural medicinal are being lost?

2. What are the cumulative (spatial and temporal) impacts of resource extraction to the landscape and Ecosystem Services? (Including economic impacts to downstream and surrounding human populations/communities)
   a. Determine intrinsic and extrinsic values and calculate costs of loss.

3. What are the compounding effects of resource extraction on political, sociological, economic and ecological structure of Appalachia?

4. Mitigation and restoration.

5. What are the emerging trends in research techniques that can help us better understand the bio-dynamics of Appalachian ecosystems?

6. What is the climate change future of Appalachia?
Water
1. Is the water in Central Appalachia safe for human needs?
2. How does resource extraction effect flooding?
3. How does resource extraction affect water toxicity?
4. Does flooding impact community economy and health?

Education
1. What are the short and long term effects of systematic educational shortfalls in the areas impacted by the extractive industries?

Commonalities

*Participants shared their team reports to the larger group and through this process, identified possible collaboration opportunities and linkages in the research, as well as common themes and potential duplicate research questions.*

**Linkages:**
- Attachment of place and value of ecosystems – group 5 and 7
- Linking point sources to human health – group 1, 3 and 6
- Ecosystem health with community health and economics – group 2, 5, 6, 7, 8
- Education impact and group 2 and 6 “Brain Drain” and education related to workforce
- Group 4 – integrates into all groups
- Biomarkers and red flags – group 3 and 4
- Education links to all
- Creating sustainable economy – group 2 and education (what do people know)

**Common Themes:**
- Disseminate information from scientific community to communities and vice versa

**Potential Duplicate Questions:**
- Group 1 and 8: resource evacuation and aquatic toxicity
- Group 5/6 and 3: children’s health studies
Maintaining Momentum

Participants discussed ways they can maintain momentum after the summit. Their responses are captured below.

- Accountability via team members deadlines/commitment
- Add contact information – group number and theme name
- Appalachian Studies Association – collaboration and scholarships
- Appalachian voices in DC (resource)
- ASA Conference:
  - March 2012: 1-2 day preconference
  - Field trip to drilling site
  - Green and Washington county field trip purpose series of tracks
  - Interpretive nature walk
  - Provide presentation session
- Captured pictures of paperwork
- Checking in on deadlines
- Citizen tool kit website (adding red flag tests)
- Conference call May 12th
- Each leader will read their information now
- Email group list
- Email, Skype, etc. to hold each other accountable
- Follow up (annual) retreat/conference
- Follow up team phone call
- How to integrate new people into the group (structure)
- In June, send out invitation to have conference call (Liz)
- KEF “Energy Production and Health” Series (conference calls)
- Missing from group – Anthropologists and community groups
- Monthly online call series with presentation/KY Environmental Foundation
- Monthly reminders
- Next event?
- Networking critical; however, maintaining autonomy of this group
- Pittsburg Coal Conference
  - Barrier: registration/travel costs and capacity
- Reaching out to other groups
- Search grant sources (wiki?)
- Set up wiki for each theme
• Spring 2012 gathering in central Appalachia (not necessarily at ASA Conference)
• Tahiti Retreat
• Team exchange email monthly
• Team meet during field studies in central WV in June and during future sampling
• Wiki links

Lingering Questions

The group identified questions throughout the summit and the following two topics were captured, but not further explored.

• Who are we?
• Needs
  o Way to have information sharing for this summit group
  o Method for collecting and disseminating data summaries to community groups
  o Individual communities assigned researcher (translator)

Parking lot

Issues which were acknowledged at the meeting, but due to time constraints could not be addressed, were placed in the parking lot for later discussion. They are as follows:

• Federal Definition of Appalachia (Central Appalachia; Appalachian Coal Fields)
• Coal Burning
Appendix A: Meeting Debrief

Meeting Debrief

To bring the meeting to a close, participants were asked to answer the following question:

1. In 5 years, how would you hope this group had made a difference in environmental and community health?
   - Clean water
   - Healthy children
   - Greater control of political system
   - Paradigm shift
   - Know Appalachia as a region turned around environment, economy and people
   - Wind mills and solar panels
   - Others look to this region as group doing best work – community based research model
Appendix B: Alphabet Soup

Alphabet Soup

*Participants shared common acronyms and their full-names with other participants, which were as follows:*

- ACF – Appalachian Community Fund
- AMI – Area Median Income
- ARC - Appalachian Regional Commission
- ARH – Appalachian Regional Healthcare
- ARRI – Appalachian Regional Reforestation Institute
- ASA – Appalachian Studies Association
- CARE – Community Action for a Renewed Environment
- CCC – Citizen Coal Council
- CDC – Center for Disease Control
- CRMW – Coal River Mountain Watch
- DD Rates – Developmental Disability Rates
- EIS – Environmental Impact Statement
- EPA ORD – EPA Office of Research and Development
- KEF – Kentucky Environmental Foundation
- KFTC – Kentuckians for the Commonwealth
- MIRA – ANEPA database
- NPDES – National Pollution Discharge Elimination System
- NRDC – National Resource Defense Council
- OVEC – Ohio Valley Environmental Coalition
- RMI – Rocky Mountain Institute
- RWJF – Robert Wood Johnson Foundation
- SSP – Sludge Safety Project
- STAY - _______ ________ Appalachian Youth
- TNC – The Nature Conversancy
- West Virginia Center on Budget and Policy
- WRI – Watershed Research Institutes
- WVDEP – West Virginia Department of Environmental Protect (Aquatics)
- WVHC – West Virginia Highlands Conversancy
- WVSORO – West Virginia Surface Owner’s Right Organization
Appendix C: Meeting Agenda

Appalachian Community & Ecosystems Health Collaborative Summit
April 10 – 12, 2011

Overall Purpose:
To produce cutting-edge science that deepens the understanding of the relationship between environmental and community health in Appalachia.

Purpose:
To identify issues, concerns and gaps in research and data regarding how environmental health affects community health in Appalachia.

Outcome:
Comprehensive, interdisciplinary research agenda.

AGENDA

Sunday, April 10
6:00 pm  Meeting Kick-Off: Dinner and Facilitated Activities

Monday, April 11
6:30 – 8:15 am  Breakfast on Your Own
8:30 am  Welcome - Alice Jones and Ben Stout
          Guest Speaker - Maria Genoe, Community Advocate
9:30 am  Introductions
          Facilitated Activities: Identify Research Questions & Themes
Noon  Lunch
1:00 pm  Theme Team Meetings: Prioritize Questions, Identify Existing Research & Resources
3:30 pm  Theme Team Report-outs
4:30 pm  Theme Team Meetings: Action Planning
6:00 pm  Dinner: If necessary, working dinner for theme teams
7:30 pm  Social Activity or Free Time

Tuesday, April 12
6:30 – 8:15 am  Breakfast on Your Own: If necessary, working breakfast for theme teams
8:30 am  Overnight Thoughts
9:00 am  Theme Team Presentations: Action Plans
11:30 pm  Wrap-up & Close
Noon  Lunch (if requested)

Note: Vouchers provided for each meal.

Facilitation Services Provided by the Facilitation Center at EKU