I. **Major accomplishments**

- Continued support for faculty research clusters, student research, and campus research laboratories.
- Collaborated with the following units to support student research grants: Office of Undergraduate Research, Cratis D. Williams Graduate School, Office of Sustainability, Office of Business Affairs, The Honors College, The College of Fine and Applied Arts, The College of Arts and Sciences, Walker College of Business, College of Health Sciences, and Institute for Health & Human Services in offering the student research funding solicitation ‘Creating a Healthy, Just and Sustainable Society.’ The ‘Creating a Healthy, Just and Sustainable Society’ solicitation is attached in Appendix B.
- A total of $36,397 was provided to faculty research clusters and laboratories, $4,294 to support student research initiatives, and $3,300.00 for faculty travel grants. See Attachment A for a summary of each of the ten clusters and laboratories.
- The RIEEE in collaboration with academic units on the ASU campus, led a campus wide effort to make application for members with the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado. UCAR is a consortium of more than 100 member colleges and universities focused on research and training in the atmospheric and related Earth system sciences. With membership in UCAR Appalachian State University would join a select set of colleges and universities that set directions and priorities for the National Center for Atmospheric Research, which UCAR manages with sponsorship by the National Science Foundation. UCAR also provides innovative services in support of the community's education and research goals. Twenty-two faculty members from three ASU colleges contributed to this application. Faculty publications associated with atmospheric science include 123 journal articles, book chapters and books over the past 5 years.
- Continue to encourage Appalachian faculty to prepare the publication of research findings through peer reviewed journals.
- Provided administrative support for over $865,000 in 21 externally funded projects conducted by faculty within the Appalachian Energy Center, the Southern Appalachian Environmental Research and Education Center, and the Center for Economic Research and Policy Analysis
- CERPA co-organized a workshop on international climate agreements that brought together leading researchers in the field from leading institutions like Columbia University, UC Santa Barbara, University of Oslo, Resources for the Future (DC), Tilburg University, University of Bath, etc. This effort benefited greatly from the generous support from Academic Affairs.
- CERPA collaborated with the WCOB to develop a plan for a new experimental laboratory that will enhance the research of the internationally recognized experimental economics group at Appalachian State.
2. **RIEEE Income and Expenses**

During the 2014 fiscal year the RIEEE received a total of $62,947 to support programs and operations. These funds come from three sources:

- ASU’s Office of Academic Affairs provided the greatest funding as reflected in the chart below. Most of the support from the Office of Academic Affairs is received after January 1, 2014 and must be expended by June 30th of the fiscal year.
- The office of Research and Sponsored Programs provided additional funding totally $9,905 to support faculty research clusters; these source of these funds were from indirect cost recovery from research grants. These funds may be used by the research clusters during the 2014 fiscal year and carried over to the next fiscal year.
- Indirect cost returns for research grants within the RIEEE provided $8,405.

It should be noted that Appalachian State University returns 20% of the total indirect cost generated by research projects managed by the RIEEE. These funds are distributed to the project principle investigators, the research Center sponsoring the project and to the RIEEE. Of these funds, the principle investigator receives 50%, the center 25% and the RIEEE 25%.

In addition to program support, Appalachian State University provides funding for the salary and benefits for the RIEEE Director, 50% of the salary and benefits for the Office Manager, and a portion of the salary for the Director of the Appalachian Energy Center. The Walker College of Business provide support for the Director of the Center for Economic Research and Policy Analysis.
3. **RIEEE Program Resource Utilization**

The RIEEE provides funding for faculty and student research as reflected in the graph below. Faculty research clusters receive the largest portion of the program support with 77% of the funds. Student research grants received $3,392. Travel expenses that are not included in the support for faculty research clusters totaled $3,300. The RIEEE also provides support for outreach programs and supplies ($4,294).

A summary of the faculty research clusters is provided in Appendix A. It should also be noted that in addition to support directly by the RIEEE, the faculty research clusters may have funding from active research grants, indirect cost return funds generated by the project and allocated to the principle investigator and the cluster, plus other sources of support from ASU.
4. **Summary of Grant Activity (RIEEE and its centers)**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Not Funded</th>
<th>Awards</th>
<th>Under Review</th>
<th>Continuing</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIEEE</td>
<td>319,794</td>
<td>504,296</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEC</td>
<td>513,424.56</td>
<td>710,451</td>
<td>754,004</td>
<td>1,771,724</td>
</tr>
<tr>
<td>CERPA</td>
<td>19,561</td>
<td>49,831</td>
<td>343,772</td>
<td>425,511</td>
</tr>
<tr>
<td>SAEREC</td>
<td>20,100</td>
<td>244,675</td>
<td>122,131</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>852,780</strong></td>
<td><strong>1,284,678</strong></td>
<td><strong>1,342,451</strong></td>
<td><strong>2,319,366</strong></td>
</tr>
</tbody>
</table>

Total ASU Awards: $10,362,013.00  
Percent of RIEEE Awards / ASU: 12.40%  
Total Submissions: $20,620,412.26

- The total awarded from external funding agencies increased from $798,276 in FY 2013 to $1,284,678 in FY 2014  
- Continuing funding increased from $2,252,168 to $2,319,366

**Grant Activity Summary – FY 2013**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Not Funded</th>
<th>Awards</th>
<th>Under Review</th>
<th>Continuing</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIEEE</td>
<td>1,759,985</td>
<td>0</td>
<td>486,990</td>
<td>1,594,885</td>
</tr>
<tr>
<td>AEC</td>
<td>831,019</td>
<td>271,631</td>
<td></td>
<td>47,433</td>
</tr>
<tr>
<td>CERPA</td>
<td>0</td>
<td>484,335</td>
<td>298,049</td>
<td></td>
</tr>
<tr>
<td>SAEREC</td>
<td>1,070,429</td>
<td>42,310</td>
<td>535,491</td>
<td>609,850</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,661,433</strong></td>
<td><strong>798276</strong></td>
<td><strong>$1,320,530</strong></td>
<td><strong>$2,252,168</strong></td>
</tr>
</tbody>
</table>

**Grant Activity Highlights**

- RIEEE and Center awarded proposals accounted for 12.4% of total ASU awarded proposals for FY 2014  
- RIEEE total awards: $1,284,678  
- RIEEE proposals currently under review by funding agency: $1,342,451  
- RIEEE & Center continuing funding: $2,319,366  
- RIEEE continuing and new funding awards: $3,604,044

**Detailed Grant Activities by Unit**

- Grant activity for the RIEEE and each of the Centers is reflected in Appendix C.  
- Grant activity for the Appalachian Energy Center is shown in Appendix D.  
- Grant activity for the Center for Economic Research and Policy Analysis is shown in Appendix E.  
- Grant activity for the Southern Appalachian Environmental Research and Education Center is shown in Appendix F.
Appendix A
RIEEE Research Focus and Funding

1. Appalachian Experimental Economics (AppEEL) - (CERPA)

Collaborators (5): Michael McKee, Todd Cherry, David Dickinson, David McEvoy, David Brunner

The experimental economics group in the Department of Economics is one of the strongest groups in the world. The strength of this group has led the Department of Economics to be an international leader in the field—ranked in the top 15 of departments nationally and in the top 30 globally (RePec, 2014). The five-member group consists of three senior researchers that are individually ranked among the top 136 international researchers in the field and two junior researchers emerging in the field (RePec, 2014). The group has been successful in securing external funds for research to investigate topics such as tax policy (US IRS), naval resource allocation (Office of Naval Research), forest management (World Resources Institute), decision-making with sleep deprivation (NSF), and policy acceptability (Research Council of Norway). The group has an extensive network of leading collaborators, including University of Massachusetts Amherst, CICERO/University of Oslo (Norway), University of Alaska Anchorage, University of Lyon (France), University of Tennessee, Columbia University, etc. The experimental research is facilitated by the Appalachian Experimental Economics Laboratory (AppEEL) located in Raley Hall. CERPA provides support for the group and manages AppEEL.

2. Environmental and Energy Policy Cluster (CERPA)

Collaborators (8): John Whitehead, Todd Cherry, Ash Morgan, Michael McKee, Peter Groothuis, Jajit Roy, David McEvoy, David Bruner

The environmental economics group in the Department of Economics has an international reputation for excellence in applied research. The strength of this group has led the Department of Economics to be ranked among the top 40 nationally in the field (RePec, 2014). The group conducts basic and applied research on a wide range of environmental and energy topics, including international climate agreements, low-carbon energy development, fisheries, forest management, non-market valuation, energy performance contracting, policy mechanisms, etc. This group has been successful in securing external funds from local, state and federal groups and agencies—e.g., NOAA, Environmental Defense Fund, Research Council of Norway, IFREE, VA Marine Resource Commission, etc.

3. Regional Economic Development Cluster (CERPA)

Collaborators (5): Ash Morgan, Michael McKee, Todd Cherry, John Dawson, John Whitehead

The regional economic development cluster consists of five faculty members that focus on applied economic development projects, with a particular focus on western North Carolina. The group has participated in major funded projects over the years, including a study to document rural economic opportunity (NC Rural Center) and work to assess infrastructure needs and development plans (Federal Highway Admin/NC DOT/Appalachian Regional Council). The
rural economic opportunity project won the Transforming North Carolina award. The group has received funding to conduct numerous economic impact studies and cost-benefit analyses for private and public agencies, including Mission Health System, Town of Boone, Appalachian State University, Blowing Rock Rotary Club, Blood-Sweat-Gears, Watauga Arts Council, The Valle Country Fair, etc. In keeping with the cluster’s objective to impact the region, members of the group have volunteered to give numerous speeches to local groups and governments. For nearly 10 years, this group produced a widely cited monthly report on the region’s economic conditions. Budget cuts limited this work, and eventually led to the end of this project.

4. AppalAIR Research Cluster

Collaborators: Howie Neufeld (Biology), Jim Sherman (Physics and Astronomy), Baker Perry (Geography & Planning), Brett Taubman (Chemistry), Ryan Emanuel (NCSU), Doug Miller (UNC A), and Rahman Tashakkori (Computer Science)

The Appalachian Atmospheric Interdisciplinary Research (AppalAIR) is an interdisciplinary air quality and climate research initiative that focuses on critical research in the western mountain region of the state. The overriding goal of the project is to expand our understanding of atmospheric processes in the southern Appalachian Mountains through the development of an intensive atmospheric monitoring research system and teaching program. The research examines air pollution formation and transport, the relationship of pollution and natural aerosol sources to a changing climate, and their impacts on regional ecosystems, weather, and climate. Past funding sources include National Aeronautics and Space Administration (NASA). Current support is from the National Science Foundation (ASU-13-0277) to Baker Perry ($498,135 - Five Years). A comprehensive submission from AppalAIR is expected in July 2014 and submitted to NASA.

5. Community Based Biogas Development (Appalachian Energy Center)

Collaborators::  Stanley Steury(1), Jason Hoyle(1), Jeffrey Ramsdell (2), Grace Marasco-Plummer(1), Joey Mosteller(1), Helen Burkett(1), and James Houser (2)

(1) Appalachian Energy Center, (2) Department of Technology & Environmental Design

Anaerobic digestion (AD) is hailed as a broadly deployable and appropriate technology with significant potential to alleviate a number of development challenges including energy shortage, lack of sanitation infrastructure, soil degradation, and deforestation. Success has been limited to small scale household scale digesters. This small scale use fills a need for limited energy generation and waste management but is less appropriate in urban settings where animal waste and space are largely unavailable. Densely populated areas, therefore, present challenges that domestic scale digesters cannot address. Although the basic technology is similarly proven, preliminary research indicates that community-scale digesters fail due to management and operation difficulties or improper design given the composition of available waste. A comprehensive proposal to evaluate the development of biogas capacity at a community scale is in preparation. The proposal will focus on community participation and widespread adoption of the technology. This multi-year proposal will be submitted to the Agency for International Development (USAID) or a private foundation.
6. Biomass and Bioenergy Research Cluster

Investigator(s): James Houser, David Domermuth, Ok-Youn Yu, Brian Raichle and Jeffrey Ramsdell (Department of Technology & Design), and Michael Hambourger (Department of Chemistry)

This research cluster is working to create a laboratory facility for biomass and bioenergy research, testing, and product development. Researchers and students will work on projects related to biomass characterization, analysis, and utilization, as well as researching the uses of products and by-products created through various biomass and bioenergy production and processing techniques.

Current campus biomass-related research initiative are in the Departments of Chemistry, Biology, Technology and Environmental Design and the Appalachian Energy Center off-campus facilities. Lab space and instruments is limited currently. A collaborative biomass and bioenergy research laboratory would support bench-scale research. A previous proposal submitted to the North Carolina Biotechnology Center received positive ratings and the research group was encourage to resubmit a proposal ($140,000).

7. Residential Energy Code Compliance Rate and Measure Results

Collaborators: Jeff Tiller, Department of Technology & Environmental Design and Charles Perry, Appalachian Energy Center

North Carolina Energy Efficiency Alliance (NCEEA), housed at Appalachian State University, submitted a proposal to the U.S. Department of Energy to conduct an assessment of how innovative energy code training activities affect code compliance in North Carolina. The project will assess the current level of compliance with the 2012 North Carolina State Energy Code; improve awareness of the residential energy code, assess the effectiveness of the educational programming, and field inspections, and provide recommendations for future training programs. The two year project requested $749,004 from the U.S. Department of Energy. The cluster will be submitting additional proposals to the U.S. Department of Energy and the N.C. State Energy Office during FY 2015.

8. Rural Natural Resources Economies & Development Group

Collaborators: C. Blanchard-Busch (Government & Justice), T. Ruseva (Government & Justice), R. Crepeu (Geography & Planning), and J. Hamilton (NCSU)

Goals of the cluster include: 1) To understand how different land use designations and practices lead to economic development and sustainable communities in rural areas, such as Appalachia; 2) To examine enterprises and activities which support the economy, the environment, and social wellbeing in rural communities; activities include, but are not limited to agriculture, forestry, natural resource management, ecological restoration, local food systems, affordable housing, alternative energy, ecotourism, and agri-tourism; and 3) To identify assets and barriers to the development of rural natural resource economies, as well as attributes that have the potential to enhance the socio-economic and ecological resilience of rural communities. The team plans on a
proposal submissions in the spring 2015 and will include the Appalachian Regional Commission and U.S. Department of Agriculture. This cluster has been in place just over a year and the focus of their research is in its formative stage with research underway to clarify sustainable development practices and policies in the High Country.

9. Carbon Emissions Inventories, Accounting, and Uncertainty and Energy Policy


The focus of this research cluster is to examine issues of carbon accounting generally and the nature and distribution of CO₂ emissions and their implications for energy policy. The group accomplishes this through the application of mathematics, statistics, accounting, and actuarial principles, geographic information systems, and the development of emissions data sets that proactively deal with uncertainty. Examining important CO₂ emissions along with accounting principles presents data that allow for an analysis of distributional, resource, political, and ethical issues. Emissions are traditionally monitored at the point of emissions rather than at the point that, for example, electricity is used or carbon-containing products consumed and the broader consideration of accounting system methods and boundaries raises many important issues. Current support is provided by NASA ($128,899) and a proposal to continue working with the NASA Carbon Monitoring System (CMS) project has been submitted ($467,275 for three years). In addition, the cluster is in internal discussion of a proposal to be submitted to NSF to further develop ideas on dealing with actuarial principles and the time value of carbon emissions. A proposal by late summer or autumn is anticipated.

   Forest Policy Research Group

Collaborators: Eric Marland, Mathematical Sciences, Kevin Shirley, Mathematical Sciences, and Tammy Kowalczyk, Accounting

The primary objective of the initial phase of this study is to evaluate the voluntary and regulatory compliance protocols using USDA Forest Service, Forest Inventory and Analysis data to describe a variety of forest conditions, ownerships, and forest management scenarios to provide regulators (i.e., ARB, CAR, and ACR) and entities interested in the compliance markets with an objective comparison of the options, uncertainty, and opportunities available to offset GHG emissions through forest management. The team will be working with the U.S. Forest Service on what is anticipated as a long-term effort ($39,980 for two years).

10. AppAqua

Collaborators: Jeffrey Colby (Geography and Planning), Kristan Cockerill (Interdisciplinary Studies), Chuanhui Gu (Geology), and Shea Tuberty (Biology)

The U.S. National Climate Assessment report released in May 2014 noted that in the Southeast U.S., there would be a decrease in water availability and exacerbated by population growth and
land-use change along with increases in the demand for water. The AppAqua research cluster notes this need to address water resources issues and has developed a high resolution geospatial database for the Upper South Fork of the New River (USFNR) watershed as part of a long-term water quality monitoring program. A key research focus is to study the long-term spatial relationships between land cover change and water quality in the USFNR watershed. Current research is investigating how to improve water conservation in headwater streams through socio-biophysical analysis. The team is developing an innovative, interdisciplinary model to identify optimal locations for riparian buffer (stream bank vegetation) conservation measures on healthy headwater streams in the watershed. Multi-year funding proposals will be submitted in fiscal year 2015 to one or more of the following funding agencies: National Fish and Wildlife Foundation - Five Star & Urban Waters Restoration Program Proposals likely due February 2015; EPA - Annual P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity and the Planet; USDA - National Integrated Water Quality Program; NSF Water Sustainability and Climate program; and EPA’s - Region 04 Wetland Program Development Grants.

Recent accomplishments include the publication or acceptance of six peer reviewed journal articles. A master’s student thesis and an undergraduate student honor’s thesis were successfully defended. A final report for an internal funding grant was submitted. A graduate research associate mentoring (GRAM) proposal was funded for the 2013-2015 academic years, and a Spring 2014 URA proposal was funded as well. Research results were presented at numerous professional conferences by the AppAqua faculty and students. The Upper South Fork of the New River (USFNR) watershed water quality database has gone through extensive quality control and now consists of over 600,000 time sequenced (i.e., every 15 minutes) entries for eight sondes located at the outlets of the watershed sub-basins.

11. **Aquatic Conservation Research Lab (ACRL)**

This Lab is directed by Michael Gangloff, Assistant Professor with the Department of Biology. Gangloff currently has research projects spanning five southeastern states (AL, FL, MS, NC and TN) that examines a broad range of topics related to habitat ecology and conservation genetics of fish, mussels, crayfishes and aquatic insects in the region’s unique and imperiled freshwater ecosystems. Many projects involve direct study of federally threatened or endangered species and ACRL personnel work closely with numerous state and federal resource agencies on these projects. One of the more exciting ongoing projects administered through RIEEE involves surveys of deep-water habitats in the Apalachicola and Chipola Rivers in northwest Florida. This study, a collaboration between ASU, USFWS and Auburn University is using side-scan sonar imaging to map substrates and microhabitats within these large, wild rivers to help better understand the size and distribution of endangered mussels and how different flow management scenarios may affect their populations. Other projects have examined the effects of small dams on mussels and fishes in North Carolina, long-term impacts to the upper Tombigbee River mussel assemblages resulting from the Tennessee-Tombigbee Waterway, and impacts of ridge top coal mining on streams in northeastern Tennessee. These projects have provided management agencies with important data and have resulted in a number of presentations at regional and international meetings and the publication of numerous peer-reviewed papers. Gangloff continues to work with federal and state agencies in addressing aquatic conservation issues.

9

Led by Lynn Siefferman, Assistant Professor, Department of Biology, and students who are supported with student research grants from the RIEEE, the Laboratory conducts research projects that examined a broad range of topics related the evolution, behavior, ecology and conservation of birds and salamanders. Research projects with support from the Audubon Society, include the Conservation and Behavior of Golden-winged Warblers in the Southern Appalachians and Anthropogenic Effects on Avian Behavior and Fitness. This research examines the impact of habitat loss and hybridization and how humans unintentionally influence on state and federally listed threatened species. Continued support is anticipated from foundations.

11. Appalachian Solar Energy Research and Demonstration Laboratory. The solar lab actively supports outreach and applied research projects to identify and characterize solar technologies that perform well in North Carolina climates. Applied research included a study of the capacity value and reliability of solar PV. Verification and dissemination of solar system performance allows North Carolina citizens to choose the solar technologies that offer the best return on investment. The lab continues to host numerous public and special event tours, as well as hands-on solar workshops for the public. The facility allows potential solar adopters the chance to see first-hand installed modern solar technologies. The solar lab also offers Appalachian students valuable hands-on experience with a range of solar technologies. These students continue to join the North Carolina workforce and contribute to the growing renewable energy sector in the State. Partnerships with solar equipment manufacturers are also being pursued.

12. Appalachian Small Wind Research and Demonstration Facility, Beech Mountain. This facility provides valuable information about wind turbine performance and durability to small wind manufacturers and utilities, while providing students and the community with hands-on experience with small wind technology. Appalachian faculty and students are actively engaged in education, outreach, and research projects that utilize the facility. These projects benefit businesses and citizens of North Carolina interested in design, manufacturing, and implementation of wind energy systems. Research activities include topics such as noise levels, impact on local bird populations, relationship of wind turbine performance to utility loads, storage technologies, etc. This work also continues to include the monitoring and reporting of the estimated output of wind energy facilities in North Carolina.
Appendix B
Student Research Grants
“Creating a Healthy Just and Sustainable Society”

Sponsored By:
Research Institute for the Environment, Energy and Economics (RIEEE)
   Appalachian Energy Center (AEC)
   Center for Economic Research & Policy Analysis (CERPA)
   Southern Appalachian Research and Education Program (SAEREC)
Office of Undergraduate Research
Cratis D. Williams Graduate School
Office of Sustainability
Office of Business Affairs
The Honors College
The College of Fine and Applied Arts
The College of Arts and Sciences
Walker College of Business
College of Health Sciences
Institute for Health & Human Services

“Creating a healthy, just and sustainable society” is a goal in which human needs are met equitably without harm to the environment and without sacrificing the ability of future generations to meet their needs. In order to meet this challenge we must broaden our understanding of the integrated system of society, the natural world, and the alterations humans bring to Earth as well as the interdependency of our social, economic and natural systems.

Appalachian State University seeks to support student research and creative efforts through grants that help us to understand our natural, economic and human/cultural systems and their interrelationships. As an example, we see that human systems affect the natural environment and the state of the natural environment affects human societies, human health and our well-being.

Human well-being and our quality of life is a function of physical, natural and human systems. We depend on nature and ecosystem services to provide the conditions for a decent, just, healthy and humane life.

We have made unprecedented changes in our natural systems in recent decades to meet growing demands for food, fresh water, fiber, and energy. These changes have helped to improve our lives, but at the same time they have weakened nature’s ability to deliver key services. The changes may also have benefited some in society but may not be advantageous to all.

We are faced with many problems such as the dire state of many of the world’s fish stocks as well as imminent loss of various insects and other animals; the vulnerability of people living in dry regions who suffer directly from the loss of ecosystem services, especially access to enough clean water; and the growing threat to ecosystems from climate change.

Human actions are threatening the planet and our natural and human systems (Assessment, Millennium Ecosystem (2005). Living Beyond our Means: Natural Assets and Human Well-Being.)

Supporting Student Research and Creative Efforts

Appalachian State University supports the concept of a healthy just and sustainable society. We believe that we can enhance human well-being through the use of economic, natural and human resources. We will be making grants available for up to $500 (for a one year research project for a single student),
$1,000 to support a student group initiative for one year. Collaborative project descriptions should explain the contribution of each team member to the group effort and the value of the team collaboration to the proposed project. Proposals are to describe a question, problem or issue as a basis for the project, the systematic process that will be used in the investigation, and the importance of the proposed research or creative activity.

**Summary of Student Research Awards**

| Number of Awards: | 20 |
| Amount of Funding Awarded: | $8,937 |

Mary Kathryn Bruning  
Mentor: Dr. Lynn Siefferman, Department of Biology  
Funding: Provided by the RIEEE - $200  
Title: Investigation of Human Activities on Responses of Wild Birds  
- A supplemental award was made by the Office of Student Research in addition to the award under this solicitation

Taylor Krivenki  
Mentor: Dr. Brett Taubman, Department of Chemistry  
Funding: Provided by RIEEE - $200  
Title: Comparative Analysis of Hop Essential Oil Stability  
* A supplemental award was made by the Office of Student Research in addition to the award under this solicitation

Katherine Meeks;  
Mentor: Gary Nemcosky, Art  
Funding: Provided by RIEEE - $200  
Title: Illusory Permanence: the Persistence of Nature  
* A supplemental award was made by the Office of Student Research in addition to the award under this solicitation

Reva Michael  
Mentor: Michael Gangloff, Department of Biology  
Funding: Provided by RIEEE - $350  
Title: Water Quality Effects Through Changing Land Use on Snail Populations

Peter Nasuti  
Mentor: Dr. Chris Badurek, Department of Geography & Planning  
Funding: Provided by RIEEE - $500  
Title: Use of a Low-Cost UAV for Collecting 3D Point Cloud Data for Analysis of Land Use Change

Elizabeth Roden  
Mentor: Dr. James Houser, Department of Technology & Design
Funding: Provided by RIEEE - $342
Title: Ultimate Balanced Algae Production System for Bioremediation

Frances Vierela
Mentor: Dr. Michael Madritch, Department of Biology
Funding: Provided by RIEEE - $500
Title: Genetically-modified variation in Carolina hemlock and resistance to hemlock woolly adelgid

Courtney Baines-Smith
Mentor: Dr. Rachel Wilson, Department of Curriculum and Instruction
Funding: Provided by the RIEEE - $500
Title: Garden-Based Education Teacher Training

Matthew Cartabuke
Mentor: Dr. James Westerman, Department of Management
Funding: Provided by the Walker College of Business - $500
Title: Social Justice Perceptions of Higher Education Students

Aaron Fairbanks
Mentor: Dr. Tricia Treacy
Funding: Funding provided by the College of Fine and Applied Arts - $500
Title: Recess

Kara Flowers
Mentor: Dr. Jeff Motter, Communication
Funding: Provided by the College of Fine and Applied Arts - $500
Title: Civic Engagement: What Can Students Do?

Alexis Gropper
Mentor: John Walker, Department of Biology
Funding: Provided by the RIEEE - $500
Title: Mycoremediation of Oil Contamination in the Ecuadorian Amazon

Kathy Henson
Mentor: Dr. Leslie McLees
Funding: Provided by RIEEE - $500
Title: Bicycling in Boone: Safety, Citizenship and Informality
David Walker  
Mentor: Dr. Pat Beaver, Appalachian Studies  
Funding: Provided by RIEEE - $250  
Title: Cultivating Community: Employing Appalachian State University’s Edible Schoolyard (ESY) as a University and Community Gathering Place and Incubator for Community Garden Best Practices

Andrew Zimmer  
Mentor: Dr. Stephanie West, Department of Health Leisure and Exercise Science  
Funding: Provided by the College of Health Sciences - $500  
Project Title: The Privilege of Eating Local Food: A Qualitative Study Exploring Low Income Families' Food Choices

Michael Neff  
Mentor: Dr. Erik Rabinowitz, Department of Health Leisure and Exercise Science  
Funding: Provided by the College of Health Sciences - $500  
Project Title: Sustainability in Ski Resorts

Amber Taylor  
Mentor: Dr. Rebecca Battista, Department of Health Leisure and Exercise Science  
Funding: Provided by the College of Health Sciences - $1,000  
Project Title: Active Today = Healthy Tomorrow

Kate Miller  
Mentor: Dr. Melissa Weddell, Department of Health Leisure and Exercise Science  
Funding: Provided by the College of Health Sciences - $495  
Project Title: An Evaluation of Sustainable Food Tourism in the Appalachian Region: A Case Study of Marketing a Tourist Oriented Map Guide

Courtney Goodman  
Mentor: Dr. Jeffrey McBride, Department of Health Leisure and Exercise Science  
Funding: Provided by the College of Health Sciences - $500  
Project Title: Effects of Strength Training on Measures of Ankle Stiffness and Mechanical Efficiency

Leslie McCullen  
Mentor: Dr. Root Martin, Department of Nutrition and Health Care Management  
Funding: Provided by the College of Health Sciences - $400  
Project Title: Measuring triterpenoids in North Carolina Apples 2013-2014
Selected Results from Student Research Projects

(Note that all students were asked to provide a summary of the results of their research. The following reflects the reports provided by the students.

Matthew Cartabuke
Mentor: Dr. James Westerman  Department of Management
Funding: Provided by the Walker College of Business -
Title: Social Justice Perceptions of Higher Education Students

Project Description: Empathy is a person’s other-oriented feelings for the perceived welfare of others, which may represent a fundamental building block in creating a healthy, just, and sustainable society. Social psychology literature has firmly established empathy as an antecedent to both altruism and pro-social behaviors. Empathy also has been demonstrated to affect feelings of justice. Further, empathy has been demonstrated as an important predictor of ethical behaviors in business students, which may be particularly important as business organizations represent a key element in creating a more sustainable and just society.

Hypothesis: Empathy will function as an antecedent to social justice attitudes.

Methodology: The study examines empathy as an antecedent to perceptions of societal fairness as measured by four different business variables including: concern for the Occupy Wall Street movement, social justice fairness, corporate social responsibility and socially responsible attitudes. This study examines empathy as a construct and its relation to social justice perceptions. Data was collected from a student sample (eighteen years or older) taken from the undergraduate population of Appalachian State University. The subjects are students enrolled in the business and psychology. Regression analyses was run between empathy (the IV) and concern for the four social justice variables (Occupy Wall Street, social justice fairness, corporate social responsibility, and socially responsible attitudes).

Results: A significant relationship was found for each variable in relation to empathy even when controlling for the affect of inter-correlations among variables, and controlling for parent's income (SES), GPA, previous employment and gender (despite women scoring higher on the empathy scale).

Presentations: Appalachian Regional Business Symposium in Johnson City, TN at Eastern Tennessee University on March 21st. A paper on this research has been accepted for a poster presentation at the Southern Management Association's Conference in Savannah, GA this November 11-15.

Katherine Meeks
Mentor: Gary Nemcosky, Art
Title: Illusory Permanence: the Persistence of Nature

Results: A mixed media installation in the Looking Glass Gallery of the Plemmons Student Union at Appalachian State University, titled Illusory Permanence: the Persistence of Nature. The project is viewable at: http://www.artistkatherinemeeks.com/exhibitions/2013/12/2/illusory-permanence-the-persistence-of-nature

A B.A in Fine Arts thesis is available in the ASU Library (http://static.squarespace.com/static/53399ef6e4b0f7a008a59e12/t/533a1abde4b0753fa167503f/1396316861655/Thesis%20Document.pdf).

University Bachelors of Fine Arts. Honors Thesis. BFA. 2nd Place and the Plemmons Student Union Purchase Award. April 6, 2014. Appalachian State University.

Articles about the project may be seen in University News (http://www.news.appstate.edu/2013/12/08/katherine-meeks/) and Mountain Times (http://mountaintimes.com/art/articles/The-Persistence-of-Nature-id-024842).

After the exhibit ended, one third of the installation, Illusory Permanence: Cracks won second place overall in Art Expo 2014, juried by Cora Fisher. It was also purchased by the Plemmons Student Union and will be part of the PSU Permanent Collections.

Illusory Permanence: Cracks Plemmons Student Union, Appalachian State University

Illusory Permanence: Dissolution, in Christopher Mello's public garden in Asheville, NC.

Another third of the installation, Illusory Permanence: Dissolution, found a permanent home in Christopher Mello's public garden in Asheville, NC (http://www.artistkatherinemeeks.com/exhibitions/2014/5/26/illusory-permanence-dissolution). The remaining plants were returned to the earth.

About Illusory Permanence: Dissolution: The chemical stability of the ceramic vines mirrors humanity’s egotistical desire for permanence of our record upon the earth, in utility and celebrity. Conversely, the intended cracking, shifting, and eventual surrender to natural forces illustrates that impossibility. I invite both deterioration and overgrowth and consider it integral to the meaning of the work. This piece will always be unfinished, as time, nature, and human interaction all play an important role in its execution.

As citizens of planet Earth, we are all inherently creators, whether we create dwellings, artifacts, people, or waste. We alter the space around us in both identifiable and hidden ways. We change the makeup of the atmosphere with every breath, every inhale and exhale. We build roads, structures, and highly engineered spaces for food production. We find the “new” appealing and herald it as a solution to a problem. We strive for permanence. Yet a myriad of natural processes outside our control work continually in opposition. Entropy has no particular goal but works constantly and unrelentingly to return the ordered to a state of disorder.
Kathy Henson  
**Title:** Bicycling in Boone: Safety, Citizenship and Informality  
**Mentor:** Dr. Leslie McLees, Department of Geography and Planning

---

**Biking in Boone**  
**A Qualitative Study of Commuters**

**Kathy Henson**  
**Leslie McLees, Faculty Advisor**  
**Appalachian State University: Geography and Planning Department**

**Introduction**

Boone lacks good infrastructure for bicycling, in spite of the recent additions of bike lanes on some roads. But some people bicycle to work or school in spite of the unfriendly environment. To do so, cyclists may resort to practices that are non-standard, unexpected, or creative. I want to investigate these informal practices and how safety discourses affect cyclists’ strategies for navigating an urban environment that privileges cars.

**What I Hope to Learn**

- What problems in Boone’s built environment discourage cycling?
- How do cyclists use creative and improvisational tactics to “make do” with a system that was not built for them?
- How do safety messages affect cyclists’ views of their own rights to the road?

**Qualitative Methods**

Crash data and other aggregate data are useful but only show one part of the story. Qualitative methods can help us understand cyclists’ decision-making processes as they confront poor infrastructure and process media messages about road safety and their rights.

**Visual Methods**

Participants will attach a waterproof video camera to their bikes to record their commute to work or school in Boone.

**Interviews**

Follow-up interviews will allow me to further explore the commuting experience with each cyclist, collect information about how they cope with the physical environment, and understand the extent to which they have internalized safety messages and how that may affect their behavior and views about their rights as cyclists.

**Discussion**

Living in places where walking and biking are accommodated is good for people’s health, mental well-being, and their ability to access services. Unfortunately, Boone lags behind other towns in the state and the nation in becoming bike-friendly. Obstacles to cycling can be infrastructural, but they can also be a matter of discourse. In addition to exploring environmental problems, this project will attempt to understand how cyclists may have internalized messages that disproportionately place the responsibility for safety on cyclists and may reveal problems with the way we talk about road safety in a car-dominated culture. A better understanding of these issues can help citizens and planners advocate for more sustainable and livable communities, making Boone a better place to live and work.

**Financial Support**

Funding for equipment was provided by a Creating a Healthy, Just, and Sustainable Society Student Research Grant.

**Timeline**

Video data and interviews will be collected during the spring and summer of 2014. The project is still recruiting participants.

---

Leslie McCullen  
**Mentor:** Dr. Root Martin, Department of Nutrition and Health Care Management  
**Project Title:** Measuring triterpenoids in North Carolina Apples 2013-2014

**Purpose of the Study:** To enhance nutrition and health promotion by developing a method to measure the levels of acids in the varieties of North Carolina apples.

Triterpenoids are a family of chemical; a methods for triterpenoid extraction from apple peels and pulps is being developed. Triterpenoids are a family of chemical compounds that have a variety of health promoting properties such as anticancer, anti-inflammatory, and anti-diabetic properties.
Project Title: The Privilege of Eating Local Food: A Qualitative Study Exploring Low Income Families’ Food Choices
Student: Kate Miller
Mentor: Dr. Melissa Weddell, Department of Health Leisure and Exercise Science

Project Purpose:

The purpose of this exploratory research is to gain insight into the food choices of low income families, specifically regarding local foods. Qualitative interviews will be conducted to better understand the choices families utilizing SNAP make when purchasing food.

Methodology: The Appalachian District Health Department (ADHD) is collaborating in recruiting subjects. Individual interviews have been held with each respondent. Interviews lasted approximately 45 minutes to one hour and included a series of questions related to sustainable living with a focus on local food purchase decisions. Fifteen people as of June 2014 have been interviewed.

Preliminary Conclusions: Preliminary conclusions include:
- Participants who knew about the farmers’ market did enjoy attending.
- Some participants were unaware of the market.
- Participants that attended found the market environment welcoming.
- They understand the value of eating local foods.
- Participants who did not attend or attended rarely cited constraints that included lack of time/schedule, location and time of market, and ease of shopping at supermarket.

Courtney Baines Smith
Doctoral Student, College of Education
Appalachian State University
Title: Outdoor Sustainability Classrooms: The Many Benefits of Learning Gardens

About the Research: A ‘Learning Garden’ is a garden established at a school or learning center that serves as an outdoor classroom to offer a variety of experiential lessons including nutrition, ecology, food systems, agriculture, earth systems and consumer choices.

Purpose: To assess how teacher attitudes concerning nutrition, ecology, food systems, agriculture, earth systems and consumer choices impact student learning and can be overcome. The project will demonstrate the viability of establishing a learning garden in a preschool setting and how offering a brief teacher training affects teacher attitudes in a positive way.

Methodology: The project investigates how a brief introductory training program affects attitudes of preschool teachers and assistants about the operation and benefits of learning gardens. The barriers to student learning will be overcome by providing a mini-training program that informs teachers of the benefits and operational details of a learning garden. A ‘Learning Garden’ was established at the Appalachian State University Child Development Center in the spring of 2014. Training programs will be 6 hours over a one to three week period. The garden is constructed. Two types of gardens are offered to allow for multiple seasons of garden-based education. For summer and fall, harvest, Sharon Lovejoy’s Zuni waffle garden will be planted which will feature the ‘three sisters’ trios of corn-beans-squash and
sunflowers-peas-pumpkins. For early spring and winter, a mini-greenhouse will provide a place to grow greens and seed-starts. The targeted audience is pre-K educators in the High Country.

**Results:** A weekly garden lesson has been led with the pre-K children every Tuesday morning. The children have been learning about plants, bugs, soil, water, nutrition, team-work, food production, counting, literacy, and commitment. An Earth Month Celebration was hosted at the garden (flyer attached) where parents and community members were invited to learn about the garden. A workshop at the garden is scheduled for July 10th at 5:30. During this workshop a presentation will be made to highlight the connections between sustainability education and learning gardens. The intended audience is anyone interested in learning gardens, parents of young children, formal and informal educators, and potential school garden volunteers.