

## THEMATIC AREA:

# WORKING LANDS

**MISSION:** *To improve planning and integration of “working lands” (which include urbanized, agricultural, forestry, industrial, and energy development) and conservation interests.*

*[Science objective]* Develop a better understanding of how potential land use changes will affect conservation goals and how these effects can be avoided or mitigated to reduce economic impacts and pressures on the natural resources of the Appalachian region (in order).

*[Management objective]* Collaboratively meet economic development and conservation management goals through improved decision-making and resource management.

## A. HEADING: REGIONAL LEVEL

### 1. PROGRAM: Landscape-level Disturbances & System-level Response

**PROGRAM DESCRIPTION:** *Develop/compile information about new or expanding land development (e.g. urbanization, energy) within the LCC and the opportunities and cumulative impacts these have on fish and wildlife. Examines major disturbances (includes climate change) as well as the impacts associated with these, regardless of ecological organization (e.g., community, species, population).*

*(Grouping) – Foundational/Stock-taking Assessment/Classification System*

- **Project Description:** Collaborate with NRCS to obtain data on private agricultural lands enrolled in federal farm bill programs, indicating an existing level of conservation.

*(Grouping) – Climate Change Science and Abiotic or Mechanical Aspects*

*(Grouping) – Climate Change Impacts on Ecological Function and Response to Changes*

- **Project Description:** Profile human populations that manage resource in geographical areas projected to experience adverse impacts.

*(Grouping) – Energy and Related Infrastructure and Roads*

- **Project Description:** Model the impacts of strategically mitigating impacts of water discharges and land disturbance associated with Abandoned Mine Lands (AML).
- **Project Description:** Forecast Energy Development in new or expanding markets (shale, wind, biomass).

[AppLCC FY11/12 Funded Project (Kiesecker, The Nature Conservancy) “Forecast

Resource Extraction” -- to forecast energy development for shale, wind, and coal for 20-year timeframe and produce geospatial displays.]

- **Project Description:** Develop a scientific method of weighing the benefits of energy development and the costs of conservation value of lands (mitigation banking, carbon sequestration, monetizing ecosystem services.)
- **Project Description:** Estimate demand for energy use with increased temperatures resulting from predicted climate change: assess increases in electricity use and as it relates to heat island effect. Consider how demand for different types of energy may change as supply (and therefore prices) changes?
- **Project Description:** Develop guidance for water withdrawals for natural gas, abandoned mine lands (AML) and other energy uses.

[AppLCC FY11/12 Funded Project (Fisher & Walter / Cornell University) “Development of a hydrologic foundation and flow-ecology relationships for monitoring riverine resources in the Marcellus Shale region”]

- o **(related) Project Description:** Research question: What’s going to happen with land ownership (in light of gas production)? Ownership is key. Concern that lands will revert to local governments.
- **Project Description:** Determine the effects of land use alterations in the energy industry on species, populations, and natural communities.
  - o **(related) Project Description:** Effects of shale gas development on aquatic communities, and thresholds of ecological impacts as it relates to this energy sector activity.
  - o **(related) Project Description:** Effects of shale gas development] on avian communities, and thresholds of ecological impacts as it relates to this energy sector activity.
- **Project Description:** Map areas of energy development or energy extraction sites (present and predicted) for use by researchers and/or to look for focus areas for research? [COP Comment: (for this Grouping) A minelands DST is under development now (Feb 2013) by partners within AMJV; need to ensure coordination between JV and LCC.]

(Grouping) – *Urbanization, Population Growth and (Domestic or Industrial) Water Demands*

- **Project Description:** Develop/ compile information about the ongoing/ future conversion of agricultural land to urban and suburban uses within the LCC and the impacts these changes are having on the character and distribution of human communities and fish and wildlife habitats so that partner agencies may be better able to understand system dynamics and

recommend alternatives to minimize future land-use conflicts involving human communities, wildlife, and ecosystem service functions. *[COP Comments: 1) To most effectively meet this goal, work with NRCS to obtain data on current conservation practices impacting local species. Use the census of Agriculture databases to profile changes in landscape specifically related to number of farms and size of farms at the county level. Also consult with the Farmland Trust to determine conservation activities. 2) Seems like a lot of the modeling and study of urbanization has been done or is on-going focus of partners like USDA FS and EPA. LCC should retain focus on those models and their effects on the biotic community, but we may need some more basic science to be able to link the biotic response to the predicted changes from urbanization models.]*

- o **(related) Project Description:** Create spatially-explicit econometric urbanization model coupled with habitat models playing out different scenarios – future projections – for this type of development; forecast future spatial footprint of development in 20 years in light of changes to demand, technology and regulation; develop scenario simulations to evaluate effects of different policies and market conditions. Need social science research into policy option and natural resource impacts given a particular policy direction. There are good models to help with our understanding. Model land use change resulting from urban growth.
- o **(related/component):** Develop decision-support tools for growth assessments/projections; run scenarios at a landscape level.
- o **(related/component):** Develop planning decision support tools to assist state and local governments and other agencies with jurisdictional decision-making power to make informed land use change decisions. *[COP Comment: Much of this work is being done on a state-by-state basis...landscape scale coordination could greatly enhance these efforts.]*
- **Project Description:** Human population shifts – need to understand complexities of population growth/urbanization patterns. *[COP Comments: Identify land grant and private Universities that have special population study institutes to obtain land use changes, example Texas A&M University.]*
  - o **(related) Project Description:** Update the 1996 (SAMAB) Southern Appalachian Man and the Biosphere report (Chapter 3 – Changing Demographics and Economic Conditions in Southern. Appalachia.
- **Project Description:** Assess the effects of land use change on the quality of life of human populations.

(Grouping) – Agricultural Expansion and (Ag-related) Water Demands

- **Project Description:** Establish a working agreement with the USDA-NRCS to identify current conservation practices on private lands focusing on irrigation management and other related agricultural water practices.
- **Project Description:** Establish a task force to address the quantity and quality of water on agricultural lands in light of urban encroachment on rural landscapes. Obtain data from local state and Federal agencies along with non-profits to identify the number and types of small specialized agricultural operations that impact water resources.

(Grouping) – *Effects of Air Pollution*

- **Project Description:** Establish a working group across Federal, State, and Local agencies, along with private non-profit organizations for long-term monitoring of air quality parameters across Appalachian LCC due to acid deposition, mercury, sulfur, and ozone.

(Grouping) – *Cumulative Impact*

- **Project Description:** Develop a landscape-scale approach for evaluating cumulative impacts of land use change, including human population characteristics, using satellite imagery, aerial photography, and geographic information systems.
  - o **(related) Project Description:** Develop a shared database, system or method for tracking land use conversions over time.
  - o **(related) Project Description:** Forecast land-cover changes based on economic drivers and other factors. Note: Include climate change models, but incorporate other LULC changes (urbanization, etc.). Institute a tracking system to develop uniform methodology and improved coordination, and facilitate adjustments for forecasts over time.
- **Project Description:** Identify indicator species (also known as representative or surrogate species), as a means of tracking effects of land use change (development impacts, edge effects, etc.) on habitats and species assemblages.

## B. HEADING: HUMAN DIMENSIONS

### 2. PROGRAM: Social Component

*For activities related to information and education it will be important to develop a socioeconomic profile of the human population managing the resources. If the human population is on agricultural lands, social characteristics such as tenure on the land, age, formal level of education, income derived from agriculture, experience with conservation practices/ systems, etc., will be key in assessing the attitudes and behaviors relative to the*

*protection and enhancement of working lands, forest management (with a specific emphasis on ecological services).*

*(Grouping) – Value/Ecosystem Services and Conflict*

- **Project Description:** Conduct opinion survey to understand people/group motivations and values as they relate to making decisions that involve trade-offs between environmental sustainability and human needs or desires. Purpose: Support ability to craft communication products that are sensitive to public motivations and values, but are also effective conservation tools.
- **Project Description:** Conduct research into economics of small landowner forestry practices (example of oak forests). *[COP Comment: Can we find triggers or tipping points that enable small landowners to more sustainably manage forested lands? Identify in detail the human characteristics of landowners/ producers managing the resources on small acreage of land with forested and agricultural tracks (row crops and livestock). Assess barriers to participation in conservation activities and develop strategies to overcome identified barriers.]*
- **Project Description:** Need to identify the drivers of environmental change. Need to define this around multiple sectors (forest products, [energy] industry, urbanization, etc.).
- **Project Description:** To more effectively promote adaptation, it will be important to develop a socioeconomic profile of the population within the Region. Most specifically, it is important to develop a socioeconomic profile at local levels that have been identified as having vulnerable species, populations, or are where climate estimates indicate that species will be adversely impacted by climate change.

*(Grouping) – Recreational, Commercial, Subsistence Use*

- **Project Description:** Impacts of land use alterations on [availability and types of outdoor] recreation.
- **Project Description:** Submit a request for proposals for a comprehensive socioeconomic study, which will include the evaluation of the inter-relatedness of other ecosystem services and recreation: Focus on brook trout and freshwater mussels.
  - o **(related) Project Description:** Evaluate [the implications of] resource management [decisions/policies] on socioeconomic values: especially the relationship between brook trout and socioeconomic benefits.
- **Project Description:** Establish a task force across government agencies, private and non-profit organizations to identify published and unpublished reports that address the cultural and overall social value of outdoor recreational activities in the Appalachian Mountains.

A summary report of the findings should include data gaps at specific geographic areas and recommend methods to obtain incomplete data.

## B. HEADING: SYSTEM LEVEL

### 3. PROGRAM: Ecological Functions of Managed/Human-Altered Systems

(Grouping) – *Foundational/Stock-taking Assessment/Classification System*

- **Project Description:** Fund a contract with an upper level or graduate GIS specialist to Map land use practices to identify vulnerable ecosystem services.
- **Project Description:** Create a task force to develop an electronic template that would facilitate the measurement and tracking of the degradation of Soundscapes.
- **Project Description:** Create a task force to develop an electronic template that would facilitate the measurement and tracking of the degradation of Viewsheds.

(Grouping) – *Barriers (flows and species movement)*

(Grouping) – *Mitigating Ag and Forestry Impacts*

- **Project Description:** Develop new/enhanced sustainable Ag and Forestland management practices.

(Grouping) – *Protection & Restoration Approaches*

- **Project Description:** Explore how species and habitat restoration can mitigate land use stressors.

### 4. PROGRAM: Ecological Functions of Natural/Intact Systems

(Grouping) – *Foundational/Stock-taking Assessment/Classification System*

(Grouping) – *Effects of Fire on Ecosystems*

- **Project Description:** Work with federal, state and local partners to assess conservation practices related to fire and prescribed burning.
- **Project Description:** Assess human populations that are most vulnerable to increasing temperature and fire- characteristics of the population such as age, transportation routes to and from fire hazard areas.

- **Project Description:** Work with NRCS as partner to determine areas that use prescribed burning as a conservation practice.

(Grouping) – *Relationship/ Ecological flows and Nutrient dynamics*

- **Project Description:** Stream classification system and subsequent geospatial data used to quantify the amount and types of streams and rivers allowing conservation partners to better allocate conservation actions and resources, and recommend flow and hydrology policies and management actions for streams that lack site specific data. To effectively accomplish this project, consider partnering with EPA, NRCS and private non-profit organizations such as the Chesapeake Bay foundation to share data on project elements.

[AppLCC FY11/12 Funded Project (Anderson et al., The Nature Conservancy & ORNL) “A Stream Classification System for the Appalachian Landscape Conservation Cooperative”]

(Grouping) – *Ecosystem Integrity/Resiliency*

- **Project Description:** Coarse-filter assessments of ecological integrity and resilience to complement priority species approach. *[COP Comment: Examples include CAPS in Massachusetts and Geophysical and Resilient System Approach to Climate Change Adaptation proposed by TNC in the Northeast.*
- **Project Description:** Comprehensive/validated road/transportation maps/data layers (for use in corridor, connectivity, invasive species analyses etc.).
- **Project Description:** Develop comprehensive models that consider terrestrial and aquatic conservation needs by incorporating an aquatic component (e.g. stream and river networks) into terrestrial landscape models.

## D. HEADING: COMMUNITY LEVEL

### 5. PROGRAM: Community Level (Description and Function or Basic Community Ecology)

(Grouping) – *Basic Ecology/Ecological Relationships*

- **Project Description:** Assessment of assumptions related to use of focal or representative species approach to guide development of decision support tools, i.e. do these approaches adequately represent larger sets of species and how do they compare to coarse-filter approaches.

## E. HEADING: SPECIES/POPULATION LEVEL

### 6. PROGRAM: Basic Biological Understanding (Species-level)

(Grouping) – *Basic Biological Information*

- **Project Description:** Develop a phenological index of ecological health using high elevation communities.
- **Project Description:** Basic biological response information as it relates to key species/populations. [*LCC Staff Comment: COP needs to elaborate, provide specific details on areas of interest/importance.*]
- **Project Description:** Support a multi-scale vulnerability assessment (that incorporate species-specific physiological data) to identify habitats and species that would be most vulnerable to climate change in the LCC. This also needs to involve information on the human populations that are impacted by these climate changes. Coarse and fine scale. [*COP Comment: physiology includes environmental physiology, species-specific data- what are the thermal tolerances, and seasonal cues for organisms, and when plugged into population models, the predicted impact on the population level processes.*]

[**AppLCC FY11/12 Funded Project** (Young et al., NatureServe) “Understanding Land Use and Climate Change in the Appalachian Landscape “]

- **Project Description:** Identify effect of changing climate on species migration and distribution [across the AppLCC].
- **Project Description:** Landscape genetics-mine data from multi-species, multi-organizations to add as layers on landscape level spatial analysis. This will allow the identification of “genetic corridors” for obvious or cryptic movement of organisms, and “genetic hot-spots,” or areas that multiple species have high levels of genetic diversity to facilitate biological planning.
- **Project Description:** Species-habitat models that allow for the assessment of the capability of habitats to support populations at objective levels at present and in the future. Most existing species-habitat models do not allow for assessments of capacity, abundance or persistence/resilience.
- **Project Description:** Updated comprehensive population surveys-what are the current distributions, habitat preferences, and community/ecological necessities for organisms.



(Grouping) – *At-Risk Species/Populations & Endemics*

- **Project Description:** Climate change impacts on endemic and other native communities within the LCC including disease, range/habitat, breeding/spawning locations, migration routes {esp. aquatics}.
  - o **(related) Project Description:** Establish endemic species population trends [to investigate possible] relationships to climate change influences. Establish a profile of the human populations that manage the aquatic and endemic communities.

(Grouping) – *Contaminants/Pollutants Effects on Species/Populations*

- **Project Description:** Work with federal, state and local agencies such as EPA and NRCS, and state agencies with parallel missions to obtain data relative to nutrient runoff and the human populations that have been targeted to reduce point and non-point source pollutants.

(Grouping) – *Invasive Organisms Effect on Species and Populations*

- **Project Description:** Identify [inter-related] effect of changing climate on invasives including: zoonotic and wildlife diseases, exotic plant and animal distribution {esp. in forests}.
- **Project Description:** [Document] climate change influences on invasive species across the US.

(Grouping) – *Effects of Disease (on a species or taxonomic group)*

## F. HEADING: “HOW (THE LCC) SHOULD DO BUSINESS”

- Make conflict resolution and consensus building training more widely available in the conservation community; consider hosting joint sessions with industry or other public interests.
- Consider establishing and funding a full time social science position at the GS 12-14 level. The position should focus on establishing and sustaining working relationships in the form of inter-agency and inter-organizational networks. Often the missions of the various members of the network are similar to the goals and objectives of the AppLCC. Position requirement should focus on the fields of rural sociology and sociology, with a specific experience in community action research. The position should allow for short-term contracts establishing cooperative agreements with universities.
- Work with land trusts and land grant universities.