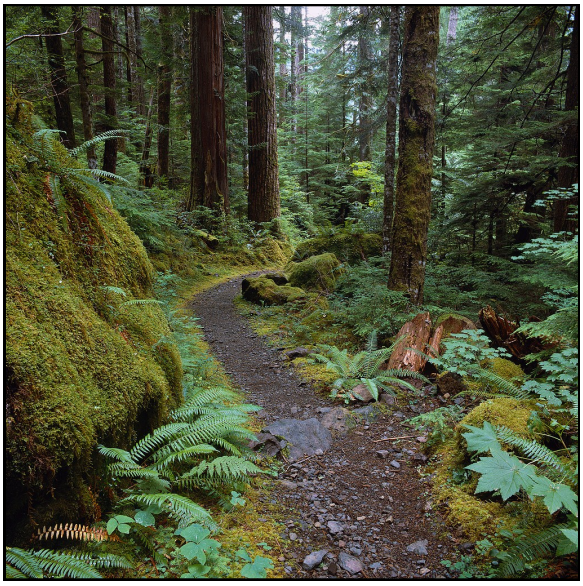
Centre County Planning Opportunities

Forests

Centre County Comprehensive Plan—Phase II
Implementation Strategies

Introduction



In 2003, the Centre County Board of Commissioners adopted a County-wide Comprehensive Plan which included background studies, inventories of existing conditions, goals, and recommendations. These recommendations, revised and updated, continue to serve as a vision and a general direction for policy and community improvement. Those specific to forestland management, conservation, and threats to forests will be discussed here along with implementation tools to achieve the recommendations. For more detailed background information please refer to the 2003 Comprehensive Plan available on the Centre County Planning and Community Development webpage at:

http://centrecountypa.gov/index.aspx?NID=207.

The Keystone Principles

In 2005, Pennsylvania adopted the "Keystone Principles for Growth, Investment and Resource Conservation", a set of principles that have focused Pennsylvania on reinvestment and reuse of its assets.

Initially intended for state agencies, these principles are becoming embraced by local governments as a tool to guide local decisions and have become adopted into county comprehensive plans.

- Redevelop first
- Provide efficient infrastructure
- Concentrate development
- Increase job opportunities
- Foster sustainable businesses
- Restore and enhance the environment
- Enhance recreational and heritage resources
- Expand housing opportunities
- Plan regionally and implement locally
- Be fair

This plan update recommends county-wide adoption of these principles.

County-wide Planning Goals

Adopted 2003

#1 — Identify, preserve, enhance and monitor agricultural resources.

#2 — Identify, conserve, and monitor environmental and natural resources.

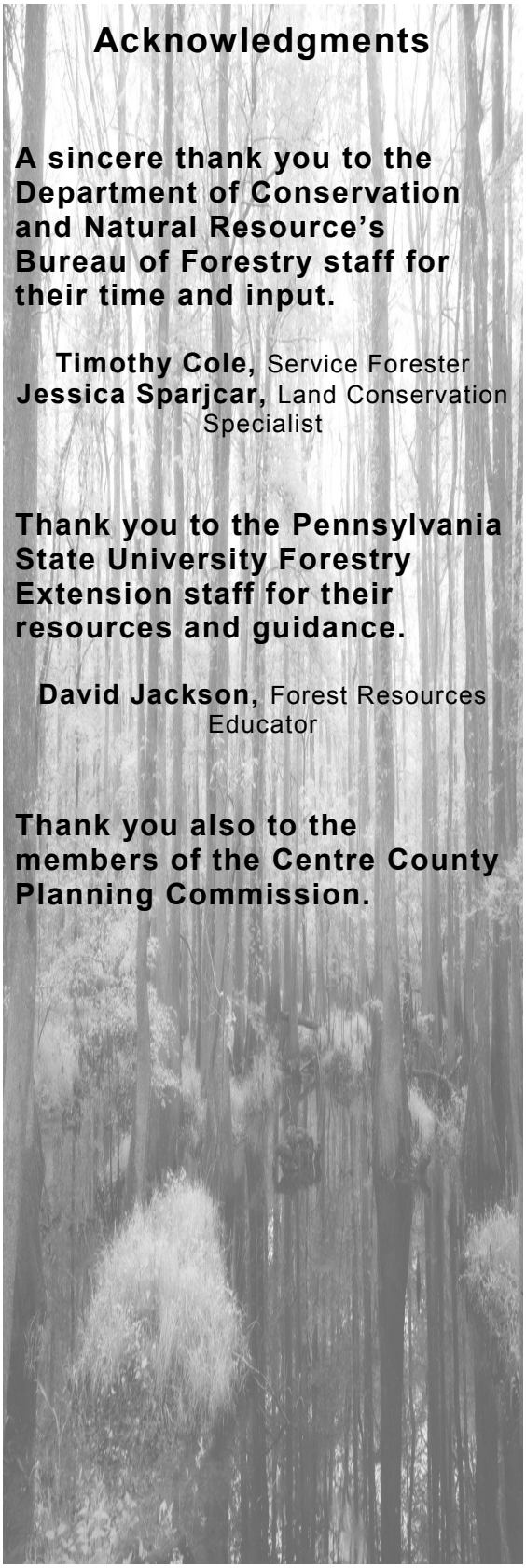
#3 — Preserve historic and cultural resources.

#4 — Ensure decent, safe, sanitary and affordable housing in suitable living surroundings, compatible with the environment for all individuals.

#5 — Appropriately locate and maintain existing and proposed community facilities, utilities, and services for all residents.

#6 — Identify and promote economic development initiatives to maintain and grow a diverse economic base in each of the County's planning regions.

Table of Contents



Acknowledgments

A sincere thank you to the Department of Conservation and Natural Resource's Bureau of Forestry staff for their time and input.

Timothy Cole, Service Forester
Jessica Sparjcar, Land Conservation Specialist

Thank you to the Pennsylvania State University Forestry Extension staff for their resources and guidance.

David Jackson, Forest Resources Educator

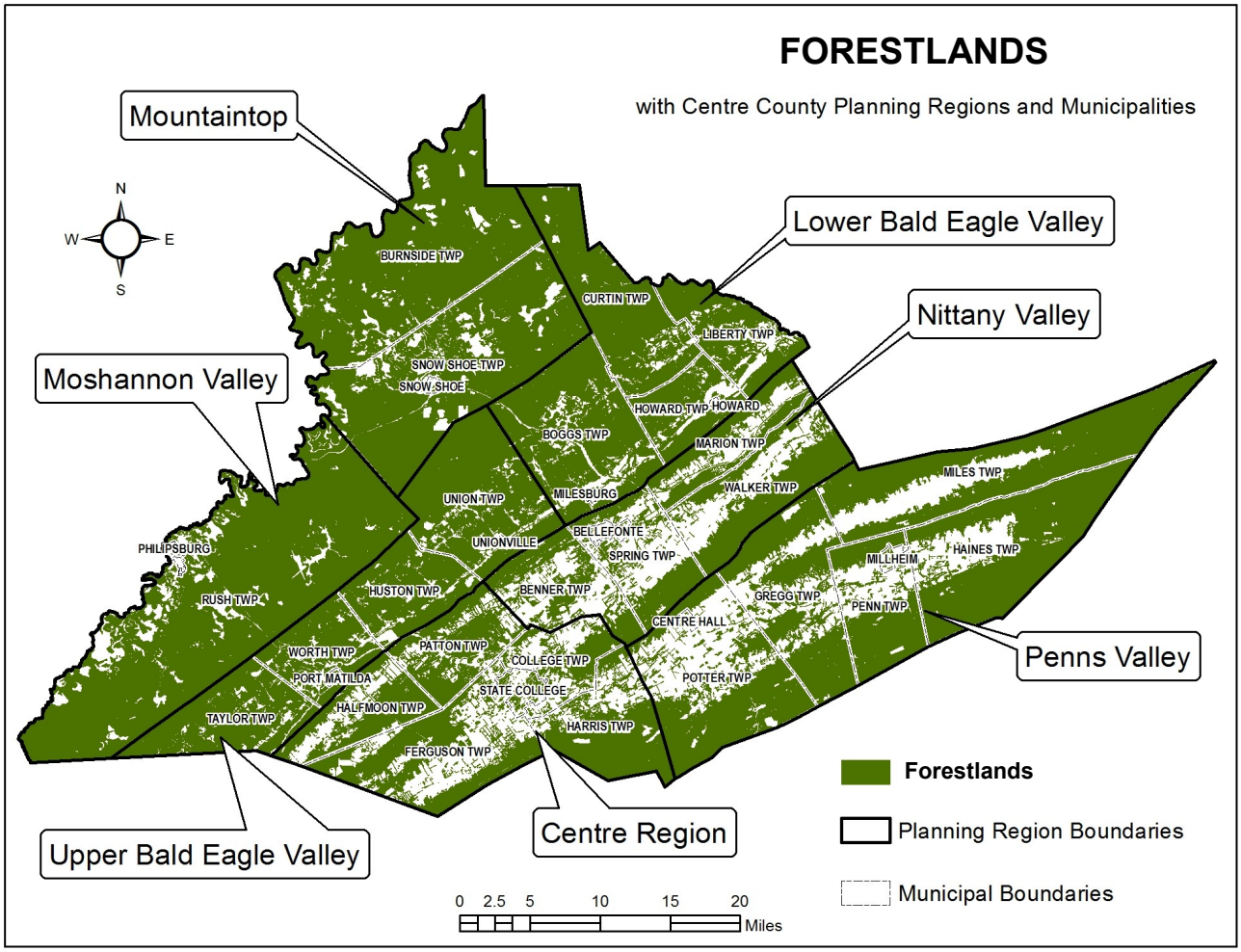
Thank you also to the members of the Centre County Planning Commission.

Current Trends and Considerations:

Forestlands cover 71.5% of Centre County (2012 Land Use Survey update). Across all County Planning Regions, forests dominate the landscape:

- Centre Region, 49,068 acres or 51%;
- Lower Bald Eagle Valley Region, 70,674 acres or 80%;
- Moshannon Valley Region, 83,744 acres or 87%;
- Mountaintop Region, 96,134 acres or 85%;
- Nittany Valley Region, 34,490 acres or 52%;
- Penns Valley Region, 109,284 acres or 67%;
- Upper Bald Eagle Valley Region, 66, 130 acres or 83%.

The health, continuity, and composition of Centre County's forest lands is influenced by man-made activities and management practices, pests and diseases, invasive species, deer, and forest fires. Deforestation and the resulting forest fragmentation from land use conversions is a significant threat to forests. The reduction and loss of forest cover provides opportunities for non-native species to invade and reshape the landscape, disrupts the ecology of forest functions as a natural groundwater recharge and filtration system, and negatively impacts wildlife habitats and migratory bird patterns. Fragmentation also limits our ability to effectively manage forests for the production of wood products. Sustaining and regenerating forest land for future generations countywide will directly impact recreation and tourism, water and air quality, economic development and job creation, and the intact landscape which comprises the view sheds showcasing the unique ridge and valley geographic province in which Centre County is located. The threats and influences to forests will be discussed in further detail with additional resources and links from the Pennsylvania Bureau of Forestry, the Pennsylvania Game Commission, the Natural Heritage Program, the National Audubon Society, the Natural Lands Trust, the U.S. Forest Service, and the Pennsylvania State University.



Identified issues related to forests

Eight (8) issues related to forests are identified as being important to address both county-wide and within particular planning regions. These issues are not ranked but only listed here, and appear in the table on the opposite page to indicate whether the issue is regional or county-wide. Associated tools and techniques that are applicable to the issue are also listed.

Industrial activities could possibly lead to forest fragmentation and deforestation. Tools and Techniques (Zoning pp. 16, 17 & 18; Vegetation Management/Conservation p. 21; Natural Resources Inventory p. 22; Site Analysis Planning p. 22)

Landowner education is critical to forest sustainability and reducing forestland parcelization. Tools and Techniques (Conservation Easements p. 22; Woodland Legacy Planning p. 23; Clean and Green Program p. 23)

Forest conservation practices protect water quality. Tools and Techniques (Zoning pp. 16, 17 & 18; Open Space/Cluster Development p. 19; Net-out of Natural Resources p. 20; Riparian Buffers p. 20; Lot Averaging p. 21; Vegetation Management/Conservation p. 21; Natural Resources Inventory p. 22; Site Analysis Planning p. 22; Greenway Planning p. 23)

Forest resources support local jobs and add valuable products to the local market. Tools and Techniques (Woodland Legacy Planning p. 23; Clean and Green Program p. 23)

Natural threats to forest health include insects, diseases, plants and animals, both native and invasive. Tools and Techniques (Vegetation Management/Conservation p. 21; Site Analysis Planning p. 22)

Recreational uses on forestlands can be in conflict. Tools and Techniques (Natural Resources Inventory p. 22; Greenway Planning p. 23)

Adjacent land uses can infringe on forest health and species habitat. Tools and Techniques (Zoning pp. 16, 17 & 18; Open Space/Cluster Development p. 19; Net-out of Natural Resources p. 20; Lot Averaging p. 21; Vegetation Management/Conservation p. 21; Natural Resources Inventory p. 22; Site Analysis p. 22; Greenway Planning p. 23)

Urban forests provide economic, environmental, and social benefits. Tools and Techniques (Vegetation Management/Conservation p. 21; Site Analysis Planning p. 22; Greenway Planning p. 23)

Issues by Planning Regions

Page	Issues by Planning Region The issues impacting Centre County's forests have been identified and supporting information provided on referenced pages. The geographic area of the county impacted by these issues is marked by an "X" in the associated planning region column.	COUNTY	CENTRE REGION	LOWER BALD EAGLE VALLEY	MOSHANNON VALLEY	MOUNTAINTOP	NITTANY VALLEY	PENNS VALLEY	UPPER BALD EAGLE VALLEY
Industrial activities could possibly lead to forest fragmentation & deforestation.									
6	Industrial activities								
7	Forest Fragmentation								
7	Deforestation								
Landowner education is critical to forest sustainability & reducing forestland parcelization.									
8	Parcelization								
8	Stewardship								
8	Sustainability								
Forest conservation practices protect source waters.									
9	Forested water quality								
Forest resources support local jobs & add valuable products to the local market.									
10	Forest economics								
Natural threats to forest health include insects, diseases, plants & animals both native and invasive.									
11	Insects								
11	Diseases								
12	Invasive Plants and Trees								
12	Wildfires								
12	White-tailed deer								
Recreational uses on forestlands can be in conflict.									
13	Motorized Recreation								
Adjacent land uses can infringe on forest health & species habitat.									
13	Agriculture								
14	Residential								
14	Wildland Urban Interface								
Urban forests provide economic, environmental & social benefits.									
15	Main Street Communities								

Industrial Activities

Industrial activities within the forested landscape have taken place for decades across Centre County. Industrial activities include:

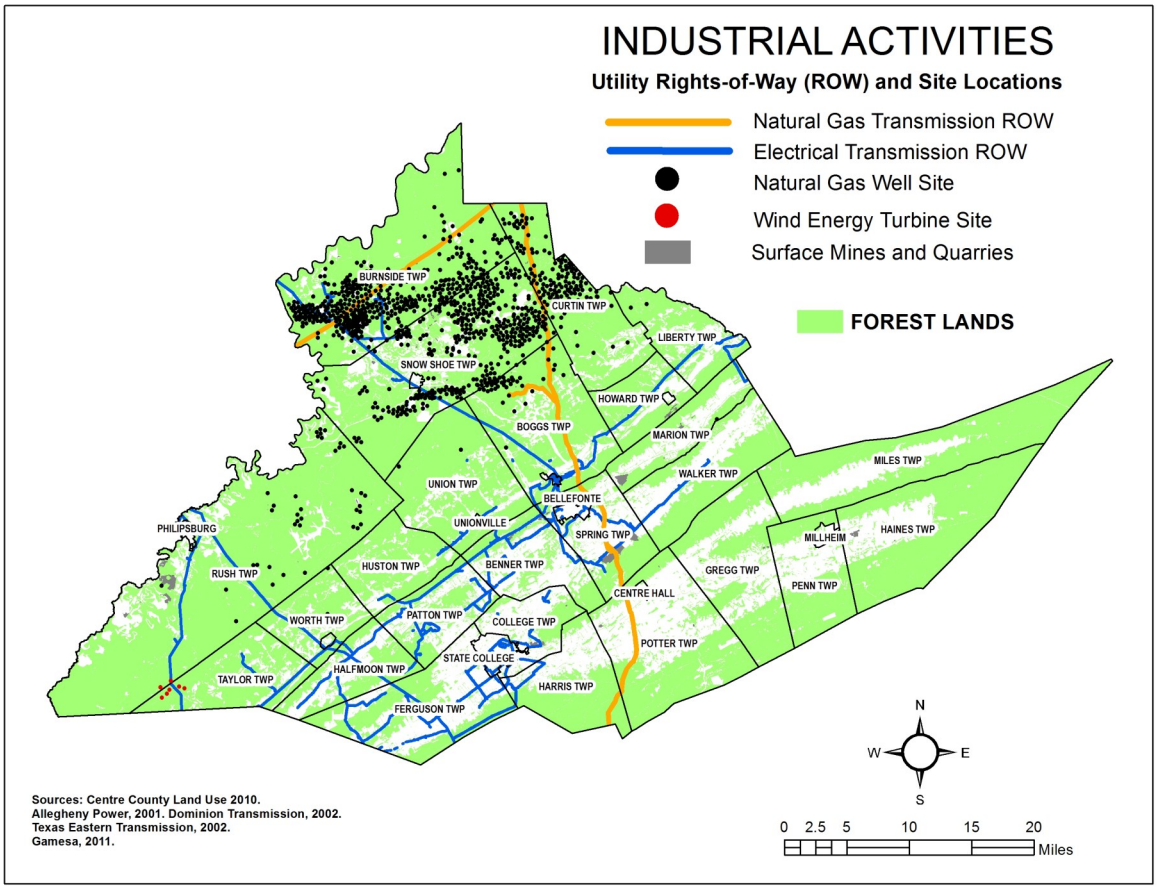
- **Natural gas well site development** (shallow, conventional and deep, unconventional);
- **Natural gas transmission pipelines**;
- **Electrical transmission lines**;
- **Surface strip mines and quarries**;
- **Wind energy turbines**.

The rights-of-way (ROWs) secured by electric and natural gas utility companies can be seen across the ridges as linear cuts in forested areas. These ROWs permanently fragment the forest because utility companies regularly maintain them. Natural gas utility companies cut trees and mow grasses and shrubs in major pipeline transmission corridors to ease access for both maintenance and in case of emergencies. Electric utility companies trim and cut trees in their major transmission line corridors to keep electric lines clear of tree branches which could potentially fall on and break the transmission lines, thus disrupting electric service. These ROWs will never be able to return to a mature forest but will be covered with grasses and low shrubs.

Natural gas well drilling has posed minimal threats to forests county-wide but the risk for further deforestation and forest fragmentation is real. Well pad development, natural gas collection pipeline construction, and the widening of roads to permit access for large-scale drilling equipment can require cutting and clearing five acres of forest for a well pad, 30 to 50 feet ROWs for new pipelines, and increasing road widths 10 to 15 feet wider to accommodate heavy volumes of traffic associated with natural gas drilling activities.

The expansion of wind energy turbines is also a concern in regard to forest fragmentation. On average, three to four acres of land are used for turbine construction. The forested ridges of the county, where the greatest wind power potential exists, makes them prime locations for siting wind energy facilities.

Surface strip mining for coal and quarrying for limestone have decreased county-wide. Many strip mined areas have been reclaimed or remediated, a process where disturbed land is converted to its former use. In many cases, these lands have been reforested or replanted with trees. Some reclaimed surfaces are seeded with grasses only.



Forest Fragmentation

Forest fragmentation is the process of breaking up large patches of forest into smaller patches. *It is important to distinguish between a forest that is fragmented due to human activities and a mosaic landscape of mature tree stands and regenerating stands that result from timber harvesting.* The term 'contiguous forest' is often used to describe large-scale forested landscapes which are not fragmented.

Fragmentation is a result of road development, clearing of forests for agricultural and industrial activities, and the clearing of trees for residential developments. Fragmentation may reduce biodiversity by reducing the true amount of interior forest habitat, therefore affecting wooded habitats' ability to support viable vertebrate populations. Interior forests typically contain older, more diverse tree communities and these interior forest attract forest-interior mammals and birds.

Because forests act as natural water filters for groundwater supplies, forest fragmentation may adversely affect the quality and quantity of public drinking supplies. Parameters of fragmentation observed to be important to water quality are:

- Land use composition of a watershed;
- Stream segment lengths bounded by various land uses;
- Percent of impervious surfaces.

Forest fragmentation can be observed and measured by the relative size of forest patches, the density of forest patches across a landscape, and the proximity of forest patches to adjacent land uses. A unique implication of forest fragmentation is 'edge effect'. As contiguous or interior forests are divided, more edges are created and the forested area is reduced. The edge is the boundary where two (or more) land uses abut. The edge forest can provide valuable habitat for some wildlife species but can be problematic for sensitive species due to increased predation and/or parasitism.

The conditions that occur at the edge forest can alter the outer forest, leading to forest degradation. Degradation is not the reduction in the amount of forest land but the decrease in the quality of forest land condition. There are various opinions in how to measure forest land quality, even among forest professionals, but many agree that the edge effect is a direct result of forest fragmentation.

Forest fragmentation can lend itself to deforestation, the conversion of forest land use to other land uses.

Deforestation

The term **deforestation** is the clearing of trees and/or forest to a non-forest land use such as:

- Agriculture;
- Industrial/commercial;
- Residential.

Deforestation is associated with nonrenewable timber harvesting practices in ecologically sensitive areas, such as tropical rainforests.

Deforested lands can be reforested or can be afforested, slightly different approaches to regenerating forests.

Reforestation is the restocking of forests and woodlands that have been depleted, usually through deforestation. Afforestation is the process of establishing forest trees by planting or seeding an area not previously forested.

Deforestation can adversely affect wildlife species by removing critical forest habitat. Conversion of forest land to other land uses can affect groundwater and stream water quality if impervious surfaces are created. Removing large stands of trees increases soil erosion factors, leads to increased sedimentation flowing into streams, and can create a geochemical imbalance at the former tree root zone where hydrological process occur.

Forest Regeneration

Forest regeneration is the act of renewing tree cover, generally promptly after a tree stand or forest has been removed. Regeneration can occur naturally but artificial means of renewing forest land should consider tree species to be planted (suitable to soils and climate), the stage of the tree to be planted (seedlings, unrooted cuttings, or seeds), and tree planting density.

Artificial forest regeneration methods are usually more common because the technique is considered to be more dependable than natural forest regeneration.

Forests in Transition

Most of Pennsylvania's forests are *even-aged* (or the same age) resulting from earlier logging activities. But the complexity of a *forest stand* can reflect a variety of species that grow at different rates due to variations in sunlight, water, and growth space. An *uneven-aged* stand contains a wide range of trees at various sizes (diameter classes), ranging from seedlings to mature trees—at all times. To the casual observer, species growth rates which result in various tree sizes within a forest stand can make determining if the stand is even– or uneven-aged difficult.

Parcelization

Parcelization occurs when large tracts of forested land are divided into smaller parcels among multiple owners.

Whether or not parcelization leads to forest fragmentation or forest land conversion is of particular concern. New parcels split from a large forested land tract may or may not necessarily be developed by each respective owner but, by chance land use changes occur, the continuity of the forested landscape is disrupted.

Determining where parcelization will occur is not a straightforward task but some reasons as to why it occurs are:

- Land inheritance to multiple owners;
- Profitable to current forest landowner(s) to divide and sell parcels;
- Recreation and tourism driving demand for seasonal residences on privately owned land;
- Local zoning and/or subdivision ordinances do not address forestland parcelization;
- Inaccessible open space becomes available after parcelization occurs.

Forest parcelization greatly reduces a privately owned forest's capacity to be a productive working forest and reduces the forest's value to maintain water quality, provide wildlife habitat, recreational access, and carbon sequestration and storage.

Forest Stewardship

Forest stewardship is the wise care and use of forest resources to ensure their health and productivity for years to come.

Forest stewardship is considered a land ethic, which is the principles and values guiding the use and treatment of the forestland.

A **stewardship plan** is a key document to a forest landowner in order to achieve their goals. A stewardship plan, prepared by a natural resource professional, inventories all of the resources on the land, describes the condition of each resource, and outlines the steps by which a landowner can fulfill their goals. While landowner objectives can vary between stewardship plans, natural resource professionals recommended that woodland property owners have a long-term plan in place. The land-use objectives detailed in a stewardship plan ensure that a landowner is getting the "best use" of the property, be it for future income from the harvesting and selling of timber or implementing strategies to enhance wildlife habitat or recreational opportunities.

Technical assistance and cost-sharing is available to landowners through the Pennsylvania Forest Stewardship Program and the Stewardship Incentive Program (SIP).

If timber harvesting is a long-term stewardship objective, hiring a forester or forestry consultant is also highly recommended by natural resource professionals. Careless timbering practices can significantly decrease expected profits over the long-term if impacts to the harvest site are not minimized using best management practices.

Forest Sustainability

Forest sustainability is the care and management of the water resources and wildlife that rely on forests, and the efforts to ensure the continued and improved health of forest resources so that future generations of people receive the same or increased benefits from the forestland.

Forest sustainability should be a component in a stewardship plan.

The process of caring for the forest to ensure sustainability while advancing landowner objectives is **tending**. Tending takes into consideration water resources, future forest stand productivity, and potential threats from insects, disease, and fires.

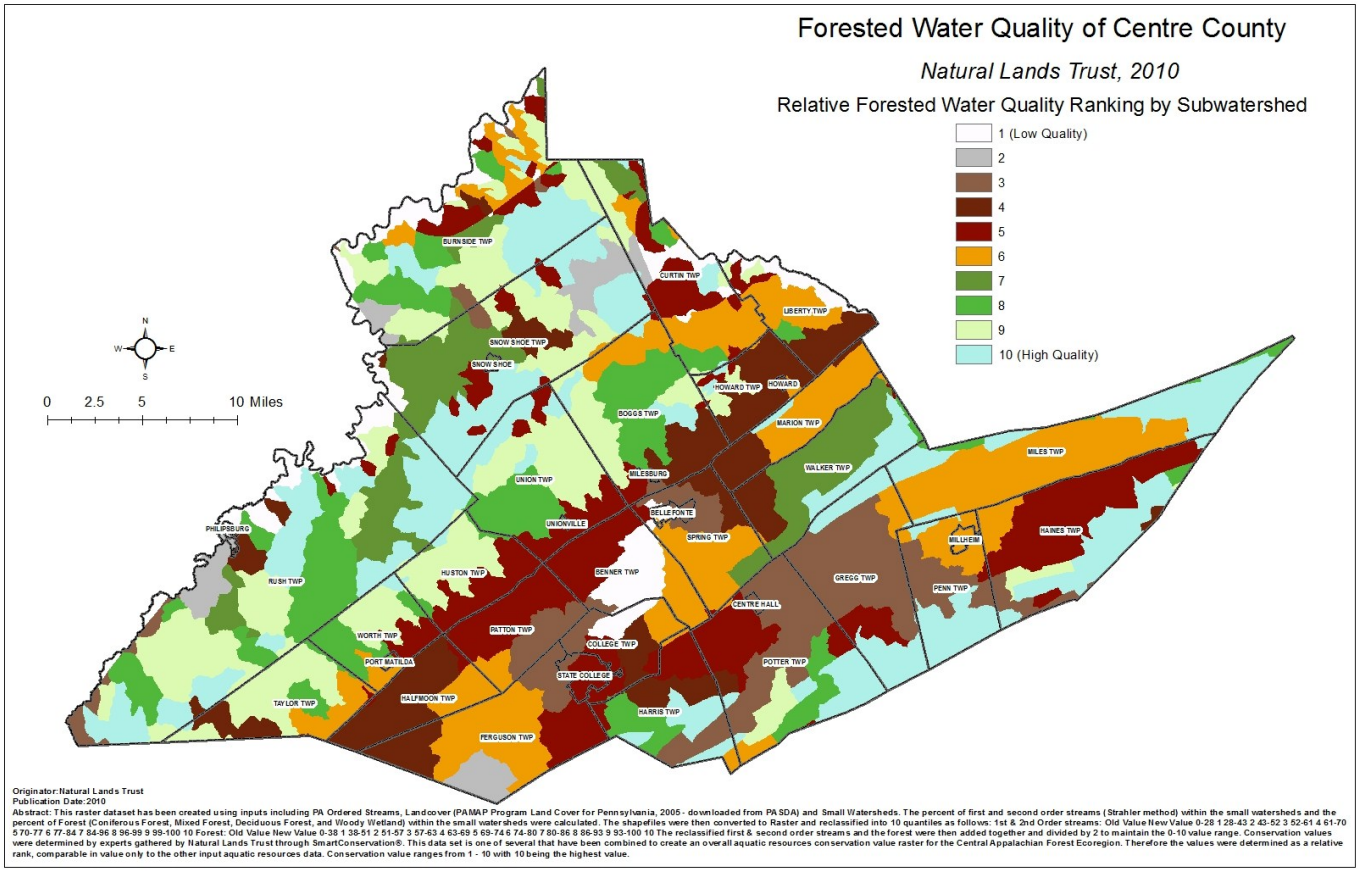
A best management practices in being a responsible "tender" is to research and follow all state laws regulating activities that affect soil and water. Erosion and sedimentation from disturbed harvest sites can affect water quality. Land slope and soil types should be considered. A best effort should be made to identify wetlands, and they should be crossed only if necessary during dry or winter seasons.

Understanding the forest as a habitat for wildlife and plant species factors into sustainability. Forest management activities effects on wildlife and other plants are often overlooked. Landowners may not be aware of specific tree species, particular habitat microsites, or the wildlife resources within their forest land. An educated landowner aware of sustainability issues may be willing to trade-off his or her objectives to protect water and wildlife.

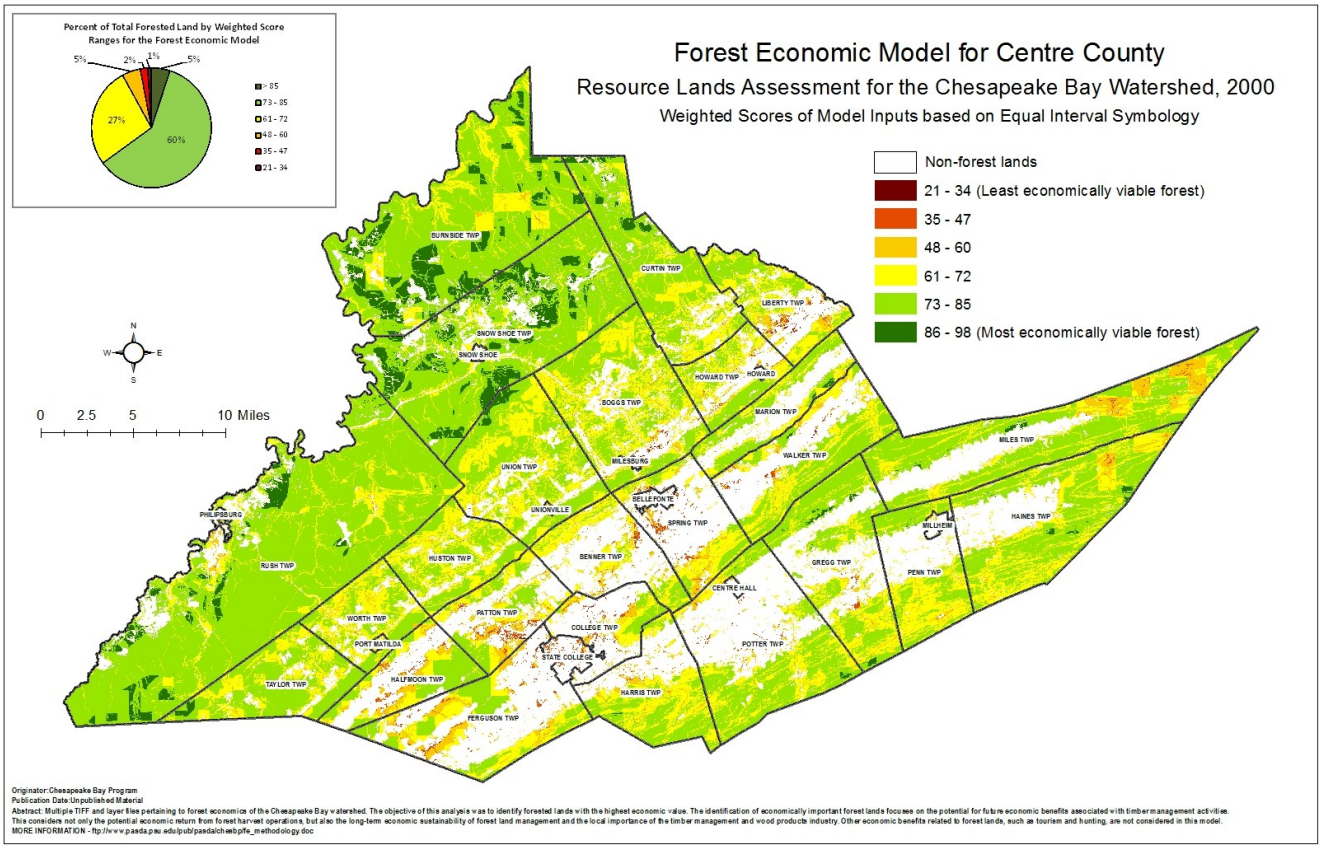
Forested Water Quality: The Watershed Approach

Forest conservationists and biologists have recognized since the beginning of the 20th century the direct connection between water resources and forests. In a 2007 article by Paul K. Barten (The Conservation of Forests and Water in New England...Again), Barten states that "the faucet is connected to the forest" and that former efforts to protect woodlands were "principally for the protection of water supplies". Most people do not make the connection between where their water source originates and how a potable water supply determines future growth, and life itself. The development of public water supply systems was enabled by forest protection. Forests act as natural water filtration and groundwater recharge systems. Because the majority of drinking water supplies in Centre County are groundwater wells (taking into consideration both public and private sources), the capacity of forests, primarily forest soils, to filtrate both rain water and stormwater before it recharges groundwater aquifers is critical. Forest soils can store large volumes of water and have the ability to transmit water easily; these soil characteristics thus greatly reduce overland water flows and soil erosion, ensuring that surface water will return with less impurities to a groundwater supply. The composition of the forest, from the canopy to the organic litter layer covering the forest ground, all factor into groundwater filtration—without the soil there would be no trees and without the microbial processes at the trees root-level, the soils would not possess the physical and chemical characteristics to cleanse water.

Forested water quality, and water quality protection in general, is best approached at the watershed level. A watershed is a natural geographic area defined by a surface water drainage pattern (streams), with a point of origin (headwaters) and an outlet. A 2010 study of by the Natural Lands Trust examined the forested water quality of sub-watersheds (see map). Several weighted factors were evaluated, the highest weighted factor being the area of forest cover and the forest cover type. A relative ranking at the sub-watershed level reveals that those heavily forested areas are going to have higher forested water quality, both in terms of the water coming from the streams' headwaters but also the capacity by which the forests filter rain waters and storm water. The lower quality ranked sub-watersheds coincide directly where concentrated development is and where non-forest land uses are prevalent.



Forest Economics: Model for long-term management



The potential for future economic benefits associated with timber management activities is reflected in the map seen above. A 2000 study by the Chesapeake Bay Program analyzed a compilation of various data sources to produce a resulting layer that indicates those forested lands most economically viable to the wood products industry. The model takes into consideration both the potential economic return from forest harvest operations and the long-term sustainability of forest land management strategies at the state and local level.

The wood products industry

Wood products (raw lumber, boards and finishing materials, woodchips and sawdust, etc.) is a $5.5 billion dollar industry in Pennsylvania, annually. The 2002 Economic Census identified 10 major Centre County industries related to logging, lumber production, wood products wholesale, and wood products retail. These ten companies generated over $31 million in sales and employed over 100 people.

Forestry jobs

The Bureau of Labor Statistics (BLS) distinguishes between three classes of forestry jobs for loggers: fallers (tree cutters), equipment operators, and the graders. The average national annual salary in 2009 for each class of forestry job was: fallers - $32,000; operators - $35,000; and graders/setters - $34,000. The BLS predicts that employment for loggers will increase by 6% between 2012 and 2018. Past data indicates that salaries for these positions will remain competitive but will not experience huge increases. Salaries for professional and technical forestry positions can range widely depending on geographic area and skill-level.

Forest land management

How forest land is managed over the long-term, either by private owners or public agencies, will be key to the forest economic model. While the majority of Centre County's forests are identified as having high potential for economic returns (real dollars generated and staying in the county), nearly half of the forested lands in the county are owned by state agencies. The Bureau of Forestry has implemented a long-term forest management plan that includes elements of conservation, timbering, and provisions for leasing lands for oil and natural gas exploration. Management of private forests is a huge concern because most landowners have no forestry knowledge or expertise. While landowner assistance is available through Penn State Extension and the Bureau of Forestry, few forest landowners take advantage of these free services.

Insects

Insects can cause superficial damage by consuming trees' leaves (damage known as defoliation) and feeding on bark and tree tissues. The Department of Conservation and Natural Resource's Bureau of Forestry releases annual Pest Alerts on the Bureau's website (http://www.dcnr.state.pa.us/forestry/index.aspx) which predicts which insects will likely cause significant damage. For the year 2013, the Bureau released alerts on the following insects:

- Bag Worm
- Bark Beetles
- Emerald Ash Borer
- Forest Tent Caterpillar
- Gypsy Moth
- Hemlock Wooly Adelgid
- Periodical Cicada
- Redheaded Pine Sawfly

Insect lifecycles, egg mass sizes (the number of eggs that are produced), and host tree species vary across the insects on the Pest Alert list. Controls are specific to the insect and the insect stage (egg, larva, pupa, and adult). Insect controls can be mechanical, biological, chemical, silvicultural, or Integrated Pest Management. Long-term pest management can be done by cultivating and sustaining a variety of healthy trees that will better withstand insect damages.

Forest Tent Caterpillar (top) will feed on a number of tree species including sugar maple, aspen, red oak, and scarlett oak. The caterpillar will also feed on ash, birch, cherry, and basswood trees.

Hemlock Wooly Adelgid (bottom) develops and reproduces on all species of hemlock, but only eastern and Carolina hemlock are vulnerable when attacked.

Diseases

The significant diseases affecting Pennsylvania's forests are:

- Beech Bark Disease
- Fabrella Needle Blight of Hemlock
- Sudden Oak Death
- Thousand Cankers Disease

While most diseases are caused by fungi, some tree afflictions are caused by a relationship between a fungus and an insect.

Beech Bark Disease is caused by the Nectria fungus. Feeding by the beech scale insect facilitates entry of the fungal pathogen. As the beech scale insect feeds through the bark and into the tissues, the bore holes that the insect makes then creates openings in which the fungus can further attack the tree. The cycle of insect feedings on the tree and continued fungal growth causes the spread of bark cankers.

Diseases may not result in instant tree death. With Sudden Oak Death, an oak tree can survive for several years but the disease symptoms can become visible in weeks: pale leaves and die back of tree crown.

Most tree diseases can be treated with chemical applications; however, pruning diseased branches or removing the tree is necessary to prevent diseases spreading to adjacent trees. Most pathogens are tree-specific meaning that the disease will only affect one tree species, so timbers stands containing a variety of tree types will withstand an outbreak or spread of particular diseases.

New strategies are being developed for comprehensive breeding and genetic engineering of tree species to create resistance to insects and diseases.

The picture below is an oak tree with Sudden Oak Death onset; the symptoms include loss of bark and excessive sap oozing from the trunk.

Invasive Plants and Trees

Invasive species are plants, animals, insects and pathogens that are not native to an area and cause harm to the environment, the economy, and/or human health. While not all non-native species are considered invasive, those species that have the ability to adapt to a variety of habitats, reproduce or spread quickly, are difficult to eradicate, and negatively impact native species are, in effect, invasive. The most effective approach to controlling invasive species, especially plants and pathogens, is through prevention and early detection. Detection programs can prevent serious infestations. Management tools to control invasive plants include mowing, cutting, prescribed fires, soil covers, herbicides, and animal grazing. Other preventative techniques include checking materials brought into new sites for invasive species, thoroughly cleaning equipment and clothing to reduce spreading seeds, and using certified seeds for restoration and landscaping, although these seeds can be difficult to find through local retailers. A full-list of invasive species is available at the PA Bureau of Forestry's website: http://www.dcnr.state.pa.us/forestry/index.aspx. The Bureau of Forestry also has an Invasive Plant Database in which a user can input species information to try and identify invasive plants. The general plant types, habitats, site conditions, and any other visual plant characteristics are included. The database link is http://www.dcnr.state.pa.us/forestry/plants/invasiveplants/invasivesearch/index.htm. Exotic plant species include trees, shrubs, vines, and herbaceous plants. Pictured at left are examples.



Pictured (left to right): Multiflora rose (shrub), Norway Maple leaf and seed (tree), and Japanese stiltgrass (herbaceous plant).

Wildfires

Certain conditions must exist for wildfires to occur: an available fuel source, dry conditions, and an ignition source. Contrary to the idea that the greatest risk of fires is in the summer, Pennsylvania's wildfires occur more in the early spring and late autumn. Increased daylight warms and dries ground debris in the forest and winds are strong and dry during these months. The third condition, an ignition source, is also more prevalent during the spring and autumn. One of the major sources for wildfires is debris burning. These fires frequently occur in someone's backyard and can quickly spread into adjacent forests. Wildfires destroy valuable woodlands and wildlife habitats. Homes and buildings in close proximity to fires are threatened as well as the threat to human lives. Over 3,000 acres of forests were affected by wildfires across Pennsylvania in the year 2012. Of the 717 reported fires, 217 were caused by debris burning, which consumed 544 acres of forests. Three programs of note for volunteer fire departments located in rural areas in combating wild fires are:

- The Federal Excess Property Program (FEPP)
- Department of Defense Firefighter Property Program
- Volunteer Fire Assistance Grants

More information at http://www.dcnr.state.pa.us/forestry/wildlandfire/vfd/index.htm.

See page 12: Residential development and the wildland urban interface.

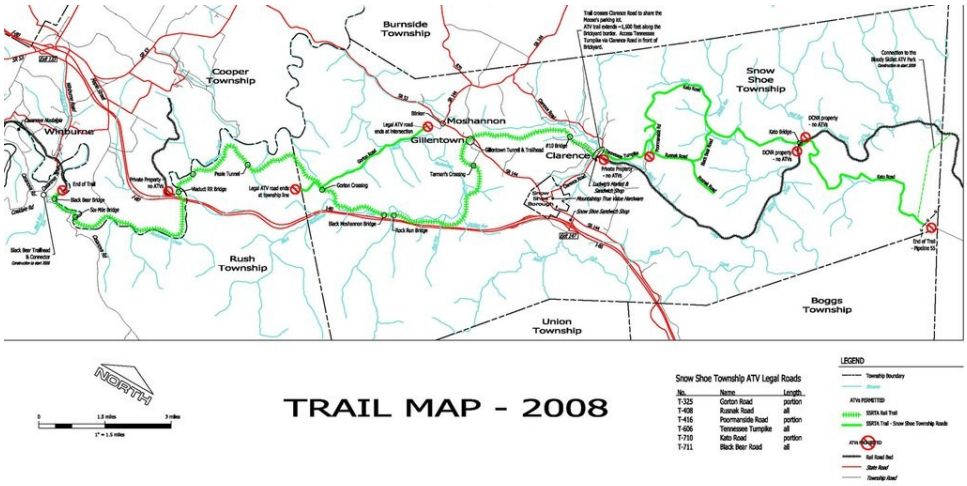
White-tailed Deer

Browsing by white-tailed deer is a significant factor preventing successful forest regeneration of desired tree species. Fencing keeps deer from browsing forest areas targeted for regeneration. While deer fencing has proved to be an effective method in increasing desirable tree species and reducing forest regeneration failures, fencing does not exclude all deer. The Pennsylvania Game Commission (PGC) reports that when white-tailed deer populations are decreasing and stabilizing, the use of deer fencing may not be necessary. The PGC is charged with both managing wildlife (within what are called Wildlife Management Units) and ensuring that wildlife have healthy, viable forests to provide food sources and shelter. Managing the white-tailed deer population is a delicate balance for the PGC: regenerate the forests that support the deer population which in turn makes a profit for the agency from deer hunting licenses. Also, forests of different ages and tree species support different numbers of white-tailed deer populations. Prior to 2005, the deer management objective was to target deer population density at 20 deer per square mile. However, detailed studies regarding deer food requirements revealed that a typical adult deer needs five pounds of food daily, especially during winter months. The complex relationship between deer food requirements and the availability of food sources that the forest can provide is still a constant topic of study for the Pennsylvania Game Commission.

Motorized Recreation Activities

Motorized recreation—All Terrain Vehicles (ATVs), motor bikes, snowmobiles– are not permitted activities within all public lands; private landowners often post no trespassing signs.

Recreation activities span a large range of physical levels, from very passive (bird watching) to active (hiking, biking) to motorized (ATVs, 4-wheelers). While forest land can support a full range of recreation activities, motorized vehicles can cause extensive damage to forests when users do not comply with public land regulations and/or disregard private landowner's no trespassing signs. ATV wheels can grip and tear up forest soils and ground cover vegetation, and disrupt wildlife habitats. In Centre County, motorized recreation opportunities are concentrated in the northern portion along the Snow Shoe Rail Trail. The rail trail's use, maintenance, and regulations are monitored by the Snow Shoe Rails-to-Trails Association. To use the trail, one must purchase a permit and properly display that permit when using the trail. Users are discouraged from driving their motorized vehicles off the rail trail but these incidences do occur. The Bureau of Forestry cannot monitor full-time motorized recreation activities in state forests. The Bureau has constructed ATV/4-wheeler paths, many in close proximity to state forest roads, to encourage motorized vehicle uses on the trail, and discourage riding within the core forest.



A useful device is to offer maps and guides for specific trail users to define what portions of the trail are accessible and permitted for the desired use. For example, the Snow Shoe Rails-to-Trails Association maintains a website and provides user maps. The Bureau of Forestry also defines trail uses on its maps.

Agricultural Activities

The 2010 Centre County Land Use Survey data indicates that land use conversions from forests to agriculture is not widespread. Aerial photo interpretation of several dozen farms across the county reveal that within larger-scale farms a large percentage of the property is retained as forest and not being actively farmed. Within the Nittany Valley and Penns Valley Planning Regions, simply due to the ridge-and-valley landscape, farmers are limited by steep slopes so that even if they wanted to clear forested land for farming, the increased potential in soil loss and increased safety risks for equipment rollover make it unfeasible and uneconomical to convert forested land for agricultural use. Approximately 100 acres of forests were converted to agricultural land uses between 2010 and the 2012 land use survey updates. This conversion was identified within one parcel in Lower Bald Eagle Valley Planning Region. Interestingly, some agriculture lands that have not been actively farmed are slowly reverting back to forested lands. While the "land use" may be considered agriculture, the land is not being actively farmed or planted for crop production. Instead, these agricultural lands are commonly referred to as pasture and are, in essence, like agricultural lands in reserve.

Agroforestry, a practice not yet common in Pennsylvania, is a cultivation system combining both agriculture and forestry where trees and crops are inter-planted. The combined agricultural and forestry technologies can create a more diverse, productive, profitable, healthy, and sustainable land use system. Benefits to agroforestry include increased soil fertility, reduced soil erosion and soil nutrient loss, reduced deforestation, maintaining wildlife habitat, and retaining green space and open space.

An **agroforest** is a complex land use system with rich biodiversity making them less susceptible to insects, diseases, drought, and wind damage. Although an agroforest can be high-yielding, their complexity is designed to produce various outputs. An agroforest system is typically not used when a large yield of a single crop or output is desired.

Residential Development and the Wildland Urban Interface

Residential development within forested land across the county can be for both permanent homes and seasonal residences. Some residential subdivisions have been developed conservatively in forests so that a large percentage (75% or greater) of the trees per individual home lot are retained and fewer trees are cleared for the building footprint and surrounding yards; other housing subdivisions have been cleared of all forest. Homes built in forested areas may provide owners with increased privacy but home construction in forested areas should be carefully planned to take into consideration slopes and potential soil loss from tree removal. Residential development in forested lands can change the quality and function of the forest, and even the future economic viability if forest health is compromised. Increases in housing density and associated development on forest lands can be linked to numerous changes on private forests including:

- Decrease in native wildlife;
- Change in forest health;
- Reduced water quality and carbon storage;
- Reduced timber production;
- Reduced recreational benefits;
- Increased risk of wildfires.

Residences adjacent to forested areas are located at what is termed the "**wildland urban interface**". The Bureau of Forestry offers homeowner tips to help reduce the risk of wildfires. The document can be downloaded from the website: http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_004071.pdf.

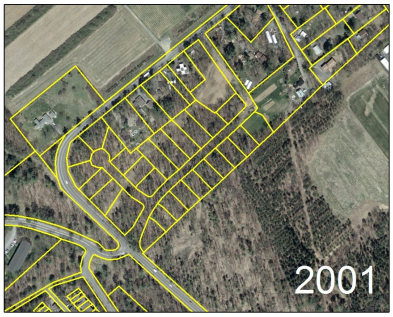
The Woods at Sand Ridge retains much of the forested landscape but leaves much to be desired regarding conservation subdivision design. While the roads follow the elevation contours and the homes' footprints on average only use 25% of the entire parcel, this subdivision greatly fragments a forested area, originally 600 acres in size. The Tools and Techniques section provides guidelines for development clustering which protects forested lands.

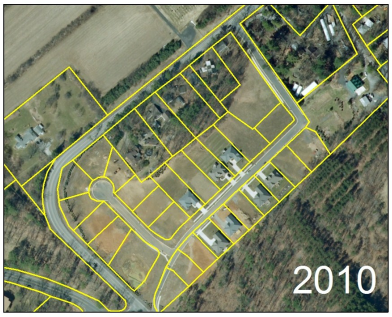
The Woods at Sand Ridge

Forested Residential Development

Wooded Hills

Cleared Forest to make Residential Development





The Wooded Hills subdivision developer, however, cleared an entire 12 acre parcel on which 24 half-acre residential lots were created. In this subdivision, none of the original trees remain which would have created privacy and road noise buffers, especially for those lots adjacent to the street system. Again, the Tools and Techniques section addresses how this type of development can be avoided in zoning ordinances and subdivision and land development ordinances.

Main Street Communities: Value in Urban Forests

The *Dictionary of Forestry* defines **urban forestry** as "the art, science, and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide to society". From a community planning perspective, as defined by the *American Planning Association*, urban forestry is "a planned and programmatic approach to the development and maintenance of the urban forest, including all elements of green infrastructure within the community, in an effort to optimize the resulting benefits in social, environmental, public health, economic, and aesthetics terms, especially when resulting from a community visioning and goal-setting process".

Environmental Benefits

- Provides green infrastructure
- Captures and filters stormwater runoff
- Shades and cools urban surfaces and buildings
- Reduces air pollution
- Provides wildlife habitat
- Stores and sequesters carbon

Social Benefits

- Parks and urban forests provide recreational opportunities for exercise, improving residents health and well-being
- Urban forests in communities of economically disadvantaged populations promotes environmental justice, providing a greater sense of community, promoting engagement among neighbors, and reducing residents dependencies on social services

Economic Benefits

- Increased real estate values *(tree-lined streets in developments and neighborhoods can increase home values by as much as 6%)*
- Increased retail values and visitors to downtown centers *(consumers willing to pay more for parking, spend more time shopping, and perceive the value of their purchased merchandise greater from stores located in a tree-lined business district)*

Proper Urban Forest Planning

An effective **urban forestry program**, for any community, should:

- Make urban forestry part of the community visioning process
- Fully inventory and assess the current urban landscape with future concepts
- Include private and civic partners
- Be an investment tool
- Be financially sustainable.

Planning Principles to Urban Forestry

1. Incorporate a tree ordinance in development code, ensure it is consistent with other codes.
2. Collaborate with developers, natural resources professionals, and other stakeholders to draft forest ordinance language.
3. Planned Unit Development regulations should include an urban forestry checklist and guidelines.
4. Ordinances must include provisions for enforcement.
5. Planning should be adaptive and flexible, easily updated as urban forestry technology changes.
6. Planning should be long-term, concentrated on tree maintenance.

Broad Design Principles

- Urban forestry should support other planning goals
- Green infrastructure should be an element in a local comprehensive plan but linked to other elements
- The natural environment makes neighborhoods more livable
- Make the site right for the trees and pick the right trees for the site!

Long-term Urban Forestry

Convincing local officials, business owners, and residents to adopt and implement a long-term urban forestry plan can be a difficult task, especially when maintenance costs are factored in and indirect savings are not immediately realized.

Urban trees need to be planted and cared for properly.

- Spaced adequately and tree root systems provided enough area for growth; *tree pits are common within sidewalk infrastructure to control both stormwater and prevent tree roots from growing under and pushing up on sidewalks*.
- Pruned and trimmed regularly; *even a tree species that reaches maturity at a desired height to fit the landscape will need to be scaled back (by a professional) .*
- Assessed and monitored for disease and pest infestation; *choosing and planting resilient, species will reduce threats.*
- New trees and replacement trees should be budgeted annually. *An urban forest program should include projected costs for future tree purchases and replacement of a certain portion of existing trees in the event of damage from disease or pests, and subsequent removals.*
- Need to be clearly defined in an urban forestry program and/or an urban forest ordinance who is responsible for tree maintenance. *If trees are planted in a residential neighborhood is the homeowner liable for maintaining the tree? Are merchants responsible for urban trees located outside of their businesses, or is it a local government?*
- Urban trees are just one component of urban forestry. *Shrubs, bushes, and grasses are all elements of green infrastructure. A professional landscape architect can guide a community through the process of selecting and pairing trees with other plants to create an aesthetically pleasing landscape that is a natural fit within a neighborhood or business district.*

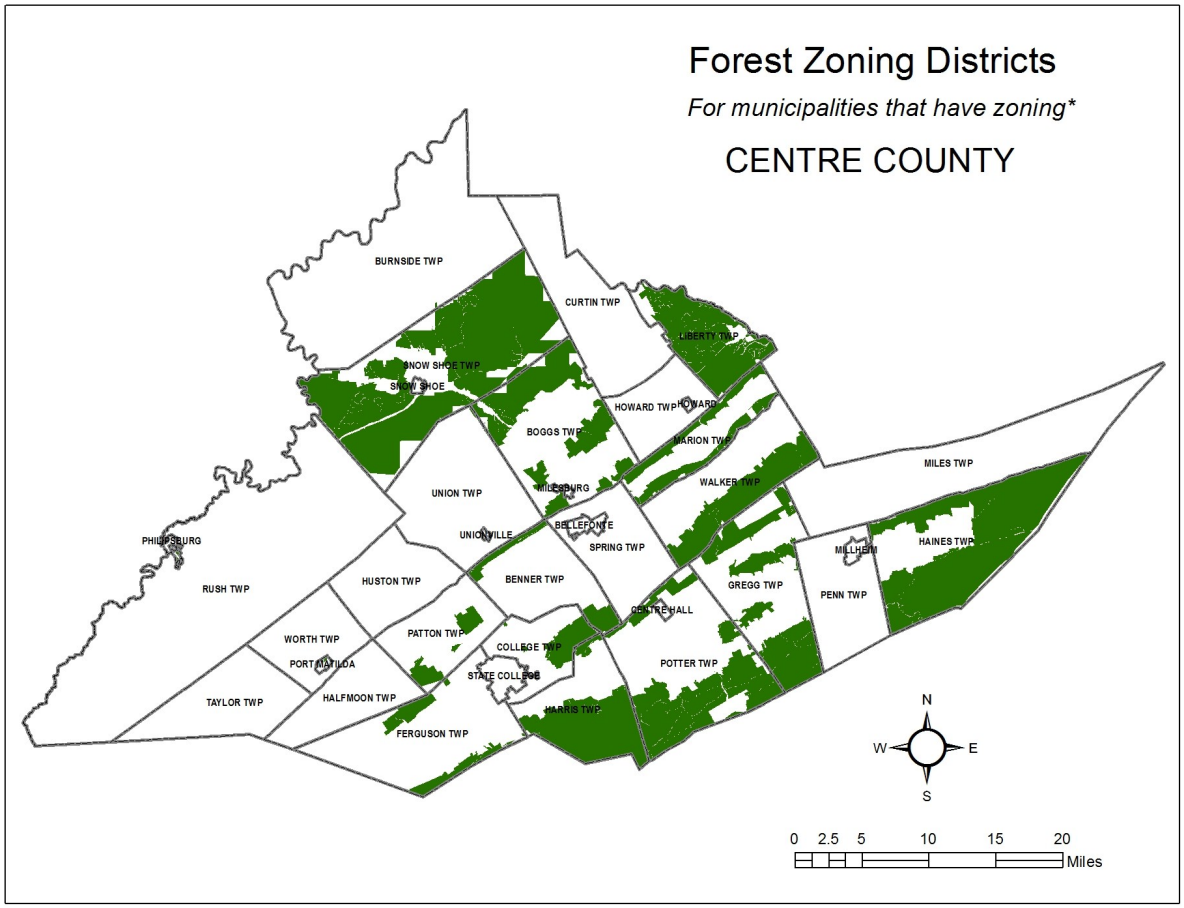
Tools and Techniques

Forest Zoning

Centre County has forest zoning in 20 of its 27 municipalities that have zoning ordinances. Forest zoning allows for some level of development activities; discussed later are additional overlay districts which make provisions for additional land use controls. The following zoning district names and municipalities regulate development activities in forested lands:

- **Conservation District** (Bellefonte Borough; Benner, Marion, and Spring Townships)
- **Conservation/Non-Residential**(Halfmoon Township)
- **Conservation/Woodland** (Walker Township)
- **Forest District** (College, Harris, and Snow Shoe Townships; Port Matilda Borough)
- **Forest Conservation** (Haines Township)
- **Forest Preservation District** (Boggs Township)
- **Forest/Gamelands District** (Ferguson Township)
- **Non-residential** (Patton Township)
- **Open Space District** (Liberty and Snow Shoe Townships)
- **Open Space/Forest District** (Gregg and Potter Townships)
- **Recreation/Conservation** (Philipsburg Borough)
- **Woodland/Conservation** (Huston and Worth Townships)

At the municipal level, zoning ordinances for forest conservation and protection are directly employable and efficient if adopted and enforced. Fifty-four percent of the county's forests are privately owned, therefore, forest management strategies and implementation, through zoning, must come from the local level directed at private forest land owners. Forest zoning can be fine-tuned to better conserve and protect forest quality and quantity.



Ridge Top Protection Overlay: Slope Management

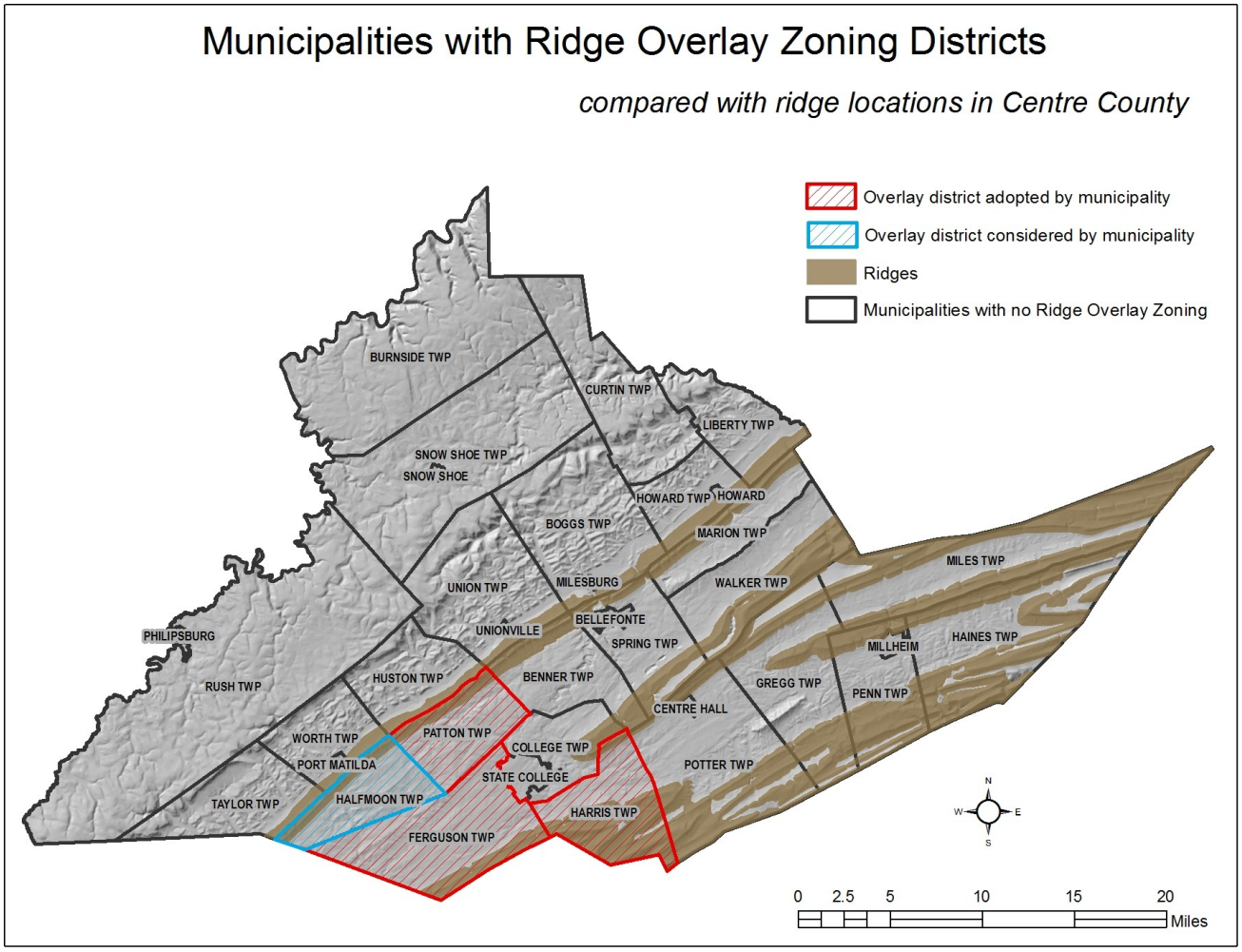
Zoning for development in forested lands can be further regulated by way of special overlay zoning districts. In Centre County, the Ridge Overlay District was adopted in the townships of Ferguson, Harris and Patton. Each municipality's ridge overlay was drafted, adopted and enforced to meet the current and future development challenges in each township on mountain ridges.

In Ferguson Township, the Ridge Overlay applies to all properties within the Rural Residential District that are outside of the Rural and Village Growth Boundaries. The development restrictions set forth by Ferguson Township's Ridge Overlay are intended to only protect not only sensitive environmental resources but to protect both township property and private property from future adverse conditions.

Patton Township's Ridge Overlay is intended to thwart any future acid rock drainage (ARD) on characteristic soils in response to the pyritic rock uncovered in the township during the construction of Interstate 99; the cost to mitigate the ARD was costly and several private drinking water supplies were compromised due to ARD. Patton Township's Ridge Overlay takes into account both the soil type and the property's position in the landscape on which development is to occur. Patton's overlay district ordinance also includes language for tree conservation.

Halfmoon Township, at this time, is considering adopting a Ridge Overlay District which would cover a portion of the Bald Eagle Ridge.

Uncontrolled disturbance of slopes and the removal of vegetation can result in increased storm water runoff, erosion, sedimentation into streams, downstream flooding, and decreased stability of the slope itself. Slope management tools are generally located in both zoning ordinances and subdivision and land development ordinances. Local governments can approach slope management from a variety of approaches because regulating development for slopes applies across natural, rural, and urban landscapes. The Ridge Overlay District applies to those lands with steep and very steep slopes, defined to meet each townships' needs.



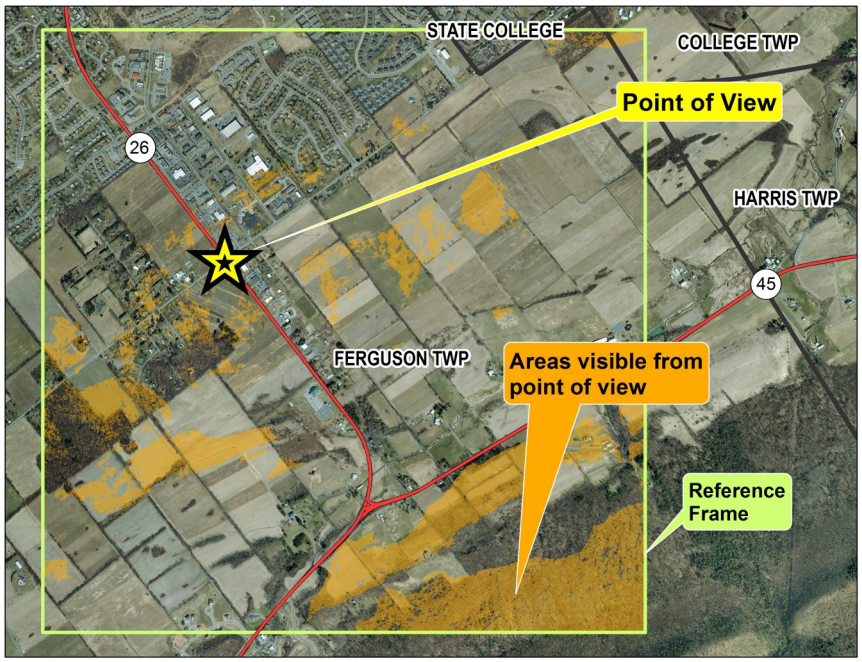
Scenic View Overlay: Viewshed Preservation

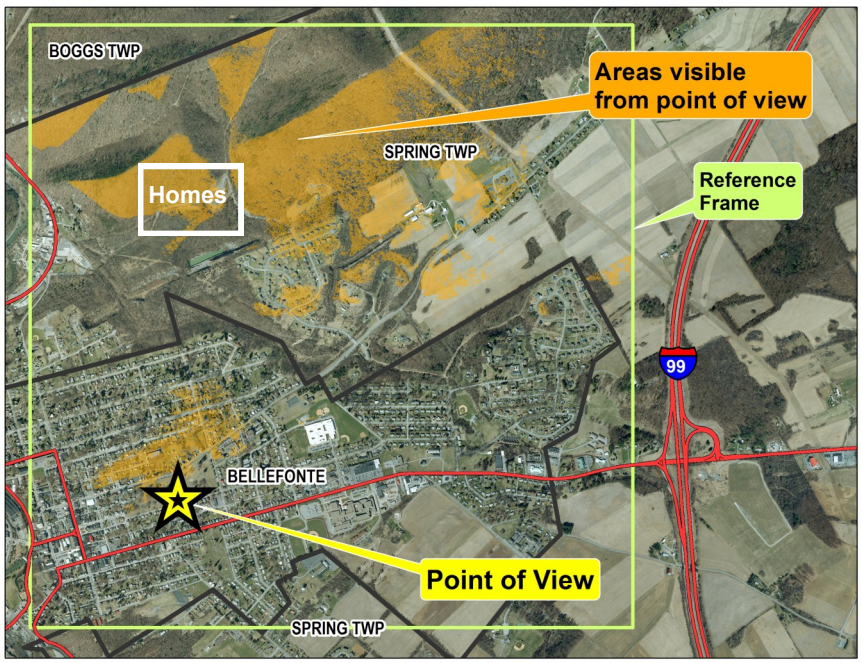
Zoning for development in forested land can be further regulated by way of special overlay zoning districts. A Scenic View Overlay is intended to protect and enhance the aesthetic character of the mountains and ridges, with the broader goal of ensuring the preservation of views to these resources from designated points of interest, a community, or even on a regional basis. The overlay district will assist in directing development on the mountains and ridges in a manner that maintains the identity, image, and environmental quality of those views.

Construction and expansion of structures within the overlay district are subject to stricter regulations, one of which is residential units cannot be built above a defined elevation and may require forest buffers between the home and the viewshed, at specified heights and widths of trees. A Scenic View Overlay would be a useful tool for any of the County's municipalities but especially applicable to those with forest zoning districts. The aerial images at right (top, State College area and, bottom, Bellefonte area) provide a spatial analysis by applying a viewshed tool to a point of view on the landscape.

In the State College example, if you were at the point of view location (star), all of the areas shaded in light orange would be visible to you on the horizon within the analysis reference frame. For the mountain region were the label call-out is ("areas visible from point of view"), no structures, development, or utility rights-of-way are in that mountain area. Although Ferguson Township does not have a Scenic View Overlay, their current Ridge Overlay Zoning provides similar viewshed protection.

The Bellefonte example is, however, different. From the point of view in Bellefonte, the areas visible to the observer on the mountain are in Spring Township; the township has neither a ridge overlay or a scenic view overlay. Two homes were built on the side of the mountain facing Bellefonte. The contiguous forest on the mountainside was fragmented and the forest-like character of the mountain changed. In this circumstance, however, the community of Bellefonte has little control over future development on the mountain because it is in Spring Township. When regional planning efforts are examined, scenic view overlays must be taken into account because the "regional landscape view" or "regional scenic view" reaches beyond municipal boundaries. Scenic View Overlays could, in effect, be best applied at the regional planning level to better educate citizens in adjacent municipalities and communities how development, more so visible development, can negatively affect neighboring communities in terms of the scenic views.





Tools and Techniques

🛠 Open Space/Cluster Development

Cluster development groups residential units on a small portion of a parcel, leaving the remainder in permanent open space or forest. For example, rather than having 20 residential units on its own acre of land, the same 20 units would be placed in a much smaller area, perhaps on one-quarter acre sized lots. Cluster development is primarily implemented through zoning ordinances but can be incorporated into subdivision and land development ordinances and open space plans. The advantages to cluster development include:

- preservation of open space;
- reduced environmental impacts (less soil disturbance, less impervious surfaces, less storm water runoff reaching groundwater);
- lower infrastructure and maintenance costs;
- and available recreation lands in close proximity to homeowners.

The primary purpose of this technique is to protect natural resources and to establish open space. Open Space/Cluster Development is a practical tool for municipalities that do not have an agricultural zoning and/or Transfer of Development Rights ordinances.

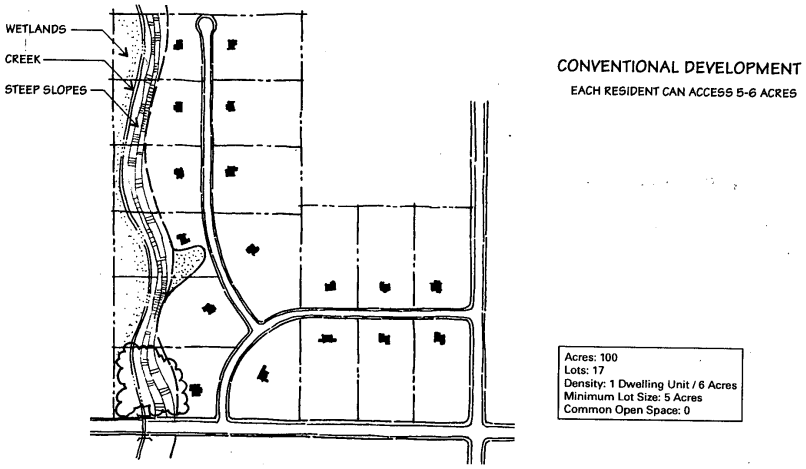
Cluster development does have the following limitations:

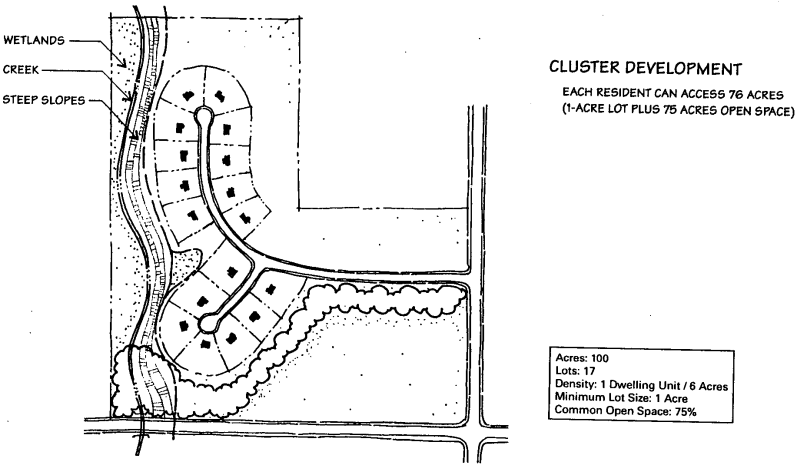
- poor design and/or not requiring enough open space can create greater negative visual impacts than a conventional development;
- transportation and air quality impacts will be near equal levels as in a conventional development, simply more concentrated;
- generally requires the need for either a community sewer system and/or a community water system when the lot sizes decrease and limited space is available for on-lot septic and/or on-lot water wells.

When open space/cluster development ordinances are being considered, there are three different approaches:

- Allowing open space, letting a potential developer decide if an open space/cluster design is the best option;
- Encourage open space, providing incentives to developers such as increased number of units;
- Require open space, specify a percentage of the development be in open space or a certain number of acres be in open space.

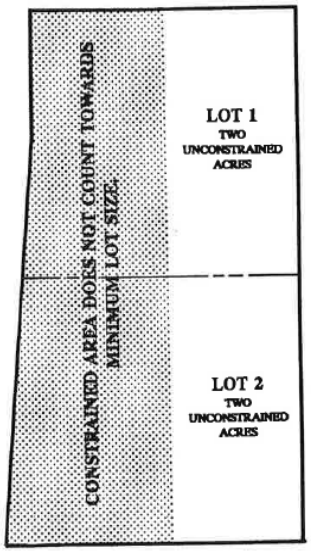
The approach can encourage (or discourage) development within a municipality depending on the type of incentive offered to developers. The success of this tool, despite the technique, is negated when not enough open space is dedicated or the open space is fragmented into smaller patches across the development.





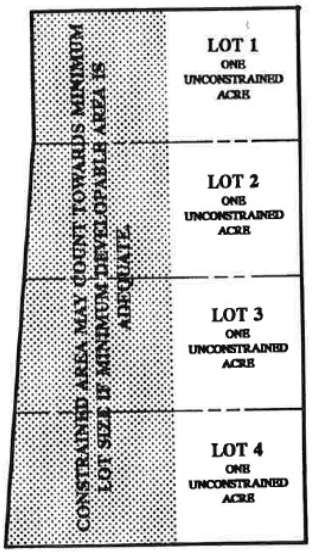
Net-out of Natural Resources

The technique of deducting environmentally constrained lands from development density calculations is commonly referred to as "net-out". Netting-out is intended to protect and preserve environmentally sensitive and constrained areas by reducing or eliminating these areas from the amount of development permitted on a given site. Environmentally sensitive and constrained areas could include wetlands, steep slopes, floodplains, and forests. Net-out is applicable wherever environmentally sensitive resources are threatened by disturbance from development. Net-out is a useful technique in rural areas where development pressures are placed on undeveloped lands. Netting-out may be a priority tool for urban/suburban areas where greater development pressures are placed on environmentally constrained lands because they generally comprise a higher percentage of the land remaining undeveloped. Net-out regulations are typically contained in zoning ordinances, but can be included in a subdivision and land development ordinance or included in a municipal open space plan. The net-out and protection of natural resources protects environmentally sensitive areas and reduces development intensity, if reductions are necessary. However, net-out can conflict with existing lot-size requirements, is not effective if not enforced, and can be counterproductive if promoting new and infill development within the urban and suburban landscape, inside of an urban growth boundary, for example. There are two approaches to netting-out natural resources: totally netting-out or partially netting-out. Each approach carries different limitations and benefits. A total net-out of natural resources deducts the entire area of all constrained resources from a land parcel to calculate the developable acreage. While a total net-out restricts development to the most usable land this approach can be perceived as being too restrictive, almost a legal taking that conflicts with land owner rights. A partial net-out is a more moderate approach in which natural resources are weighted differently in calculating the developable acreage. For example, a municipality could deduct 100% of a floodplain, steep slopes or wetlands from a parcel but only deduct a portion of woodlands and moderate slopes to calculate the developable acreage. The partial-net out approach allows for some reasonable use of a parcel while deducting the most constrained natural resources.



Total Net-out Approach

100% of resources deducted from lot area



Partial Net-out Approach

Portion of resources deducted from lot area

Riparian Buffers

A riparian buffer is a vegetated area near a stream, usually forested, which helps shade and partially protect a stream from the impact of adjacent land uses. It plays a key role in increasing water quality in associated streams, rivers, and lakes, thus providing environmental benefits. Riparian buffers have become a very common conservation practice aimed at increasing water quality and reducing pollution. Riparian buffers act to intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. They also serve to provide habitat and wildlife corridors in primarily agricultural areas. They can also be key in reducing erosion by providing stream bank stabilization. In addition, riparian buffers can have economic benefits: often people who purchase land for recreational uses are willing to pay more if the lot is primarily wooded or has wooded acreage. A riparian buffer is usually split into three different zones, each having its own specific purpose for filtering runoff and interacting with the adjacent aquatic system. Buffer design is a key element in the effectiveness of the buffer. It is generally recommended that native species be chosen to plant in these three zones, with the general width of the buffer being 50 feet (15 m) on each side of the stream. Harris Township adopted a riparian buffer ordinance in the year 2010 which can be found online at http://www.harristownship.org/zoning.htm.

Lot Averaging

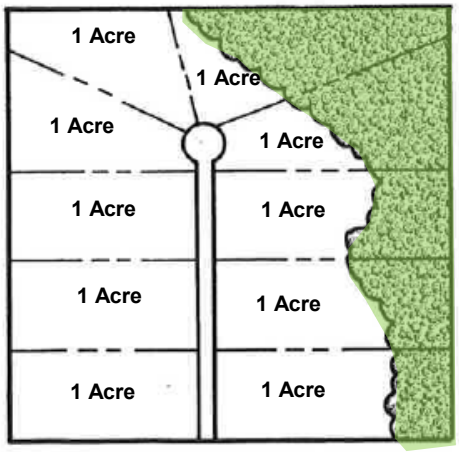
Lot averaging is a technique that allows developers to create residential subdivisions with lots that average the minimum allowable lot size in the applicable zoning district, rather than strictly adhering to the minimum lot size for every lot created. This approach results in a subdivision with a variety of lot sizes. Lot averaging gives developers flexibility in siting lots and avoiding environmentally constrained areas. The flexibility allows for denser development. Lot averaging is generally divided into two categories: common approach and flexible approach.

The **common approach** is implemented more in suburban areas where subdivision design for streets and infrastructure is critical. The common approach can still provide provisions for protecting environmentally constrained areas but the development pattern retains a conventional pattern. The common approach can stipulate that lots meet a required minimum size or, minus any environmentally constrained areas, the lot meet a minimum developable size minus any natural resource deducted from the lot.

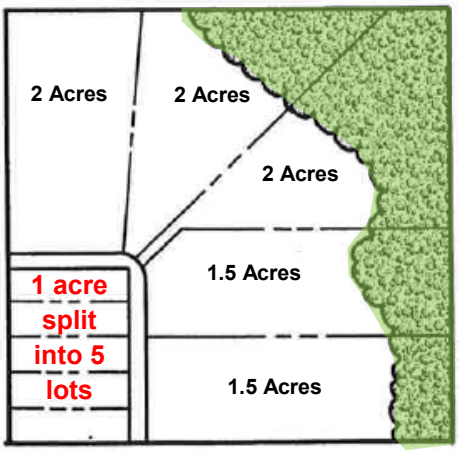
The **flexible approach** to lot averaging can provide significant open space preservation, protect environmentally sensitive resources, and can increase the aesthetic quality of the overall design to fit the natural landscape. As long as the *average lot size* meets zoning ordinance requirements, lots can vary widely in acres.

Lot averaging is implemented through zoning ordinances with supportive language in the subdivision and land development ordinance. Lot averaging has the potential to create more attractive subdivisions, reduce environmental disturbances, helps logical site lot placement, and can increase open space preservation. It should be noted though that lot averaging can actually result in a developer subdividing more lots than the zoning ordinance allows.

COMMON APPROACH



FLEXIBLE APPROACH



Vegetation Management/Conservation

Vegetation management conserves and manages existing trees, woodlands, native vegetation, and hedgerows before, during, and after the development process. This approach is not intended to restrict development but rather it can work to a developer's advantage. A developer would be efficient (economically and environmentally) to plan a development based on the location of existing woodlands instead of clear-cutting the parcel prior to the permitting process and plant new trees after the development is completed. Vegetation management is applicable in both the rural and urban areas for both tree conservation and landscaping. This approach is primarily implement through subdivision and land ordinances but a zoning ordinance can include maximum site disturbance limits, minimum tree planting standards, and a list of acceptable native tree species. The advantages of this approach for conserving forest land are:

- improved air quality;
- retain wildlife habitats;
- create buffers between land uses;
- shade and climate control;
- aesthetic value and landscape conservation;
- reduced soil erosion;
- reduced dust and noise;
- provide protection from strong winds.

Tools and Techniques

Natural Resources Inventory

The Centre County Natural Heritage Inventory (NHI) , compiled by the Western Pennsylvania Conservancy (2002), is the foremost guiding document the County references to identify natural areas that are regionally important to biodiversity. These areas have been interpreted and delineated by Conservancy staff as being exceptionally unique for being undisturbed by human activity, the habitats demonstrate potential to support species of special concern, or the natural resources contained within the landscape are significant to support Pennsylvania's native species. The NHI identifies biologically diverse areas, landscape conservation areas, and managed lands. Of the 97 sites identified in the NHI, **71 are totally contained within forested lands**. In addition to these sites, the National Audubon Society identifies five geographic areas in the County as Important Bird Areas (IBAs). These IBAs are:

- The Bald Eagle Ridge;
- The Greater Part of Sproul State Forest;
- The Greater Part of Rothrock State Forest;
- The Greater Part of Moshannon State Forest and Black Moshannon State Park;
- State Game Lands 176 (Scotia Barrens).

Site Analysis Planning

A site analysis plan is part of a subdivision and land development ordinance that identifies environmental characteristics and other important features of a tract proposed for subdivision and land development. Related to the Cluster Development, Net-out of Natural Resources, Vegetation Management, and Lot Averaging Tools, a site analysis plan that identifies the forested portion of a developable tract can help local officials steer a developer to subdivide the tract in an environmentally conscience and economically efficient manner. The advantages of site analysis planning are:

- provides information to enforce ordinance standards;
- provides information to help preserve sensitive or constrained natural resources;
- identifies land to be developed with the least degree of environment impacts;
- helps preserve the aesthetics of the site;
- provides an approach to regulate and monitor the intensity of developments;
- encourages local control of site designs.

Conservation Easements

Conservation easements and land trusts are both tools by which forested lands can be protected. Although Centre County uses easements and trusts primarily for agricultural land protection, two organizations in the County have employed this mechanism to protect wooded lands: ClearWater Conservancy and Lion's Paw Alumni Association. To date, ClearWater Conservancy has conserved over 4,000 acres of land using conservation easements.

Conservation easements are legal documents that limit certain activities on the land and are intended to conserve specific natural features. A conservation easement must be donated or sold by the legal landowner and must be accepted by a receiving party - usually a nonprofit organization such as a land trust.

The process of securing a conservation easement requires time and financial resources usually beyond the scope of what a local municipality can allocate. When the process and resources are shared across a number of entities, including a land trust, the conservation easements are typically more successful to implement because the effort is shared with resources coming from multiple sources.

Easements are usually permanent and recorded with the deed to the property. For the easement holder (land trust), the easement provides open space that the land trust does not assume the burden of ownership in terms of taxes and maintenance.

For the landowner, an easement provides a permanent method to protect the land by which they can be compensated through tax relief.

The land trust, however, may be able to inspect the property to ensure that the use of the property complies with the terms of the conservation easement. The land trust can require the property owner to discontinue restricted activities as stated in the easement documents, correct identified problems, or face penalties and/or legal action for noncompliance.

Woodland Legacy Planning

Woodland Legacy Planning, comprised of estate planning, land stewardship, and communications, is a planning process to achieve a joint vision and a smooth transition between owners of forested property. The Woodland Legacy Planning Project (http://extension.psu.edu/natural-resources/forest/private/legacy-planning) offers tools and resources for landowners as they begin to think about what happens to their land after their tenure.

A Woodland Legacy Plan is a written document that should include:

- current condition of the forest land;
- landowner goals;
- recommendations on how to achieve those goals;
- map that identifies stands of trees describing tree species, age and condition of trees;
- long-term recommendations applied to each stand of trees;
- based on no less than a 15-year time frame.

Several states, including Maryland, offer long-term tax incentives to property owners who retain and actively manage forested lands and who can document that they have a woodland legacy plan. Ten steps to legacy planning are:

1. Commit to a stewardship plan.
2. Gather as much information about the woodland property.
3. Write a draft of goals and values about future management.
4. Discuss with family and/or heirs a legacy plan.
5. Seek a natural resources professional.
6. Seek a professional estate planner.
7. Gather and research unbiased information from others who have legacy plans.
8. Develop a business model.
9. Finalize a legacy plan.
10. Identify and/or groom a land manager.

Without a future land manager to implement the plan's goals, the legacy plan may never be fulfilled and the forested tract become subdivided, the trend known as parcelization.

Greenway Planning

Greenways are linear networks of open space that fulfill a variety of conservation, recreation, and transportation functions. To date, all but four counties in Pennsylvania have completed Greenway and Open Space Plans. Centre County adopted a Recreation and Greenway Plan in August of 2010. The Greenway Plan specifically outlines approaches to protecting natural resources (forests included), interconnecting landscapes, and tools for promoting local tourism. Several of the greenway corridors identified in the County's plan connect the state forest lands and transect the forested landscape. These greenways include:

- The Mid-State Trail;
- The Proposed Bald Eagle and Spring Creek Navigational Canal Trail;
- The Snow Shoe Rails-to-Trails;
- The Allegheny Front Trail;
- The Musser Gap Greenway.

A Greenway Plan, adopted at the county-level with implementable strategies for local level governments, is a supporting document that provides key concepts for conserving forest land. The key concepts in the Greenway Plan could be adopted into municipal zoning ordinances.

Clean and Green Program

Clean and Green, the Pennsylvania Farmland and Forest Land Assessment Act of 1974, provides for lands devoted to agricultural use, agricultural reserve use or **forest reserve** use to be assessed at the value it has for that use rather than the fair market value. The intent of the act is to encourage landowners to keep their land in one of these uses. The benefit to landowners who enroll their property in the Clean and Green Program is a reduction in property taxes. Because enrollment is voluntary, not all landowners of eligible properties are aware of Clean and Green. In Centre County, applications for enrollment in the program are available at the County Tax Assessment Office. The property must meet certain requirements for enrollment and, if eligible, will receive a preferential assessment. The Program carries specific obligations that the landowner must comply with in regards to any land use changes or activities on the land that do not meet the definition of Clean and Green. A landowner will be held liable for paying rollback taxes on property if the use of the property changes or if the landowner opts to remove enrolled property from Clean and Green. For more information regarding the Clean and Green Program in Centre County, please contact the Tax Assessment Office by phone at (814) 355-6721. Detailed information and act updates are available on-line at http://www.pacode.com/secure/data/007/chapter137b/chap137btoc.html.

Implementation Strategies and Opportunities

Reduce forest parcelization, fragmentation and deforestation.

- Provide incentives to developers who design residential subdivisions that incorporate clustering homes and infrastructure, net-out of natural resources, lot size averaging, conserve existing woodlands, and plant additional trees (native, when possible).
- Develop model zoning ordinance language that promotes forest conservation, including zoning district overlays.
- Encourage coordinated municipal efforts through zoning and comprehensive planning to conserve woodlands.
- Encourage municipalities to adopt open space ordinances that include forest land conservation.
- Increase and promote educational materials to private forest land owners that outline best management practices.
- Contact and communicate with State Forest personnel regarding current and future forest management strategies.

Promote forest landowner education and technical support.

- Private Forest Landowners Conference hosted by Penn State University. More information at http://ecosystems.psu.edu/research/centers/private-forests/conferences/2015-private-forest-landowners-conference.
- Provide a list of service foresters and contract foresters.
- Promote forest stewardship and tree farm programs.
- Promote the Natural Resources Conservation Service (NRCS) cost share programs.
- Provide resources and information regarding estate planning as it relates to forest stewardship and forest legacy planning.

Educate and provide assistance regarding forestland and water quality.

- Direct landowners to the NRCS cost share program for riparian buffers.
- Provide information on the TreeVitalize riparian buffer program.
- Network with water resources personnel at research centers to gather information and data related to water quality and quantity as related to forests. Such research centers can be the: Stroud Water Research Center. http://stroudcenter.org/. Pennsylvania Water Resources Research Center at Penn State. http://www.pawatercenter.psu.edu/.
- Provide information, data, and maps for Centre County's Source Water Protection Planning efforts.

Promote and educate local officials regarding forestry industries and products.

- Network and create connections to maintain and enhance a viable forest products market county-wide.
- Discuss with local officials tax incentives to keep forestland as forests, making ownership of large forested parcels affordable.
- Discuss with local officials the realistic timeline of how forests regenerate, and that local tax incentives for affordable forestland ownership will impact future property owners for generations.
- Identify and consult with municipal officials forested parcels that would be the most optimal to place in a conservation easement. These parcels could be adjacent to larger contiguous tracts of forested lands or adjacent to public forest lands.

Implementation Strategies and Opportunities

Coordinate and cooperate with state agency personnel at the local level.

- Contact and keep in communication with district foresters, conservation district staff, forest land managers, the Natural Resources Conservation Service (NRCS), and University extension.
- Invite and engage state agency personnel at planning commission meetings, with municipal supervisors, and zoning officers.
- Share and exchange information, data, and planning tools with state agency staff that are applicable at the local level to forest land management.
- Gain a better understanding of the shared forest management practices between agencies, and relay these shared goals to state agency personnel, creating a common foundation for communication and long-term planning.

Decrease threats to forests from insects, diseases and invasive plants.

- Direct municipalities and private forest land owners to educational resources and experts, including Penn State's Cooperative Extension Unit and local Forest Program Manager Office.
- Include links from the County's website to the Bureau of Forestry's website which regularly updates insect and disease alerts across the Commonwealth.
- Utilize the United States Forestry Service Eastern Forest Environmental Threat Assessment Center's Forest Change Assessment Viewer to track and/or download data.
- Encourage watershed, conservation, and outdoors clubs to become better educated in identifying insects, diseases and invasive plant species.
- Discourage movement of firewood between counties.
- Add language to subdivision and land development ordinances to discourage use of invasive plant species in development projects.

Steer recreation activities to appropriate landscapes.

- Identify the priority recreation projects from the Recreation and Greenway Plan and promote at the municipal level those recreational activities best suited for the area.
- Solicit feedback from private landowners adjacent to proposed recreation project areas to determine if activities are welcome by the property owners, will pose a nuisance, and if the proposed project is feasible.
- Provide maps and guides on the county's website to educate visitors and residents as to where certain recreational activities should or should not take place.

Promote property easements that conserve forested lands.

- Work with local land conservancies to identify priority lands for conservation.
- Educate residents on the benefits and uses of easements.
- Consider applying to be included in the Forest Legacy Program (the county must first submit a letter of interest to DCNR).

Interrelationships

Recent revisions to the Pennsylvania Municipalities Planning Code specify that a comprehensive plan include a statement of interrelationships among various plan components with emphasis given to environmental, energy conservation, fiscal, economic development and social impacts. Additional information of relevance to this discussion as it relates to forests can also be found in other 2003 Centre County Comprehensive Plan Chapter Updates titled: Agriculture, Economic Development, Historic Resources, Housing, and Land Use; and in the newly completed Centre County Greenways Plan.

Environmental Impacts and Energy Conservation

- Forests act as a natural filter for groundwater supplies, remove pollutants from the air, and control soil erosion.
- Forests provide habitats for animal and bird species, especially the core or interior forests.
- Forests provide buffers between land uses, particularly those of incompatible uses.
- Forest land is key to greenway planning because the linear greenways connect and/or intersect forested lands.
- Preserving forests reduces urban sprawl.
- Forests are largely diverse in plant and animal species, some species of which are protected.
- Forests play a crucial role in soil nourishment and nutrient recycling.
- Urban forests, especially, provide shade for building which greatly reduces cooling costs.
- Urban forests, again, provide wind breaks or barriers for buildings which greatly reduces heating costs.
- Forests, on a large-scale, regulate climates.

Fiscal Benefits

- Forested land uses and forested open space (undeveloped lands) can add to a local government budget surplus because there are no associated service costs to forest lands, reducing local service expenditures.
- Private forested land may qualify for preferential tax assessment programs, depending on the property acres and if the property owner retains the land as forest, thus reducing an owner's property taxes.
- Properties that are adjacent to forest lands, either private or public, on average, have increased property values.
- Forested landscapes, at the state-level, serve as the cornerstone for the Natural Heritage, Lumber Heritage, and PA Wilds, all successful marketing and recreation campaigns that have infused real dollars into rural Pennsylvania communities.
- The estimated value of standing timber in Centre County is over $451 million. Growing and harvesting timber provides income to landowners and jobs for rural economies.

Social Impacts

- Forests, both rural and urban, create recreation opportunities that enhance health and wellness for residents.
- Urban forests enhance community aesthetics and provide beautification to hardscapes that add to downtown character and public spaces.
- Forests can be considered outdoor classrooms used as educational spaces, both formal and informal.
- Forestry stewardship programs and forest legacy planning strengthens community and family relationships, setting long-term sustainability goals based on shared visions and values.

Economic Development

- Industries related to forests and forest products generate $5.5 billion annually in Pennsylvania; sustaining healthy forests through best management practices ensures long-term supply of trees for wood and wood products.
- 2.9% of the county's population was employed in the agriculture, forestry and fisheries sector in 2012; maintaining or increasing jobs in this sector requires sustainable forestry practices.
- Forested landscapes provide a wealth of recreational activities.
- Forested landscapes are anchor attractions for our state parks, state game lands and, naturally, our state forest lands. Maintaining viable forest environments secures long-term recreation planning goals.
- Preserving forested viewsheds as a community backdrop adds to the aesthetic value of rural communities, drawing visitors, new residents, and businesses.

Program Applicability in Centre County

- **Environmental Quality Incentives Program (EQIP)** - *Forestry Program*; administered by the USDA-Natural Resources Conservation Service. http://www.nrcs.usda.gov.
- **Project Learning Tree**; program of the American Forest Foundation. https://www.plt.org. *Program administered at the state level through DCNR Bureau of Forestry* at http://www.dcnr.state.pa.us/forestry/education/projectlearningtree/index.htm.
- **Pennsylvania Tree Farm Program**. http://patreefarm.org.
- **Tree Vitalize**. Partnership with the Pennsylvania Department of Conservation and Natural Resources. http://treevitalize.net.
- **Tree City USA**; program of the Arbor Day Foundation. http://www.arborday.org/programs/treeCityUSA/index.cfm**.**
- **i-Tree Canopy.** On-line tools for tree canopy assessments. http://www.itreetools.org/canopy/index.php**.**
- **Pennsylvania Timber Show**. Hosted by Penn State University and the Pennsylvania Forest Products Association. http://agsci.psu.edu/timber/about.
- **Woodland Owners of Centre County**. http://woodlandownerscc.info.
- **Forest Stewardship Program**; directed by the DCNR Bureau of Forestry. http://www.dcnr.state.pa.us/forestry/index.aspx.
- **Pennsylvania Sustainable Forestry Initiative**. http://www.sfiofpa.org.
- **Pennsylvania Forest Products Association.** http://www.hlma.org/. *Previously known as the Hardwood Lumber Manufacturers Association.*
- **American Tree Farm System**. https://www.treefarmsystem.org.
- **Pennsylvania Forestry Association**. http://www.paforestry.org.
- **Pennsylvania Community Forests**. http://www.pacommunityforests.org.
- **Keystone Recreation, Park, and Conservation Fund Act**. http://keystonefund.org.
- **Growing Greener.** Administered by the Pennsylvania Department of Environmental Protection. http://www.depweb.state.pa.us/portal/server.pt/community/growing_greener/13958.
- **Community Recreation and Conservation Program (C2P2).** Administered by DCNR-Bureau of Recreation and Conservation. https://www.grants.dcnr.state.pa.us.
- **Land Trust Program.** *Part of the C2P2 Program.* https://www.grants.dcnr.state.pa.us.

Resources

Department of Conservation and Natural Resources, Bureau of Forestry. http://www.dcnr.state.pa.us/forestry/index.aspx

Pennsylvania Game Commission. http://www.pgc.state.pa.us/portal/server.pt/community/pgc/9106

Natural Heritage Program. http://www.naturalheritage.state.pa.us/

National Audubon Society. http://www.audubon.org/

Natural Lands Trust. http://www.natlands.org/

U.S. Forest Service. http://www.fs.fed.us/

Penn State Cooperative Extension. http://extension.psu.edu/

Chester County Planning Commission. Community Planning Handbook, Volumes 1 and 2.

Rural Cluster Development Guide. http://www.sewrpc.org/SEWRPCFiles/Publications/pg/pg-07_rural_cluster_development.pdf. Southeastern Wisconsin Regional Planning Commission. Guide Number 7. December 1996.

County of Centre

Prepared by:
Centre County Planning and Community
Development Office
420 Holmes Street
Bellefonte, PA 16823

Phone: 814-355-6791
Fax: 814-355-8661
E-mail: eatuck@centrecountypa.gov

FIND THIS INFORMATION

ON THE WEB

HTTP://CENTRECOUNTYPA.GOV