

2021 // RETURN ON ENVIRONMENT STUDY

Franklin County



Photo: Ben Goodman



Photo: Ben Goodman

Fishing holes are plentiful in the numerous creeks of Caledonia State Park.

01 // INTRODUCTION

Franklin County's rural character and time-honored traditions are changing

Nature has been part of Franklin County's heritage, culture, pride, and economy for over 300 years, and remains a major driver for tourism and economic development. Green, rolling hills and forested ridgelines create a striking natural backdrop for all residents, while scenic views of farms and fields reflect the County's rural character, values, and traditions. Franklin County's landscape is unique. Both the Kittatinny Ridge and South Mountain are renowned migration areas for birds and wildlife.

More than 450,000 people visit Franklin County each year (FCADC, 2020). People live in and visit Franklin County for the quality-of-life assets that nature provides, including scenic views; easy access to state and local parks; hunting and fishing; bird watching; the Appalachian National Scenic Trail; Michaux, Buchanan, and Tuscarora State Forests; Caledonia and Mont Alto State Parks; and many other outdoor recreation opportunities. However, the loss of farmland and scenic views, fragmentation of forests, extreme weather conditions, and increasing traffic are harbingers of major changes.

Over the next 20 years, changing demographics, growth, changes in climate, and increased demand for outdoor recreation will shape future growth.



Photo: David Shipper

A Ruby-throated Hummingbird takes a morning drink during an early spring bloom.

02 // WHY AN ROE?

Nature is a competitive advantage

“We can’t solve problems by using the same kind of thinking we used when we created them.”

– Albert Einstein

Pennsylvania’s Constitution imposes “a duty to conserve and maintain public natural resources for this generation and generations yet to come.” If the goal is to maximize health, safety, and social welfare—and to conserve and maintain public natural resources—our policy process must distinguish clear and concrete economic values from which to choose.

Return on Environment (ROE) studies explain nature’s invisible financial value in terms everyone can understand. They do not explain nature’s intrinsic value, but rather what people have been willing to pay to replace these cost-free services once nature is disrupted or destroyed. As a result, policymakers, businesses, and residents can see natural systems as a portfolio of financial assets rather than a commodity or added expense. By understanding this financial value, Franklin County is better equipped to strike an effective balance between maintaining connected, open spaces and supporting smart growth. This approach can help improve environmental quality and ensure a sustainable economy.

METHODOLOGY

Building on previous valuation studies, and using standard economic analysis techniques, ROE studies estimate the financial value of open space by calculating the avoided costs from natural system services and air pollution removal; outdoor recreation revenues; and avoided healthcare costs as a result of increased exercise.

Natural system services represent the benefits that human populations derive, directly or indirectly, free of charge from ecosystem functions such as groundwater, stormwater and flood mitigation, carbon sequestration, air-pollution removal, wildlife habitat, aquatic habitat, erosion prevention, habitat regeneration, pollination, biological control, and nutrient uptake. If these services are lost, taxpayers will have

to pay for infrastructure or other interventions to manage them. Most natural system services do not have established markets, making estimates difficult. Results in this study are based primarily on the transfer of data from peer-reviewed studies, as well as data from regulatory fines, nutrient trading, forest replanting, habitat replacement costs, tax benefits, and conservation easement values. The i-Tree Landscape Model, developed by the U.S. Forest Service, is used to estimate the air pollution removal and carbon sequestration and storage rates. The model analyzes tree canopy, land cover, and basic demographic information to calculate levels and financial value.

ROE provides a way to assign dollar values for natural systems by landscape type (cropland, forests, pasture, developed land). The system also assigns natural system values to locations that are in a riparian buffer, floodplain, wetland, or headwater. Additional delineations, such as Green Ribbon Landscapes, categorize “added” value for adjacent lands that fall within defined buffers of wooded areas or areas that are protected open space or linked by trails. These evaluations can be used to establish preservation priorities and scenario evaluations for many planning programs.

The IMPLAN model examines economic and demographic data to calculate the value of outdoor recreation. The model, as used in this study, includes activities that can be performed in natural settings without causing harm to nature. Resident levels of participation and direct annual spending are tracked across 13 major recreational activity categories using survey results from the PA Department of Conservation and Natural Resources (DCNR). Indirect and induced economic effects, along with employment and state and local taxes, are analyzed for the identified outdoor recreation activities.

Healthcare savings are derived by applying DCNR outdoor exercise participation rates to the conclusions of recent health studies about the benefits of outdoor exercise. Outdoor recreation activities include walking, hiking, jogging, running, bicycling, camping, unstructured and playground play, paddle sports, bird and other animal watching, wildlife photography, hunting and fishing, and nature study. These activities are provided by open space at little or no direct cost to users. For more information on methodology, visit the “Return on Environment” web page at www.kittatinnyridge.org.

The economic benefits presented in this report provide a new perspective on the value of natural system services, which can support informed decisions concerning economic development, infrastructure, land use planning, safety, tourism, and recreation. The results of this ROE Study show that nature is serious business. The goods and services that flow from Franklin County’s existing open spaces and natural systems save residents, communities, and businesses over \$1 billion in avoided costs from natural system services, revenues from outdoor recreation each year, and reduced healthcare costs.

OBJECTIVES

The objectives of the Franklin County ROE Study are to document:

- // The monetary value of natural system services (the flow of goods and services that benefit people, directly or indirectly, from ecosystem functions).
- // The value of improved air quality relating to healthcare costs.
- // The monetary value of outdoor recreation and the number of participants.
- // The spatial distribution of natural resources’ financial value.
- // The recognition of the importance of biological diversity and landscape connectivity.
- // The integration of new land-use and habitat-expansion tools into everyday practice.

PROCESS

This study was assisted by a steering committee that attended three, two-hour meetings over the course of three months.

The process followed a basic framework:

1. Identify and consider the free services that nature provides.
2. Develop economic processes to calculate the economic benefits of these services.
3. Establish the monetary value of natural system services to families, local communities, and businesses.
4. Determine the monetary value of reduced healthcare costs due to forest canopy cover.
5. Assess Franklin County’s major, long-term environmental issues.
6. Determine how ROE can help meet Franklin County’s future goals.

CHALLENGES AND ISSUES

Promoting sustainable economic growth while maintaining a high quality of life, low cost of living, good health, and a unique sense of place is Franklin County’s major challenge. A second, and more difficult, challenge is how to balance the health of natural systems to support a sustainable economy. Research shows that the most efficient way to avoid excessive future costs is to increase the connectivity of large forests and riparian corridors (ecosystems of plant life growing near natural bodies of water) so that they may function and retain resiliency under a wider range of weather conditions (US EPA, 2012). Franklin County also faces these issues:

Water: Very heavy precipitation and flooding have increased significantly in Pennsylvania, and precipitation is expected to increase by another 8% by 2050 (PA DCNR, 2018). Flooding can damage existing physical infrastructure, affect groundwater supply, cause lakeshore and stream bank erosion and sedimentation, reduce water quality below public thresholds for recreation use, and increase water treatment costs.

Water Pollution: 26.6% of Franklin County’s waterways are under some level of impairment. Franklin County has 450 miles of impaired streams (FCCD). Less than half of the riparian buffers (vegetated areas along waterways that help shade and protect waterways from the impact of adjacent land use) in the County are currently providing financial benefits.

International Impact: Both the Kittatinny Ridge and South Mountain are renowned migration areas for birds and wildlife. Land use decisions in Franklin County impact the ecology of both North and South America in the Atlantic Flyway. A study published in the journal *Science* (Rosenberg, et al., 2019) found that since 1970, North America has lost nearly 3 billion birds—or 29% of its avian population—and many species are in “conservation need,” meaning they lack adequate habitat.

State and Local Impact: As Millennials (people born between 1981 and 1996) continue to prioritize outdoor recreation opportunities, participation rates should increase. However, the demand for outdoor recreation in the future in Franklin County may exceed the business capacity to meet it.

Sprawl: It is critical that the County effectively manages natural resources in the midst of economic expansion. Franklin County has continuously been a high-growth area between 2010–2017, ranking between fourth and ninth in the Commonwealth (Hook, 2018). During recent periods of significant growth, areas in Pennsylvania consumed more land per person than any other state (Clarion Associates, 2000). Sprawl accelerates the fragmentation and depletion of forests, wetlands, and other open areas where cost-free natural system services occur, and this contributes to the loss of critical habitat. Commercial and industrial development, farms, and open land generate more revenue than they require in services. In a review of 98 communities across 21 states, researchers found that, for every dollar received from residential development revenues, an average of \$1.08 was spent to provide services like roads and schools (Kelsey, 1998).

Temperature: Pennsylvania as a whole is getting wetter and warmer. In the last century, the temperature in Pennsylvania increased 1.8°F and is expected to warm another 5.4°F by 2050. Pennsylvania will see many more days above 90°F by mid-century compared to 2000 (PA DCNR, 2018). Temperature increases may result in lower lake levels due to increased evapotranspiration, the potential for drought conditions, and a reduction in available outdoor water-based recreation. Higher water temperatures can also lead to changes in water composition, potentially resulting in a reduction or shift of keystone species.

Air Quality: In Franklin County, 96.38% of air quality percentage levels rated as “good” (Homefacts, 2020). However, the effects of climate change—influenced by land management activities, forest health, and tree productivity—are reducing the ability of forest ecosystems

to absorb and sequester carbon emissions, which will diminish air quality in the future.

Forests: Native species composition is expected to change, as some decline, increase, hybridize, and move up from the south. Invasive species will move into the Commonwealth and those here will increase, which will further reduce the resilience of species and habitats to the impacts of climate change, reduce diversity, and increase the potential for species decline (PA DCNR, 2018). More frequent, severe, and widespread pest outbreaks will result in increased tree mortality and management and treatment costs. Increased frequency of wildfires, blowdowns, and other natural disturbances will create challenges for public safety operations, damage roads and trails, and may lead to long-term loss of access to natural areas.

Recreation: Climate change is likely to have a significant impact on the types of recreation that occur in state and county parks and forests, as well as the length of the recreational season. A longer recreational season will result in increased visitor impact on natural resources and increased stress on ecosystem components. Extremely hot days during the summer may result in some parks exceeding visitor capacity, turning visitors away or closing. Milder winters will lead to less winter recreation activities such as ice fishing, snowmobiling, and cross-country skiing (PA DCNR, 2018).

These challenges and issues all point to a region in the process of significant change over the next 20 years. While the long-term effect of these changes may not be fully understood, decisions regarding the use of land can have both positive and negative impact on the local economy and quality of life.

FIGURE 01 // ROE VALUATION BENEFITS

- // Nature’s complex system is conveyed in a simple bottom line that is understandable to a broad audience.
- // Dollars, as a financial measure, underscore nature’s connection to quality of life, health, cost of living, economy, and sense of place, while conveying a level of significance or priority that allows for a better trade-off analysis.
- // Monetary estimates of the value of natural system services can be applied within decision frameworks related to land use, tourism, and economic development.
- // Discussion of natural system cover types, services, and their values engages stakeholders in an educational process that can help organizations in their missions and raise awareness with policymakers and citizens.
- // Environmental health can be measured and incorporated into local decision-making processes.
- // Economic valuation of natural system services and biological diversity can make the value of protecting them explicit to policymakers, investors, and homeowners.
- // New business opportunities can be identified.



Photo: Amanda Hann

The Kittatinny Ridge remains a constant backdrop season after season for summer corn.

03 // THE PLACE

Nature is serious business

“Pennsylvania’s economy, as well as the food supply of our region and beyond, depends on clean water and healthy, viable farms. You can’t have one without the other.”

– Pennsylvania Secretary of Agriculture Russell C. Redding

In Franklin County, nature creates jobs and businesses need clean water for products and processes. Major industries, such as agriculture and tourism, along with residents’ spending for equipment, food, and outdoor recreation fees, relate directly to the quality of natural resources, open spaces, and biological diversity.

The valley is bordered by the Kittatinny Ridge to the west and South Mountain to the east. While home to over 155,000 people, Franklin County is frequently described as “rural and open.” The County has retained much of its original character from its founding in 1729 when it was part of Lancaster County. It became independent in 1784. Franklin County is part of the Cumberland Valley bounded by Adams, Cumberland, Fulton, Huntington, Juniata, and Perry counties in Pennsylvania, as well as Frederick and Washington counties in Maryland. Elevations range from 292 to 2113 feet with 92 summits. While quite steep in some places, the landscape is neither jagged nor harsh, with gentle inland slopes and farmland filling the gaps between the forested, mountain areas. Franklin County is rich in natural resources.

FIGURE 02 // FRANKLIN COUNTY HIGH-QUALITY NATURAL RESOURCES

IMPORTANT BIRD AREAS	3
PROTECTED LANDS	260 TRACTS; 98,358.57 ACRES
NATURAL HERITAGE AREAS	68 SITES
EXCEPTIONAL VALUE STREAMS	7.63 MILES
CLASS A STREAMS	18.47 MILES
WILD TROUT STREAMS	6.06 MILES

Source: PA DCNR 2020 Conservation Explorer Tool

FIGURE 03 // FRANKLIN COUNTY DEMOGRAPHICS

POPULATION

The current population is estimated at 155,027. The median age of residents is 41.4 years. The median age is expected to rise steadily through 2025. The growth rate in 2018 was 1.25%.

HOUSEHOLDS

In 2018, the County had an estimated 65,791 housing units, with an average household size of 2.52 persons.

INCOME

The County's median household annual income is \$59,713, which is more than the national median annual family income of \$58,267.

EDUCATION

87.4% of County residents have a high school education or higher, and 21% have a college degree or higher.

Source: U.S. Census Bureau, 2019 QuickFacts Franklin County Pennsylvania

CLIMATE

Franklin County's climate is like the rest of central Pennsylvania. Though the region can experience heavy rain and significant snowfall, it does not suffer from the Great Lakes effect that counties in the western and northern parts of the state experience. It is also far enough away from the eastern coast of the United States to avoid the cooling effect associated with the ocean. Though central Pennsylvania does not typically bear the full brunt of hurricanes or tropical storms, there have been incidents where storms have turned inland and caused substantial damage.

The 2012 United States Department of Agriculture (USDA) Plant Hardiness Zone Map is the standard by which gardeners and growers can determine which plants are most likely to thrive at a location. The map is based on the average annual minimum winter temperature, divided into 10°F zones. The plant hardiness zone has moved 100 miles north in the last 30 years. According to the USDA, most areas in the United States moved a half-zone as the temperature increased by five degrees. This translates to a 100-mile northern change in Franklin County since 1990 (Climate Central, 2019).

GROWTH

The County's many amenities and location have stimulated strong economic growth. According to the Penn State Data Center, the County was estimated to be the fourth fastest-growing county in the Commonwealth in 2019.

BUSINESS

The quality of the environment impacts business location, attracts investment, stimulates tourism and recreation, and attracts wealth. Many businesses today want employees to have healthy lifestyles because active employees are happier, more creative, more productive, and miss less work (Henderson, 2018).

The quality and quantity of resources available to businesses are critical to business function. Franklin County's location and natural resources make the region very business friendly. The recreational opportunities available on open spaces benefit the region's workforce, translating into increased productivity and avoided medical expenses. The forested mountains offer surface and groundwater resources for businesses, ensuring clean, filtered water to produce their products and to meet water-quality permit standards (Beers, 2019). According to the U.S. Environmental Protection Agency database on National Pollution Discharge Elimination System (NPDES) permits, rivers in Franklin County supported over 150 permitted intakes and discharges from operating businesses and manufacturing in 2020. Businesses can fall into one of the following categories:

FIGURE 04 // FRANKLIN COUNTY ROE BUSINESS TYPES

Resource Based: Water companies, breweries, bottling companies, restaurants, resorts, agriculture, tourism, and offices. Examples include Jan Zell Wines and Roy Pitz Brewery.

Resource Use: Manufacturing, electricity generation, and agriculture.

Outdoor Recreation: Sporting goods, restaurants, gas stations, clothing manufacturers. Examples include Keystone Outdoors, Family Cycling Center, Dicks Sporting Goods, and Quick Release Bicycle.

Green: Companies that adhere to sustainability protocols for business—recycling, furniture manufacturers, Home Depot. Examples in Franklin County include Volvo Equipment Construction and Nutrient Control Systems.

Naturally Smart: Companies that use natural resource protection as part of their business operations, such as wind turbines, solar roofs, watershed management, carbon credits. Examples in Franklin County include Lighthouse Solar, Rosenberry & Sons Lumber, Timmons Farm, Amazon, and Waste Management.

TOURISM

Recreational tourism is one of the fastest growing sectors in Pennsylvania's economy, according to the Pennsylvania Department of Conservation and Natural Resources (PA DCNR, 2018). Tourism is a major industry in the Commonwealth and Franklin County. Tourism is largely based on natural attractions, trails, and other outdoor

opportunities. Recreation accounts for 19.9% of tourism spending, or \$63.5 million annually (PA DCED, 2018).

A study conducted by The Pennsylvania State University, Recreation, Park and Tourism Management (RPTM) analyzed the amount of revenue each state park within Pennsylvania receives annually from day users and overnight users (Penn State University, 2012). Three types of day users were identified in the study:

- // **Local Day Users:** Pennsylvania residents who live within 50 miles of the park and make up 56% of visitation and 38% of total day spending.
- // **Non-Local Day Users:** Pennsylvania residents who live more than 50 miles from the park and make up 28% of visitation and 38% of total day spending.
- // **Non-Pennsylvania Resident Day Users:** Those who live more than 50 miles from the park and make up 16% of visitation and 24% of total day spending.

Franklin County's various natural resources and scenic landscapes are important assets that provide potential for substantial growth in travel and tourism industries. Top attractions include the Appalachian National Scenic Trail; Michaux, Buchanan, and Tuscarora State Forests; and Caledonia and Mont Alto State Parks.

FIGURE 05 // FRANKLIN COUNTY ANNUAL TOURISM REVENUE (\$ MILLIONS)

TRANSPORTATION	94.6
FOOD	82.0
RECREATION	63.5
SHOPPING	54.9
LODGING	37.7
TOTAL	332.7

Source: PA DCED, Economic Impact of Travel and Tourism in Pennsylvania

AGRICULTURE

Agriculture is the major land use in Franklin County. 30% of soils are prime agricultural land. The County ranks fourth in the Commonwealth in total agricultural cash receipts. Additionally, Franklin County ranks second statewide in total cropland and the production of milk, cattle, melons, and corn silage; and third for fruit and berry production (U.S. DOA, 2017).

FIGURE 06 // FRANKLIN COUNTY AGRICULTURE

MARKET VALUE OF PRODUCTS SOLD	\$476,469,000
NUMBER OF FARMS	1,581
AVERAGE SIZE OF FARM	170 ACRES
LARGEST PRODUCTS	COW'S MILK, POULTRY, AND EGGS

Source: PA DCED, Economic Impact of Travel and Tourism in Pennsylvania

The County's farms not only contribute to the local economy, but also provide natural system services that include groundwater recharge areas; water infiltration and nutrient uptake through wetlands, riparian corridors, and forests; wildlife and pollinator habitats; soil formation; and open space that is valued by residents and tourists for outdoor activities. However, farms are also a source of non-point pollution.

To sustain the current level of agriculture well into the future, Franklin County has engaged in an aggressive agricultural land preservation program. As of December 2020, 142 family farms were preserved, totaling 18,035 acres. One best management practice that Franklin County farmers have embraced has been the transition from conventional tillage to conservation tillage (FCCD, 2020).

FORESTS, WOODLANDS, AND WETLANDS

The northeastern United States is part of the Eastern Deciduous Forest Biome where, for over 14,000 years, the soils and climate have produced trees. Forests are home to 80% of the world's terrestrial biological diversity.

The forests, wetlands, limestone caves, and streams of Franklin County provide habitat for a wide range of plants and animals. The Nature Conservancy identified, in Franklin County's Natural Areas Inventory (NAI), areas that serve as critical habitat for species of special concern or that host a variety of habitat and landscape features warranting conservation. The inventory pinpoints nine natural areas of high or exceptional (regional or statewide) significance and approximately sixty other areas in the County. Finding ways to protect or expand the forests and interconnect them with riparian corridors or upland corridors is essential for ensuring a healthy environment.

Franklin County's landscape is unique, over 40% being forested. Both the Kittatinny Ridge and South Mountain, two remaining major forested wildlife corridors, are renowned migration areas for birds with more than 150 species of songbirds and 16 species of hawks, eagles, falcons, and vultures (Audubon PA). As part of the Appalachian Mountain Ridge and Valley Region, this area is an integral part of the larger Atlantic Flyway, which channels millions of migratory birds from their wintering grounds to their nesting grounds and back. The Kittatinny Ridge lies parallel to Appalachian ridges that host many hawk-watch locations. Each autumn, birds of prey follow the Ridge south, taking advantage of updraft winds. This forested corridor allows wildlife to move north or south and has been identified as the most resilient landscape in the state for adapting to a changing climate.

FIGURE 07 // SPECIES OF GREATEST CONSERVATION NEED IN FRANKLIN COUNTY

1. AMERICAN KESTREL
2. WOOD THRUSH
3. SCARLET TANAGER
4. GRAY CAT BIRD
5. LOUISIANA WATERTHRUSH
6. HOODED WARBLER
7. CERULEAN WARBLER
8. BLACK-THROATED GREEN WARBLER
9. BLACK-THROATED WHITE WARBLER
10. TUNDRA SWAN
11. YELLOW-BREASTED CHAT
12. EASTERN WHIP-POOR-WILL
13. PURPLE MARTIN
14. RUFF GROUSE
15. FIELD SPARROW
16. SAVANNAH SPARROW
17. GRASSHOPPER SPARROW
18. VESPER SPARROW

Source: 2015-2025 Pennsylvania Wildlife Action Plan

Franklin County residents and visitors want to experience nature at its best. Areas in need of protection within the County have the highest economic value from a natural system services standpoint. These areas help define resident quality of life and sense of place. Protecting bird habitat also helps manage snakes, rodents, and insect populations. Using ROE data can help Franklin County establish the patterns and priorities it needs to create a sustainable environment and growing economy. The highest priorities are protecting and connecting large forests over 100 acres, and riparian areas and wetlands. Businesses, governments, and households need to work together to manage open space in ways that result in the highest ROE.

WATER

Human-induced environmental problems, such as water and air pollution, have existed for over 100 years. According to the Franklin County Conservation District (FCCD), over 26.6% of Franklin County's streams are classified as impaired waters at some level by nutrients and total impaired waters represent 450 miles of all streams. In 2014, the Pennsylvania Department of Environmental Protection (DEP) identified agriculture as the primary source of the excess nutrient and sediment loads in impaired watersheds. These waterbodies demonstrated impaired aquatic life use, meaning the overall aquatic community (fish, macroinvertebrates, plants, and algae) was not healthy, and there were pollutants or pollution that must be minimized or eliminated to return the waterbody to a healthy condition. Although the FCCD has made great strides in promoting "no till" agriculture and other sustainable practices, agriculture still presents a significant challenge to water quality. This is potentially because much of

the agricultural land sits on karst geology, so that water with nutrients has less time to filter during infiltration to ground water systems. FCCD has noticed a correlation between the lack of trees and lower water quality. Stormwater systems also present a challenge for flooding and water quality.

The northeastern portion of Franklin County lies in the Susquehanna River Basin, while the remainder of the County is encompassed by the Potomac River Basin. The three major watersheds in Franklin County are Conodoguinet Creek, the Conococheague Creek, and Antietam Creek. Additionally, several tributary streams drain to these creeks, and they are each located within their own sub-watersheds. Local watershed groups include:

- // Antietam Watershed Association
- // Franklin County Watershed Association
- // Johnston Run Revitalization Council
- // Middle Spring Watershed Association

Source: Franklin County Conservation District

FIGURE 08 // HIGH-QUALITY STREAMS IN FRANKLIN COUNTY

EXCEPTIONAL VALUE

1. CONODOGUINET CREEK
2. BUCK RUN
3. WESTERN CONOCOCHAEAGUE CREEK
4. FALLING SPRINGS BRANCH
5. ROCKY MOUNTAIN CREEK
6. MUDDY RUN
7. EASTERN BRANCH ANTIETAM CREEK

CLASS A WILD TROUT STREAMS

1. BROAD RUN
2. WESTERN BRANCH ANTIETAM CREEK
3. YANKEE GAP RUN
4. WESTERN BRANCH OF CONOCOCHAEAGUE CREEK (RM.52.35)
5. CONODOGUINET CREEK-BEAR CREEK RUN
6. FALLING SPRING BRANCH

STOCKED TROUT

1. BUCK RUN
2. CARABAUGH RUN
3. CONOCOCHAEAGUE CREEK (FROM DAM AT BIRCH RUN RESERVOIR DOWNSTREAM TO BOYERS MILL ROAD)
4. CONODOGUINET CREEK
5. DENNIS CREEK
6. EAST BRANCH ANTIETAM CREEK
7. FALLING SPRING BRANCH
8. LETTERKENNY RESERVOIR
9. LITTLE COVE CREEK
10. RAVE RUN
11. WEST BRANCH ANTIETAM CREEK (CONFLUENCE WITH BEAR VALLEY RUN DOWNSTREAM TO SR 0997)
12. WEST BRANCH CONOCOCHAEAGUE CREEK (AMBERSON ROAD BRIDGE TO U.S. 30 BRIDGE AT FORT LOUDON)

Source: <https://pfbcc.pa.gov/fishpub/summaryad/troutwaters.html>

Much of the drinking water in the Cumberland Valley comes from below-ground aquifers, accessible through various wells and springs. These aquifers flow in and around the limestone and dolomite present in the karst topography that dominates the Cumberland Valley and thus, Franklin County. Two-thirds of the County is underlain by aquifers suitable for drinking water. Some of these areas have very high-quality water. These aquifers are in the Cumberland Valley and smaller valleys in the northwestern part of the County.

Franklin County has several water supply reservoirs that are also used as sources for drinking water (Figure 09). As calculated in this ROE Study, 73% of the reservoirs in Franklin County are well located in watersheds with high-quality water and watershed forested over 66%. These reservoirs have the lowest water treatment costs available (Petal and Thompson, 2005).

The Letterkenny Reservoir is the largest reservoir in the County and has high water quality. It is one of the largest sources of raw and treated water in the Northeast. This reservoir is in the headwaters of the Conodoquinet Creek. The Greencastle Reservoir is located just east of Greencastle in Antrim Township, and the Mercersburg Reservoir is located northwest of the borough in Peters Township. In addition, the boroughs of Chambersburg and Waynesboro draw water from South Mountain in the Adams County portion of the Michaux State Forest, just over Franklin County's eastern border.

FIGURE 09 // TOP-RANKED RESERVOIRS IN FRANKLIN COUNTY

RESERVOIR	WATER SOURCE	CHARACTERISTICS OF STREAM SOURCE	% OF FORESTED WATERSHED
LETTERKENNY	CONOCOCHIEGUE CREEK	EXCEPTIONAL VALUE	> 66%
LONG PINE RUN (ADAMS CTY)	CONOCOCHIEGUE CREEK	EXCEPTIONAL VALUE	> 66%
WAYNESBORO	E. BRANCH OF ANTIETAM CREEK	EXCEPTIONAL VALUE	> 66%
MERCERSBURG	BUCK RUN	EXCEPTIONAL VALUE	> 66%
GREENCASTLE	MUDDY RUN	IMPAIRED WATERS	0%
MOUNTAIN LAKE	CONOCOCHIEGUE CREEK	HEADWATERS	40%
WOLF LAKE		IMPAIRED WATERS	30%
GUNTER VALLEY	TROUT RUN	EXCEPTIONAL VALUE	> 66%
HORSESHOE LAKE	W. BRANCH OF CONOCOCHIEGUE CR.	HEADWATERS	> 66%
CALEDONIA	ROCKY MOUNTAIN CREEK	EXCEPTIONAL VALUE	> 66%
SHIPPENSBURG	FURNACE CREEK	HEADWATERS	> 66%
ROCKY SPRING	ROCKY SPRING BRANCH	TROUT STOCKED	30%
RED RUN LAKE	RED RUN	NATURAL TROUT REPRODUCTION	> 66%
COMET LAKE	RED RUN	NATURAL TROUT REPRODUCTION	> 66%

Source: <https://www.anyplaceamerica.com/directory/pa/franklin-county-42055/reservoirs>
 Forest cover estimates are based on review of USGS topographical maps and satellite imagery.
 Stream characteristics are based on maps of impaired streams and the hydrology map of the Franklin County Greenway Plan.

In a study of 27 U.S. water suppliers, researchers found that protecting forested watersheds used for drinking water sources can reduce capital, operational, and maintenance costs for drinking water treatment. They found watersheds with greater percentages of protected forests correlated with fewer water treatment expenditures. The study was based on water companies that treated 22 million gallons per day (Figure 10) (Ernst, 2004).

FIGURE 10 // WATER TREATMENT COST PER % OF FORESTED WATERSHED

% OF FORESTED WATERSHED	AVERAGE ANNUAL WATER TREATMENT COST (\$)
60%	297,110
50%	369,380
40%	465,740
30%	586,190
20%	746,790
10%	923,450

Source: Petal, Sandra L. and Barton H. Thompson, 2005

CHESAPEAKE BAY PROGRAM

Franklin County lies within the Chesapeake Bay Watershed. The Pennsylvania DEP is implementing a bottom-up planning process for reducing nutrient and sediment pollution—the Phase III Watershed Implementation Plan (WIP). WIPs are detailed plans developed by the seven Chesapeake Bay Watershed jurisdictions (Delaware, District of Columbia, Maryland, New York, Pennsylvania, Virginia, and West Virginia) to help guide them in meeting their pollution-reduction goals under the Chesapeake Bay Total Maximum Daily Load (TMDL). In Pennsylvania, counties are being asked to write a local WIP, also known as the Countywide Action Plan (CAP), using county-specific “WIP toolboxes” (Chesapeake Bay Program, 2018).

The Franklin County Conservation District is heading a program called Clean Water for Franklin County. This initiative plans to shift the Countywide Action Plan (CAP) into action, set forth by the PA DEP's Phase 3 Watershed Implementation Plan (WIP) III. The CAP aims to result in cleaner water for Franklin County by reducing nearly 1.3 million pounds of nitrogen runoff from entering communities' waters. ROE can help explain and locate where restoration will provide the greatest benefits and help prioritize protection efforts.

PARKS, TRAILS, AND GREENWAYS

With a rolling countryside and breathtaking views, Franklin County provides miles of trails for all ages and skill levels. Visitors can explore the County's scenic beauty and boomtown industrial past by hiking the Appalachian National Scenic Trail, crossing historic train-truss bridges, kayaking in the Conococheague Creek, and biking the Chambersburg Rail-Trail. As Franklin County Visitor's Bureau notes, you will experience "great moments along the way."

Bicycling is popular on country roads and miles of off-road trails. Mountain bikers can test their skills on single-tracks or designated trails, each with unique terrains, or cycle the picturesque farmland and historic sites of Franklin County's countryside. From bald eagles to fields of wildflowers, Franklin County hosts a wide selection of nature. There is an abundance of flora, fauna, streams, and expansive woods that are home to some of the oldest trees in the Commonwealth.

FIGURE 11 // FRANKLIN COUNTY'S MAJOR NATURAL ASSETS AND PROTECTED OPEN SPACE

- // Appalachian National Scenic Trail
- // Michaux, Buchanan, and Tuscarora State Forests
- // Cowan's Gap, Mont Alto, and Caledonia State Parks
- // Meeting of the Pines Natural Area
- // Tayamentasachta Environmental Center

Source: Franklin County Visitors Bureau, 2020

Case Studies

BENDING BRIDGE FARM // LOCAL FOOD

Bending Bridge Farm is a certified, organic vegetable farm located in Franklin County near Fort Loudon, Pennsylvania. It distributes dozens of varieties of vegetables through farmers markets and a unique 30-week member choice CSA. Bending Bridge Farm started in 2009 on a half-acre market garden. Over the past 10 years, two farms, dozens of employees, and hundreds of farm share members have been involved with the farm. Members of the cooperative enjoy the full seasonal bounty the region has to offer, from early spring lettuce to late fall broccoli and all the best summer tomatoes and peppers in between.

TIMMONS FARM // SUSTAINABLE AGRICULTURE

Billy Timmons and his family have been implementing best management practices (BMPS) on their farms for several years. Recently, they have installed manure storage structures, improved animal walkways, added livestock exclusion fencing along a stream and around a pond, installed a concrete pad and collection system for silage trenches, and installed a manifold pipe and vegetated treatment area for silage leachate and runoff from a laneway.

CARL ROSENBERY & SONS LUMBER, INC. // SUSTAINABLE FORESTRY

Carl Rosenberry & Sons Lumber, Inc. is a leader in sustainable forest management practices and techniques. These practices have allowed repeated harvesting on company-owned timberlands as well as on public and private timberlands maintained professionally as sustainable forests. Nonproductive lands have been planted with oak seedlings. Sustainable forest trained crews harvest timber within a 60-mile radius of their facility. Their procurement methods yield consistent quality while assuring abundant resources for the future.

VOLVO CONSTRUCTION EQUIPMENT // SUSTAINABLE DEVELOPMENT

The Volvo Group focuses on four of the United Nations' 17 sustainable development goals, including: Good health and wellbeing (No. 3); Industry innovation and infrastructure (No. 9); Sustainable cities and communities (No. 11); and Climate action (No. 13). The Volvo Group is involved in several key initiatives, including: The Construction Climate Challenge (CCC), providing a neutral platform for all construction industry stakeholders to collaborate, build competence, and share knowledge about climate change; WWF Climate Savers, promoting environmental awareness, developing efficient technologies, and encouraging sustainable development; and World Green Building Council (WorldGBC), helping to influence future strategies and support environmentally friendly building methods, specifically around infrastructure.



Photo: Ben Goodman

Letterkenny Reservoir is one of the largest sources of raw and treated water in the Northeast.

04 // CONCLUSIONS

Protecting Franklin County's open spaces protects our future

“The environment, after all, is where we all meet, where we all have a mutual interest. It is one thing that all of us share.”

– Lady Bird Johnson

The first rule of ecology is that everything is connected to everything else. Natural system services provide a form of risk management, since for the last 14,000 years they have worked 24 hours a day, 365 days a year, free of charge. While nature can eventually replace itself, once disrupted or destroyed, natural system services will be diminished for 50 to 120 years before they again reach full capacity. The economic benefits presented in this report provide a new perspective on the value of natural system services, which should contribute to informed decisions concerning land use, economic development, safety, tourism, and recreation.

Franklin County ROE Study results, presented in Figure 12, show that it is difficult to have a strong economy without a healthy environment, clean water, quality habitat, and open space. Avoiding costs for services that nature already provides for free allows more money to circulate in the economy and creates jobs.

FIGURE 12 // FRANKLIN COUNTY'S ANNUAL ROE VALUE*

AVOIDED COSTS

- // Natural system services: \$844 million
- // Air pollution removal impact on health: \$14.9 million

OUTDOOR RECREATION REVENUES

- // Outdoor recreation: \$161 million
- // Jobs: 1,330
- // State and local taxes: \$8.6 million

AVOIDED HEALTHCARE COSTS DUE TO INCREASED EXERCISE

- // \$99.3 million

* Expected Direct Economic Impact

Franklin County's economy is approximately \$5.9 billion a year, based on a recent study (Jobs EQ, 2019). Figure 13 shows the total value of Franklin County's annual ROE: the sum of avoided costs for natural system services and healthcare plus revenue from local outdoor recreation is larger than the sum of revenue from agriculture and tourism combined.

FIGURE 13 // FRANKLIN COUNTY'S TOTAL ANNUAL ROE VALUE

INDUSTRY SECTOR	ROE VALUE (\$ MILLIONS)
NATURAL SYSTEM SERVICES (AVOIDED COSTS)	844
AGRICULTURE (REVENUE)	476
TOURISM (REVENUE)	322
OUTDOOR RECREATION (REVENUE)	161
HEALTHCARE (AVOIDED COSTS)	99

Source: Fcada.com, 2020 and the Franklin County ROE model, 2020

NATURAL SYSTEM SERVICES

Natural system services are driven and boosted by biological diversity. Open spaces are where most natural systems function and where most benefits are provided. County forests help reduce health problems by removing significant amounts of air pollution. Trees remove substantial amounts of nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), ozone (O₃), and particulate matter (PM). When considering the importance of Franklin County's open space, it is essential to recognize the role of trees, fields, meadows, and wetlands in filtering water, cleaning air, controlling flooding, and providing environmental services.

The EPA Healthy Watersheds Program (HWP) noted that, in some cases, natural infrastructure solutions are less expensive and more reliable than engineered solutions (US EPA, 2012). By relying on nature's ability to provide these valuable services, Franklin County can avoid significant financial impact from economic development, tourism, water treatment, water supply, flood remediation, infestations, air pollution removal, erosion control, outdoor recreation, and healthcare costs.

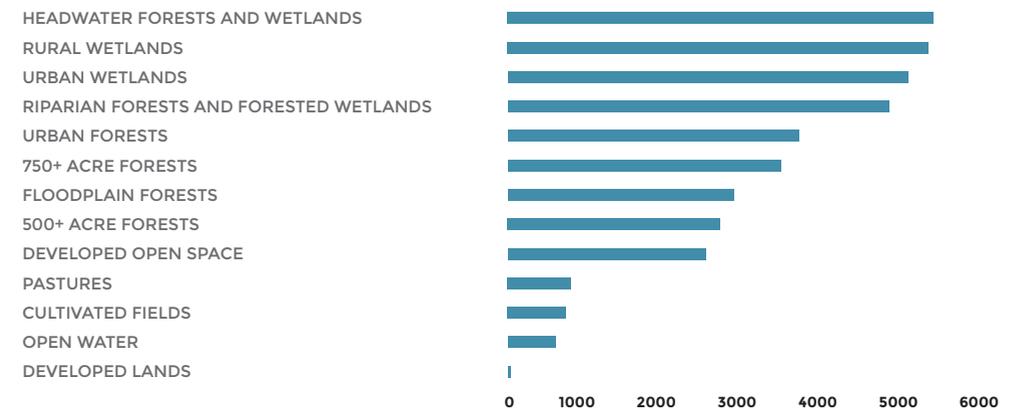
The Franklin County ROE Study identified ten natural system services that occur on 14 different land cover types. Eight apply to upland areas and streams, and two apply to air quality. While not comprehensive, the list in Figure 14 includes major services that nature provides throughout Pennsylvania. Therefore, estimates are conservative.

FIGURE 14 // FRANKLIN COUNTY'S ANNUAL AVOIDED NATURAL SYSTEM SERVICES COSTS

NATURAL SYSTEM SERVICE	AVOIDED COSTS (\$)
HABITAT	425,206,061
STORMWATER	214,551,002
NUTRIENT UPTAKE	74,151,818
GROUNDWATER	54,818,139
POLLINATION	21,243,982
AQUATIC RESOURCES	20,254,469
BIOLOGICAL CONTROL	17,187,847
CARBON SEQUESTRATION	8,888,007
EROSION CONTROL	1,697,364
AIR POLLUTION REMOVAL	6,019,362
TOTAL	844,018,051

Based on the valuation of natural resources in this report, Figure 15 shows that wet forested areas like headwaters, riparian corridors, and floodplains have the highest ROE value. These values relate to different cover types based on the benefits that each cover type provides.

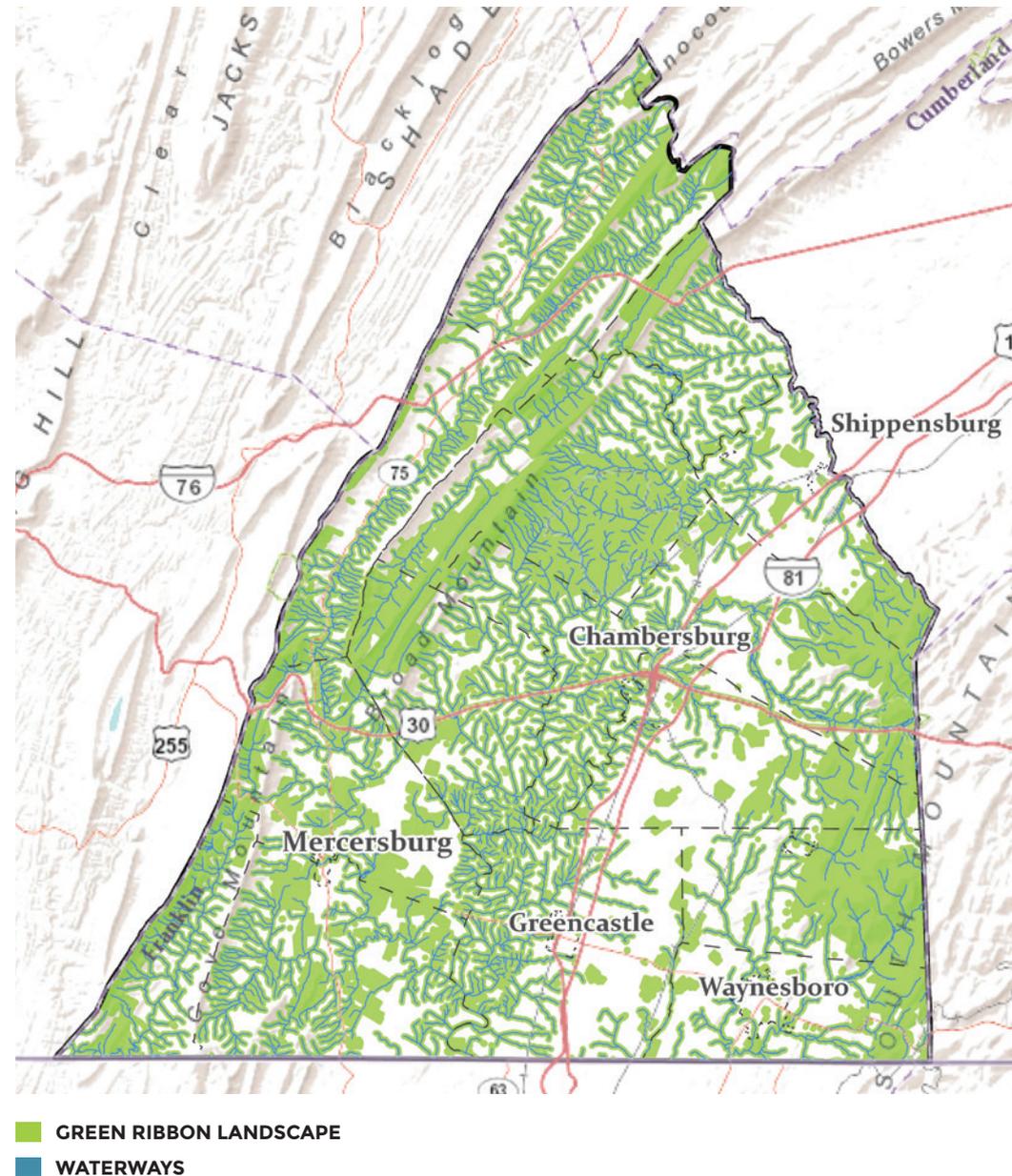
FIGURE 15 // ANNUAL ROE VALUE BY COVER TYPE (\$ PER ACRE)



On a regional scale, the most effective way to realize and maintain the full value of natural system services is to ensure landscape connectivity with large native forests and grassland habitats connected by riparian and upland green corridors. These landscape patterns are called Green Ribbon Landscapes (GRL). GRLs are the highest-value ROE areas with natural habitat conditions, usually forested. They are the foundation for biological diversity to thrive. This pattern of landscape connectivity can potentially moderate some of the worst effects of habitat fragmentation and severe weather conditions.

Franklin County's GRL is shown in Figure 16. These areas have the highest ROE values due to their ability to provide high water quality, water supply, reduced flooding, erosion control, and excellent wildlife habitat. An aggressive conservation strategy could significantly increase these ROE numbers.

FIGURE 16 // FRANKLIN COUNTY GREEN RIBBON LANDSCAPE



Key Findings:

- // Maintaining connected habitats and corridors allows the full value of open space to be realized and sustainable. These precious resources provide support for a more resilient environment during changing climatic conditions.
- // The financial value of current riparian buffers in the County is \$155.63 million per year.
- // The land areas with the highest ROE are headwater forests and wetlands, rural wetlands, riparian forests, forested wetlands, urban wetlands, and upland forests over 750 acres.
- // The total value of air pollution control is \$14.9 million per year.
- // The largest avoided costs are for habitat, stormwater, nutrient uptake, groundwater, and pollination.
- // An impact of sprawl is increased fragmentation of forests and invasive plants. This causes loss of critical habitat. Bird populations in North America are in freefall. A study published in the journal Science found that since 1970, North America has lost nearly 3 billion birds (or 29% of its avian population), and many species are in "conservation need" (Rosenberg, KV et al. 2019).
- // A study of restoration in Pennsylvania state parks showed a \$7 return for every \$1 invested. Similar results should occur in other open space projects (Trust for Public Land, 2013).

OUTDOOR RECREATION

Franklin County's open space provides desirable places for many free and low-cost recreational activities that enhance the quality of life and health for residents and visitors. It generates value by providing opportunities for people to engage in recreation and exercise. In 2018, 18,399 hunting licenses and 17,476 fishing licenses were reported in Franklin County (PA Game Commission and PA Fish and Boat Commission, 2018). Outdoor recreation participants in Franklin County spend between \$70.4 and \$161 million per year on gear, accessories, vehicles, and other trip-related expenses (Figure 17). Annually, this creates an expected 580-1,330 jobs and \$3.7-\$8.6 million in state and local taxes (4WARD Planning, 2020).

FIGURE 17 // FRANKLIN COUNTY'S ANNUAL OUTDOOR RECREATION ECONOMIC CONTRIBUTION

ACTIVITY	LOW DIRECT ECONOMIC IMPACT (\$)	EXPECTED DIRECT ECONOMIC IMPACT (\$)
HUNTING	12,640,113	27,598,500
BICYCLING	8,580,744	20,231,024
FISHING	10,485,600	17,476,000
HIKING/BACKPACKING	3,255,567	13,487,349
JOGGING/RUNNING	2,962,566	13,603,619
WILDLIFE WATCHING	4,870,328	12,892,045
BIRDING/BIRD WATCHING	1,912,646	11,858,403
MOUNTAIN BIKING	9,742,284	9,742,284
CAMPING	4,185,729	15,347,673
KAYAKING/CANOEING	1,220,838	7,557,565
WALKING	6,697,166	7,032,025
CROSS-COUNTRY SKIING	3,264,869	3,264,869
NATURE STUDY	616,302	922,953
TOTAL	70,434,752	161,014,309

Source: Franklin County ROE Outdoor Recreation Model and PA DCNR 2020-2024 PA Statewide Comprehensive Outdoor Recreation Plan

Key Findings:

- // Over 116,270 people in Franklin County participate in outdoor recreation at least once a year.
- // Contact with nature has many health benefits. According to the National Recreation and Parks Association 2020 Survey, four out of five U.S. adults agree that visiting local parks, trails, and nature preserves is essential for their mental and physical well-being during the COVID-19 pandemic.
- // Demand for outdoor recreation is increasing by at least 3.1% per year in line with population growth. However, DCNR found that from Spring 2019–Spring 2020, state park visitation was up 36%, trail users were up 62%, and state park camping was up 139%.
- // Pennsylvania DCNR found that outdoor recreation equipment sales increased during COVID-19, as follows: kayaks 85%; bicycling 121%; camping gear 30%; and birding supplies 15%.
- // Hunting, fishing, bicycling, wildlife watching, hiking, and walking are the most popular activities.
- // Major outdoor recreation vendors such as Bass Pro Shop, Cabela's, and Field and Stream locate along the Kittatinny Ridge due to the long-standing outdoor culture in the region.
- // Based on the IMPLAN model, outdoor recreation provides an additional \$48.7 million–\$111.2 million each year in additional economic output above the direct outdoor recreation contribution.
- // Fastest growing outdoor recreation activities are kayaking, camping, rock climbing, paddle boarding, and biking.
- // Women and children are increasing their participation in hunting and fishing, as well as other activities (Bass Pro Shop, 2016).

OUTDOOR RECREATION AND REDUCED HEALTHCARE COSTS

Daily physical activity has declined dramatically, according to the Centers for Disease Control and Prevention, helping to produce an epidemic of obesity and degenerative diseases (CDC, 2016). While many people experiment with forms of physical activity that are good for them but not pleasurable, they tend to stay with activities they enjoy, often for decades (Carlson, S., et al, 2016).

Being in contact with nature motivates people to exercise and appears to boost the benefits of exercise (Coombes, E., et al., 2010). Greenery encourages exercise, provides a more restorative environment than indoor settings, and has a greater positive effect on mental health (Graham, P., and U.K. Stigsdotter, 2010). Access to open space and recreation opportunities results in more physical activity and better health. Howard Frumkin and Richard Louv's research on contact with nature suggests that children and adults benefit so much from contact with nature that land conservation can now be viewed as a public health strategy (Louv, R. 2011).

Several studies show that outdoor recreation plays a significant role in the lives of Americans. It provides physical challenges and a sense of well-being, helps develop lifelong skills, provokes interest and inquiry, inspires wonder and awe of the natural world, and provides an alternative to daily routines. Recreation contributes greatly to the physical, mental, and spiritual health of individuals while bonding family and

friends. Outdoor recreation participants in Franklin County benefit from exercise and save roughly \$99.32 million annually in healthcare costs. This number is based on participation rates in Franklin County as shown in Figure 18.

FIGURE 18 // FREQUENCY OF PARTICIPATION IN OUTDOOR RECREATION IN FRANKLIN COUNTY

DO NOT EXERCISE AT ALL	34.3%
LESS THAN ONCE PER WEEK	16.3%
MORE THAN ONCE PER WEEK	18.0%
MORE THAN TWICE PER WEEK	31.2%

Source: PA DCNR 2014 Outdoor Recreation Participation Survey

FIGURE 19 // FRANKLIN COUNTY'S AVOIDED HEALTHCARE COSTS DUE TO EXERCISE

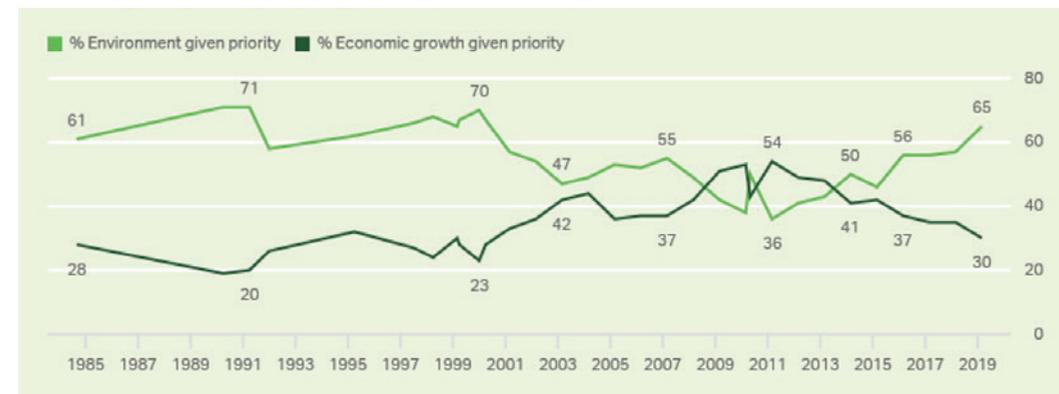
FREQUENCY OF EXERCISE	ANNUAL SAVINGS (\$ MILLIONS)
AT LEAST ONCE PER WEEK	18.78
MORE THAN TWICE PER WEEK	80.54
TOTAL	99.32

ATTITUDES TOWARD THE ENVIRONMENT ARE CHANGING

Over the past 30 years, national polls conducted by Gallup, Inc. have shown a changing attitude toward the environment over economic development (Figure 20). For 24 years, there was a clear preference for the environment; however, since 2008, opinions have wavered. Since 2014, environmental protection has been favored over economic development. In 2019, 65% of those surveyed chose the environment, up 8% from the previous year, while 30% chose the economy (Gallup, 2019).

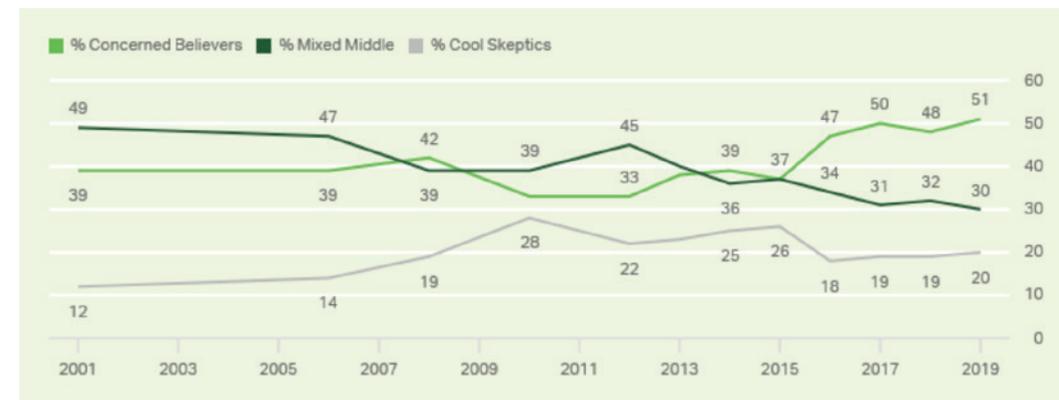
Gallup's 2019 Survey (Figure 21) found that Americans care about the quality of the environment, but focus more on immediate environmental challenges rather than on issues like climate, which they consider a long-term threat. 51% of Americans think that reports of the danger posed by the climate crisis are correct or understated, 30% are unsure, and 20% see climate change as "generally exaggerated."

FIGURE 20 // AMERICANS' PREFERENCE FOR PRIORITIZING ENVIRONMENTAL PROTECTION VERSUS ECONOMIC GROWTH



Source: Gallup, 2019

FIGURE 21 // IS THE SERIOUSNESS OF GLOBAL WARMING GENERALLY UNDERESTIMATED?



Source: Gallup, 2019

DEMAND FOR OUTDOOR RECREATION IS INCREASING AND MAY HELP ATTRACT FUTURE GROWTH

The outdoor recreation industry is strong and growing, generating \$887 billion annually in the U.S., and it has created 7.6 million jobs. Pennsylvania ranks in the top five states for annual spending on outdoor recreation. During the past recession, recreation spending in the U.S. increased by 5% (Outdoor Industry Association, 2018).

In the Franklin County ROE Study, outdoor recreation includes activities that can be performed by County residents in a natural setting, without causing harm to the

environment. These activities are part of the quality of life provided in Franklin County. The list was compiled based on the relative value provided as determined by the participation rates in the DCNR participation surveys. The list is not comprehensive; therefore, the numbers are conservative.

31% of Pennsylvanians surveyed during Pennsylvania DCNR's 2014 Outdoor Recreation Participation Survey said they planned to spend more time outdoors. A 2015 report by the National Outdoor Foundation found that the following outdoor activities have been increasing: paddle sports, mountain biking, cross-country skiing, day hiking, bird watching, and bicycling. Local Franklin County outdoor recreation experts add fishing, running, and nature study to the list.

Nationally, the outdoor recreation activities that Americans participate in most frequently are:

Running	19.2%
Fishing	16.4%
Hiking	15.9%
Road/Mountain Biking	15.9%
Camping	13.9%

Source: Outdoor Industry Association, 2018

In Franklin County, residents participate most frequently in:

Walking	63%
Wildlife Watching	31%
Bird Watching	31%
Bicycling	29%
Hiking	29%
Hunting	16%
Fishing	15%
Jogging/Running	13%
Kayaking/Canoeing	13%
Camping	11%
Mountain Biking	6%
Nature Study	6%
Cross-Country Skiing	5%

Source: PA DCNR 2014 Outdoor Recreation Participation Survey

PUTTING ROE TO WORK

Addressing the scope of the challenges facing Franklin County at all levels will require concerted, collaborative action on a much larger scale than has happened to date. It is equally clear that conservation challenges are increasingly complex and comprise multi-faceted social, institutional, and ecological factors that have local and global impact. Communities that understand the financial value of nature have a better chance of striking an effective balance between the challenges of smart growth and maintaining connected, climate-resilient landscapes that support a strong economy. This includes arresting increased flooding, the decline in habitats and species, and the degradation of natural system services.

Franklin County's ROE Study results show that conservation and the economy are inextricably linked, and that it is exceedingly difficult to have a strong economy without a healthy environment, clean water, quality habitat, and plenty of open space. If the economy of Franklin County is to remain strong, environmental stewardship cannot be the responsibility of a few dedicated people. Environmental stewardship must become part of Franklin County's everyday culture, and the best ways to begin are suggested in Figure 22.

FIGURE 22 // THE BEST WAYS TO ENSURE CLIMATE RESILIENCY, A HEALTHY ENVIRONMENT, AND A SUSTAINABLE ECONOMY

- // Incorporate ROE findings into decision making.
- // Restore riparian forests to protect water quality at its source in headwaters, wetlands, and along riparian areas.
- // Protect and expand large forests (especially over 250 acres), connect riparian forests to large upland forests, and maintain and restore tree-canopy cover (Green Ribbon Landscapes).
- // Remove invasive plants by minimizing disturbances (edges, clearings) in natural areas.
- // Remove obsolete dams to improve water quality and aquatic habitats.
- // Minimize impermeable surfaces and limit turf grass to areas essential for recreation and landscape access.
- // Practice good stewardship and incentivize the use of native plants in the landscape surrounding parks, preserves, riparian areas, and trails.
- // Encourage municipalities to pass conservation-oriented ordinances, including native plant and conservation subdivision design ordinances.



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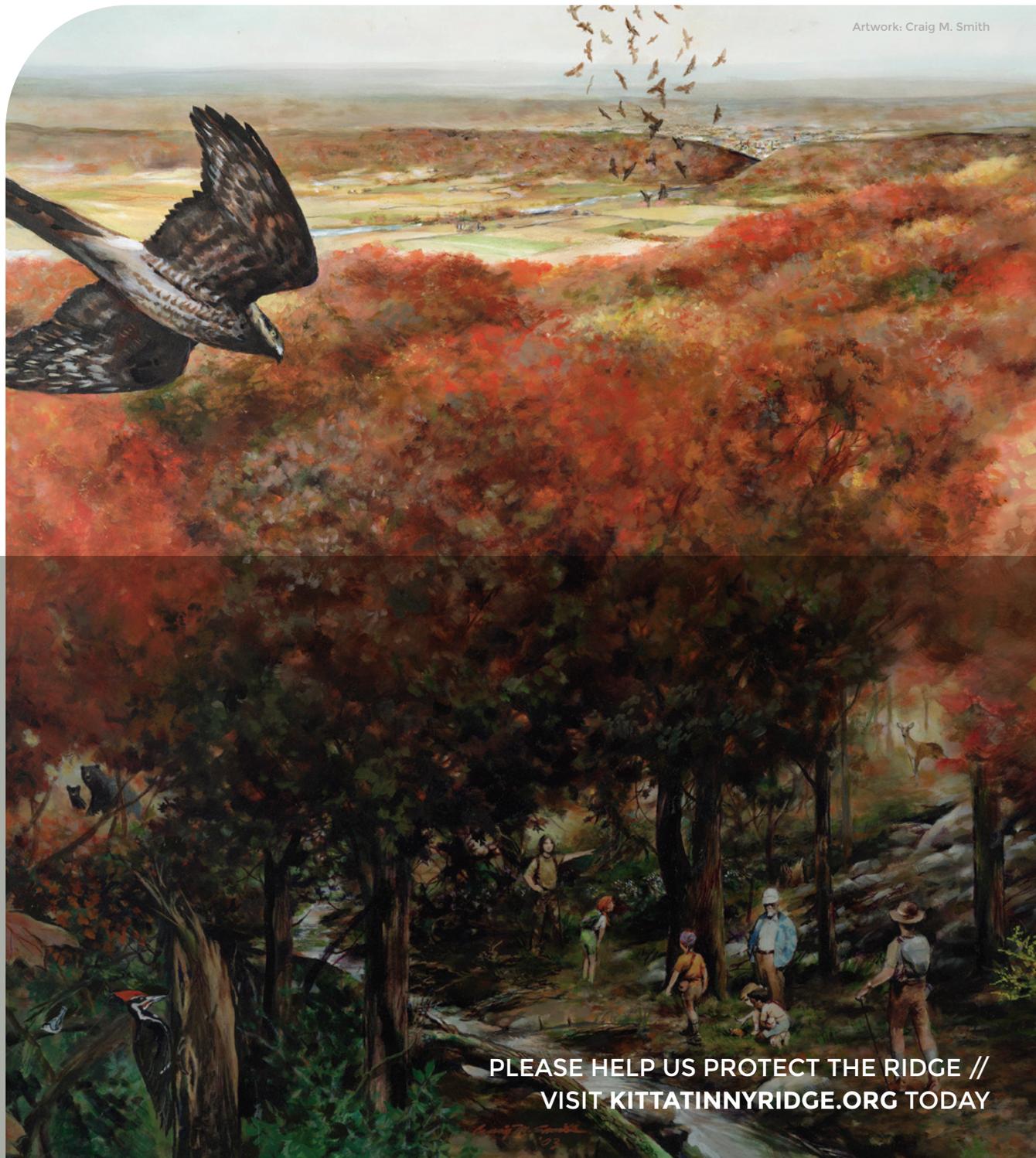
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STUDY WORKSHOP PARTICIPANTS

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South Mountain Partnership
Franklin County Area Economic Development Corporation
Franklin County Visitors Bureau

Artwork: Craig M. Smith



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