

Natural Environment

Introduction

Coconino County residents take pride in the **NATURAL ENVIRONMENT**. Although our environmental quality is generally excellent, development pressures and human activities continually pose threats. Maintaining healthy natural systems is an investment in our future that supports our quality of life, helps to maintain property values, promotes economic development, and encourages growth in tourism. Residents want to protect the environment but acknowledge the need to balance competing interests. Approaches to large-scale planning and community development must consider limited public agency budgets, private property rights, market demand for certain types of development, and state statutes. Balancing these issues with **CONSERVATION** is a primary planning objective.

This Element characterizes components of our environment that we can enhance or preserve—air quality, forest health, **ENVIRONMENTALLY SENSITIVE LANDS**, vegetation, wildlife, and soils. It also discusses ways to improve our environmental quality using renewable energy sources and **SUSTAINABLE BUILDING** practices. The goals and policies presented in this Element encourage reasonable approaches to environmental protection using the best available information and planning tools.

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The Conservation Framework Relationship

This Natural Environment Element is closely related to the **CONSERVATION FRAMEWORK**; in fact, it provides much of the scientific background required to understand and implement the Conservation Framework’s ecological principles and guidelines. The goals and policies of this Element consider all five ecological principles and eleven **CONSERVATION GUIDELINES**.

Our Vision & Purpose

County residents support the protection and stewardship of natural resources, as well as the maintenance and restoration of healthy ecosystems. The *Coconino County Comprehensive Plan* addresses environmental concerns by establishing policies that identify, protect, and manage sensitive lands so we can continue to enjoy our unique natural heritage. These policies focus on conserving and managing plant and wildlife communities to ensure that viable populations of all **NATIVE SPECIES** survive, maintaining **HABITAT CONNECTIVITY** to prevent landscape fragmentation, and preventing the spread of non-native and noxious plant species. They also address ways to improve the health of our forest ecosystems, reduce catastrophic wildfires, minimize soil erosion and air **POLLUTION**, incorporate “green,” or sustainable building practices, and promote renewable energy sources.



Environmentally Sensitive Lands

SEE ALSO PAGE 43

Public Safety: Floods, Earthquakes, & Slopes

BIOLOGICAL DIVERSITY

The variety and complexity of life and organisms among species, populations, habitats, and ecosystems.

RIPARIAN AREA

An area surrounding a river or stream that supports an ecosystem of wildlife, vegetation, soils, and water.

WETLANDS

Areas that are inundated often enough to support plants and animals adapted to saturated soil conditions.

ENVIRONMENTALLY SENSITIVE LANDS include areas with critical resources—**FLOODPLAINS**, riparian zones, rivers and streams, **WETLANDS**, **SPRINGS** and seeps, and steep slopes. These areas provide **HABITAT** for rare or endangered plant and animal **SPECIES**; in addition, some are important for **GROUNDWATER RECHARGE**. Environmentally sensitive lands require special consideration in the development-design process. Through **INTEGRATED CONSERVATION DESIGN** or similar measures, we can maintain or increase land values by retaining as much of their natural characteristics as possible. Preserving private land for habitat, **OPEN SPACE**, or other nondevelopment purposes may require compensating the owner using a method that reflects the fair-market value of the property. Such methods include purchasing the property outright, exchanging it for other lands, **TRANSFERRING DEVELOPMENT RIGHTS**, or offering property-tax breaks.

Early settlement tended to occur along drainageways and floodplains for practical reasons—these areas provided tillable land for farming and shelter, shade, and a source of water in the arid climate. Today's private land ownership patterns reflect this pattern. Floodplains also provide habitat for a large percentage of native flora and fauna, create **WILDLIFE MOVEMENT AREAS**, and serve as important repositories of **BIOLOGICAL DIVERSITY**. The Federal Emergency Management Agency has designated floodplains for most watercourses, both year-round and ephemeral, on maps showing surface-water elevations during **100-YEAR FLOODS**. Although Coconino County allows development within the 100-year floodplain, minimizing construction in these areas helps protect riparian vegetation and wildlife communities.²⁰

RIPARIAN AREAS are rare in Coconino County. Regardless of whether the drainage contains permanently flowing water, soils in riparian areas are generally deeper and moister than they are in adjacent uplands. Riparian areas facilitate movement and provide food, water, and cover for many species of wildlife. Many land uses compete for riparian resources, challenging **CONSERVATION** efforts. Furthermore, because water is scarce, management decisions often favor human uses (recreation, drinking water, irrigation, and livestock use) over conservation. The potential for conservation action depends on our ability to influence public land-management activities and provide incentives to private landowners for restoring degraded riparian habitats. Oak Creek is the only riparian system in Coconino County with substantial **DEVELOPMENT**. The *Oak Creek Canyon Area Plan*²¹ (originally created in 1984) was largely designed to protect water quality as well as riparian resources.

WETLANDS are just as uncommon, or perhaps even rarer than riparian areas in Coconino County. Examples include portions of Pumphouse Wash in the Kachina Village area, Rogers Lake, Marshall Lake, Dry Lake (adjacent to the Flagstaff Ranch Golf Club), and Mormon Lake (the largest natural water body in the state). Wetlands are formally delineated by the U.S. Army Corps of Engineers, as specified in the *Clean Water Act*, based not only on the presence of water but also of saturated soils and certain vegetation types. Wetland habitat in Arizona is rare because of the state's aridity, high evaporation and rapid siltation rates, and steep topography. Consequently, it is highly valuable for wildlife. Wetlands typically contains shallow depths of permanent to semi-permanent fresh water, along with abundant plants such as duckweed, cattail, rushes, and sedges. These areas are used for recreation (fishing, canoeing/kayaking, hunting, bird watching), wildlife habitat, water protection, flood retention, groundwater recharge, and a variety of municipal water needs. They occur throughout the state but are particularly notable in the San Francisco Plateau, in ponderosa pine forests at elevations of 6,000 to 7,500 feet, where they range from seasonally flooded flats to deep, permanent marshes.



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Widely scattered throughout Coconino County, springs and seeps provide unique habitats for a variety of invertebrates and plants, many of which occur nowhere else in the world. Springs also provide water that supports larger animals. Most springs discharge at mid and low elevations, near the Colorado River and its major tributaries; however, many springs occur at high elevations around the San Francisco Peaks and in areas surrounding Flagstaff, as well as along the Mogollon Rim.

Perennial streams and rivers in Coconino County include the Colorado River, the Little Colorado River, Oak Creek, the upper portion of West Clear Creek, and East Clear Creek and its tributaries. Although highly valued for human uses, areas bordering surface water not only provide habitat, but they also perform important hydrologic functions: discharging floodwaters, filtering stormwater **RUNOFF**, and recharging groundwater.

Steep slopes and ridgelines can also be environmentally sensitive for many of the same reasons mentioned previously. Property owners often desire steep slopes for residential construction because they can offer spectacular views; however, these slopes may contain a wide range of vegetation types and provide valuable habitat for a diversity of bird and wildlife species. Slopes can often have unstable, highly erodible soils, as well.

Goal: **Conserve and enhance the natural qualities of environmentally sensitive lands.**

Policies:

1. The County encourages the protection and restoration of floodplains, springs, riparian areas and the natural conditions of these and other environmentally sensitive lands as opportunities arise and resources become available. *SEE CONSERVATION GUIDELINES: B, C*
2. Development projects, including placement of lots, alignment of roads, and installation of other structures and infrastructure, shall be designed to minimize alteration of natural landforms and native vegetation and maximize conservation of distinctive natural features. *SEE CONSERVATION GUIDELINES: B, C*
3. In order to protect riparian vegetation and wetlands, every effort shall be made to avoid development in floodplains, locate structures on portions of property outside of floodplains, and to utilize floodplain areas for open space, recreation, community amenity sites, or other uses that do not impede the natural functions and processes of flooding. *SEE CONSERVATION GUIDELINES: A, B, C*
4. Integrated conservation design practices, such as open space dedication, conservation subdivisions, and cluster development, are encouraged for new developments so as to conserve sensitive and unique natural areas. *SEE CONSERVATION GUIDELINES: B, D, E*
5. The County promotes the use of conservation tools such as conservation easements, fee-simple acquisition, or cluster development to protect riparian areas, wetlands, and other critical habitats. *SEE CONSERVATION GUIDELINES: B, C, D*

Wildlife

Coconino County features impressive, grand **LANDSCAPES**, valued not only for their scenic qualities, but also for the wildlife that inhabits them. Many factors impact wildlife survival, including changes in the available **HABITAT**, vegetation, and water, as well as **SPECIES** competition, predators, disease, and parasites. Federally designated **CRITICAL HABITATS** are important components of our landscape and **ECOSYSTEMS** because they protect **THREATENED & ENDANGERED SPECIES (TES)**. Thirteen species were listed in Coconino County in 2002.

The health of a wildlife species is strongly related to the quality of its habitat. Contiguous habitat “patches” are critical to many species that migrate seasonally. These patches can be altered or destroyed by **DEVELOPMENT**, wildfires, roadways, or concentrated human ac-



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SEE ALSO APPENDIX E

Wildlife Considerations



HABITAT FRAGMENTATION

The division of contiguous tracts of wildlife habitat into progressively smaller patches and isolated areas. Fragmentation often occurs when wildlife movement areas are converted to more narrowly defined corridors; it can sometimes deplete a habitat area.

WILDLIFE MOVEMENT AREA

A broad habitat area that allows animals to move from one region to another in relative safety.

WILDLIFE CORRIDOR

An often limited or constrained area providing connectivity to larger animal habitats.

tivity. **HABITAT FRAGMENTATION** occurs globally and will likely reduce **BIODIVERSITY** and damage ecological processes irreversibly in the near future. Studies show that diversity is greatest when habitat patches are large and contiguous.²²

Animals often require different resources for different activities. For example, birds may nest and forage in different areas. Wildlife activities that require specific environmental components include nesting, calving, foraging, roosting, bedding, and singing. Requirements may differ by life stage or season—for example, during nesting and fledging periods, or during breeding seasons. Migratory birds typically use different habitats within their breeding, migration, and wintering grounds. Habitat use can vary from year to year, often reflecting the availability of resources such as water and vegetation.

Species with large home ranges—the Mexican spotted owl, black bear, mountain lion, pronghorn, northern goshawk, and others—are commonly referred to as “wide ranging.” Some use specific **WILDLIFE MOVEMENT AREAS** and **WILDLIFE CORRIDORS**. Others, like mule deer and Rocky Mountain elk, inhabit forested areas around the county. Known for long seasonal migrations and heavy grazing, these animals cover different areas throughout the year, including agricultural areas, piñon-juniper woodlands, and spruce-fir forests. Mountain lions, which occupy the Mogollon Rim and Kaibab Plateau, are wide-ranging and sensitive to human activity. Bighorn sheep live along the Colorado River in the Grand Canyon and are sensitive to human disturbance by tourists and rafters. Pronghorn and mountain lions are good indicators of the degree of habitat fragmentation around the county.

Although we understand much about wildlife in Coconino County, additional information would help managers and planners—in particular, information about wildlife distribution, habitat use, movement, and population dynamics.

Goal: **Protect wildlife communities and their habitat.**

Policies:

6. The County encourages use of integrated conservation design, creative planning, supportive zoning, and other land use strategies to protect and conserve important wildlife habitat and other environmentally sensitive lands. *SEE CONSERVATION GUIDELINES: B, C, D, E*
7. To reduce degradation of habitat, development projects (including roads and trails) shall be carefully sited to minimize impact to sensitive plant and wildlife species.²³ *SEE CONSERVATION GUIDELINES: C, E*
8. In order to improve watershed conditions, reduce soil loss or damage, protect aquatic habitat, and minimize unnecessary disturbance to wildlife, the County supports the protection of habitat and the closure of unnecessary roads. *SEE CONSERVATION GUIDELINES: C, E, F, I*
9. The County favors projects that protect open space and connective corridors and supports the protection of wildlife watering areas. *SEE CONSERVATION GUIDELINES: C, E*
10. Development projects within ponderosa pine forests should preserve existing meadows for neighborhood open space whenever appropriate and practical. *SEE CONSERVATION GUIDELINES: C, E*
11. The County promotes the protection of threatened and endangered wildlife and vegetative species and their habitats. *SEE CONSERVATION GUIDELINES: D, K*



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USFS



AGFD



Vegetation

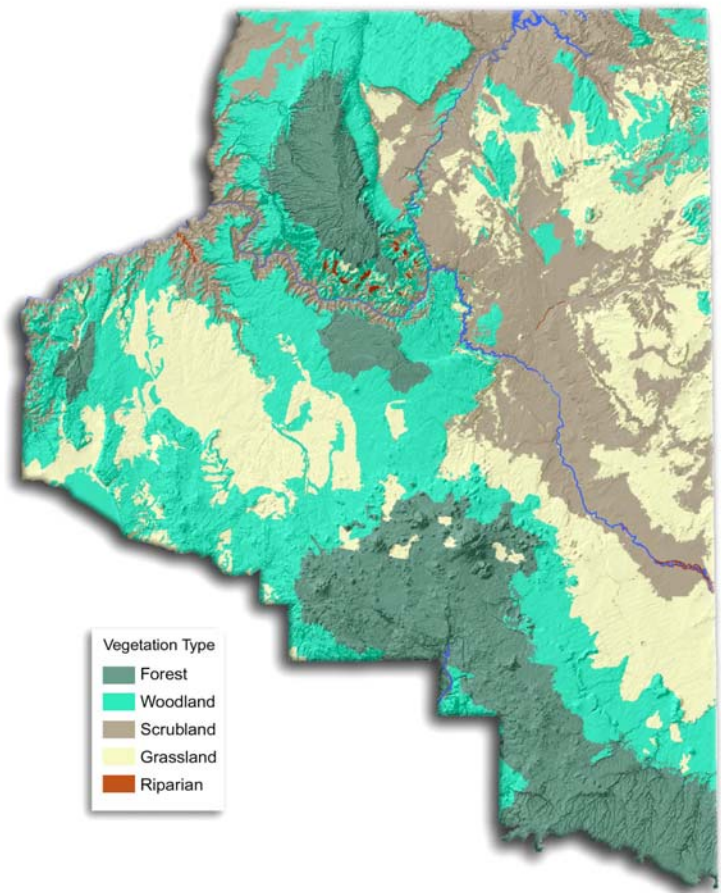
Coconino County's diverse topography creates a range of temperature and precipitation conditions, supporting a broad array of plant communities. The bottom of the Grand Canyon, for example, contains desert shrubs such as yucca, mesquite, and ocotillo, while the San Francisco Peaks feature alpine tundra above tree line. Between these elevations lie grasslands, piñon-juniper **WOODLANDS**, ponderosa pine forests, and mixed conifers (above 9,000 feet in elevation). Coconino County contains the largest continuous stand of ponderosa pine in North America. In addition, **RIPARIAN AREAS** like Oak Creek Canyon support highly diverse natural communities, where deciduous trees like cottonwood, sycamore, ash, maple, alder, and willow prevail. Certain species like Gambel oak provide forage for turkeys, squirrels, and bears regardless of elevation; they also provide nest sites in hollowed out areas. Each plant community may support a range of mammals including elk, lions, deer, antelope, bears, coyotes, and rabbits, as well as turkeys and other local and migratory birds.

Some rare vegetation types cover small areas but are very important ecologically: riparian plants, alpine tundra, mixed conifers, old-growth stands of ponderosa pine, and plants that grow near springs. In 2002, six plants in Coconino County were listed as **THREATENED & ENDANGERED SPECIES** under the federal *Endangered Species Act*, another was listed as a candidate, and two more are protected under separate **CONSERVATION** agreements. Threatened and endangered species are considered in the management of federal lands, state lands, and projects that use federal funds.

Humans have altered Coconino County's **ECOSYSTEMS** profoundly in the last century. In particular, fire suppression has changed our ponderosa pine forests, which contain 10 to 100 times more trees per acre than they did prior to suppression. Other changes related to fire suppression include a decrease in the ground cover that historically carried cool, frequent fires, and an increase in the shrub and mid-story vegetation that carries hot fires through the tree canopy. These changes have caused more destructive wildfires, encroachment of trees into meadows, and epidemic outbreaks of insects and diseases. Intensive grazing by wildlife and livestock has also affected our ecosystems, reducing or removing palatable species and replacing them with less palatable, thorny, or even poisonous species and non-native species. When overgrazing is severe, streamside vegetation deteriorates, banks erode, water quality degrades, and storage capacity declines. As streambeds widen and deepen, depths become shallower; as a result, water temperatures increase and the quality of fish and aquatic invertebrate **HABITAT** declines.²⁴

Our ecosystems have been impacted by the intentional or accidental introduction of **INVASIVE, NON-NATIVE SPECIES**. These plants tend to initially occupy **DISTURBED SITES** and then invade adjacent **NATURAL AREAS**, spreading rapidly and displacing **NATIVE SPECIES**. Their colonization and spread seriously threatens ecosystems; if these plants are not aggressively controlled, many ecosystems risk significant impacts to their biological integrity.

General Vegetation Patterns in Coconino County



INVASIVE, NON-NATIVE SPECIES

A plant species not historically found in the local area. When introduced into an area, these species proliferate, replacing native species and reducing biodiversity.



Invasive, non-native species can disrupt complex ecosystems and their processes, reduce **BIODIVERSITY**, degrade wildlife habitat, jeopardize endangered species, and alter genetic diversity. Cheatgrass, for example, has impacted many Arizona grasslands, and diffuse knapweed, toadflax, salt cedar, and scotch thistle are widespread. Such species can harm horses, livestock, and wildlife; they can also damage meadows and riparian areas, increase fire frequency, and increase the rates at which fire spreads. They tend to occupy severely burned areas, damaged riparian areas, roads and utility corridors, heavily used recreation areas, and other disturbed sites.

NOXIOUS WEEDS are invasive, mostly non-native species identified by the U.S. Department of Agriculture and the State of Arizona to be of particular concern. Other invasive, non-native plants may be identified by cooperative **WEED MANAGEMENT AREAS (WMAs)** such as the San Francisco Peaks WMA and the Arizona Strip WMA, which cooperate with other agencies and involve residents in weed control actions. Invasive, non-native weeds must be addressed on parcel-by-parcel and large-scale bases by land management agencies, roadway stewards, private property owners, and developers.

Goal: **Conserve plant communities and improve the health of vegetative ecosystems.**

Policies:

12. The County promotes the protection of threatened and endangered vegetative species and encourages the preservation of native, non-invasive vegetation and retention of other significant vegetative features for all new development proposals. *SEE CONSERVATION GUIDELINES: B, H, C*
13. To the extent possible, revegetation and restoration of disturbed areas with native species shall be required. *SEE CONSERVATION GUIDELINES: C, I*
14. The County shall require appropriate action to prevent the spread of noxious weeds prior to implementation of a development project or roadway maintenance. *SEE CONSERVATION GUIDELINES: C, F*

Forest Ecosystem Health

The U.S. Forest Service manages about 28 percent of the land in Coconino County. Most of this land lies within the Coconino and Kaibab National Forests; the rest lies within the Apache-Sitgreaves and Prescott National Forests. To guide activities on these lands, the Forest Service relies on management plans, which it adopted mostly in the late 1980s and has amended numerous times since. Federal management policies support multiple uses—logging, grazing, mining, and recreation, among others. Recent years have brought increasing attention to forest health, fire hazards, the **WILDLAND/URBAN INTERFACE**, conflicting uses, access and road issues, and the tremendous increase in recreational use. This increased awareness has led to a public, open process for developing new wildland management plans.²⁵

Historic management practices, which fortunately have improved over the last century, often changed wildlife **HABITAT. ECOSYSTEM** scientists generally agree that frequent, low-intensity ground fires helped control tree density, mid-story fuel loads, and accumulation of forest floor litter. Livestock grazing and fire suppression—a classic management objective of previous years—disrupted normal fire cycles, causing “irruptions,” or sudden increases, in tree populations.²⁶ These practices ultimately increased the incidence of extensive and severe crown fires. Today’s fires, often catastrophic in nature, threaten old growth, wildlife habitat, and forest soils. It is estimated that an area may require over 250 years to completely recover after a stand-replacing fire. Because severely burned areas become vectors for undesirable invasive species and noxious weeds, ecosystem changes are significant and often irreversible.



SEE ALSO

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Public Safety: Wildland/Urban Interface



Cooperation between the Forest Service and the local community is essential for improving forest health and ensuring that future development in forested areas meets criteria for property protection and environmental conservation.

Goal: Improve forest health and promote the restoration of forest ecosystems.

Policies:

- 15. New development in forested areas shall accommodate the connectivity of trails and wildlife corridors to avoid habitat fragmentation and discourage the haphazard development of social or user-created roads and trails. *SEE CONSERVATION GUIDELINES: B, E*
- 16. The County seeks to protect and preserve old-growth habitat and ecosystems. *SEE CONSERVATION GUIDELINES: D, H*
- 17. Residents of neighborhoods in wildland/urban interface areas are encouraged to participate in forest planning, management, and restoration efforts. *SEE CONSERVATION GUIDELINES: C, H*



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Soils

Soil conditions need to be considered in the planning and development process for several reasons. One is to ensure that buildings and structures are adequately supported;²⁷ other reasons focus on soil **CONSERVATION**. Minimizing soil **EROSION**, for example, can help control airborne dust as well as sediment deposition in watercourses. Soil depths must also be adequate for water to infiltrate into the ground and maintain **GROUNDWATER** levels in **AQUIFERS**. Soils host a community of insects, fungi, roots, and bacteria that is integral to every natural **ECOSYSTEM**; disturbances to this ecosystem may affect vegetation and decomposition, promote the colonization of invasive species, decrease water quantity, or degrade water quality.

Coconino County has a range of soil types. Areas northwest and southeast of Flagstaff feature shallow, gravel/silt/clay soil types with numerous rock outcrops. North of Flagstaff, soils consist of shallow to deep accumulations of gravelly clay or cinders that cover areas of ancient volcanic activity. Deeper soils dominate much of the Navajo Reservation. In areas southeast of Fredonia, in House Rock Valley, and west of Tuba City, soils are characterized by shallow clay/silt sands that cover sandstone bedrock.

Soils are also important in controlling floods and drainage. Soils not only provide a mechanism for water infiltration, but they also support vegetative ground cover, which absorbs water. Uncontrolled **RUNOFF** in nonvegetated areas can cause soil displacement and erosion. If the soils within a drainage area are highly erodible, a protective **MITIGATION** plan may be necessary. Such a plan may specify approaches such as slope grading and seeding barren land.

To properly treat and dispose of **WASTEWATER** from septic tanks and leach fields, soils must allow water to **PERCOLATE** at a reasonable rate. Two properties influence percolation: the soil's texture and its structure. If the soil is aerated enough, bacteria will be able to break down the waste material, a filtering mechanism that functions best when wastewater percolates at a medium rate. If percolation occurs too fast, the water table could rise;



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SEE ALSO

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Community Services:
Wastewater

if it occurs too slowly, wastewater could accumulate on the ground and pose a health hazard. “Loam”—soil that contains a mixture of clay, sand, and organic materials—is ideal, but heavy clay and hard rock are unsuitable because they do not adequately filter wastewater. Shallow or unsuitable soils make designing on-site wastewater disposal systems difficult and expensive because conventional septic tank and leach field systems may not be feasible.

Goal: **Protect soil resources and improve soil conservation practices.**

Policies:

18. The review process for subdivision and other major development proposals shall consider mitigation measures for drainage, erosion, sedimentation, and related issues for problematic soils and soil types. *SEE CONSERVATION GUIDELINES: B, C, I*
19. The County encourages the conservation of soils to prevent erosion and its impacts. *SEE GUIDELINES: B, H*
20. In areas of shallow or poor soils where standard on-site wastewater systems are not feasible, very low density development, integrated conservation design, a centralized treatment facility, and/or technologically advanced environmentally sensitive systems shall be preferred. *SEE CONSERVATION GUIDELINES: B, I*

Air Quality

Coconino County’s mostly exceptional air quality is one of its most important assets. Maintaining this quality is important, not only for public health but also for protecting views of the Grand Canyon and our scenic areas. Our air quality is high because the county has very little heavy industry; attracting new, nonpolluting industries will help us maintain this standard. Unlike larger **URBAN** areas, carbon monoxide from vehicular emissions is not a serious problem; to date, no standards have been violated, although we may occasionally experience localized problems on winter mornings during peak hours of travel. The **ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ)** is responsible for issuing air quality permits, monitoring air quality, and enforcing regulations. All areas in northern Arizona meet federal standards set by the **U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)**.



Cynthia Lovely

Air **POLLUTION** in Coconino County comes from four sources: dust and other local particulates, prescribed burns, regional haze, and power plants. Occasionally, high-particulate problems originate locally from wind-blown fugitive dust, dust from traffic on unpaved roads, construction activity, and wood stove and

fireplace smoke. Dust from dirt roads generates the most local residents’ concerns; we have little local control over the other sources. **PRESCRIBED BURNS** are necessary to reduce fire risks, improve forest health, maintain wildlife **HABITAT**, and improve grazing resources. ADEQ permits this burning, and fire managers model the smoke dispersion characteristics to determine the best timing for prescribed burns. The regional haze originates outside the county. A multimillion-dollar study was conducted in the 1990s prior to the upgrade of pollution control equipment at the Page power plant.²⁸ This study determined that activities on the west coast cause the largest degradation of air quality in the Four Corners region. Power plants located outside the region also cause air pollution. The most notable of these is the coal-fired generating station at Laughlin, Nevada, which is expected to add pollution-control technologies by 2006.

PRESCRIBED BURNING

The controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions. Prescribed burns are confined to a predetermined area to meet resource management objectives.



Goal: **Improve the county's air quality.**

Policies:

21. Where locally desired, formation of road improvement districts, dust control districts, and road maintenance districts shall be encouraged as a means of solving dust problems and allocating costs to those most affected. *SEE CONSERVATION GUIDELINES: C, I*
22. The County, individual property owners, property owners associations, and road maintenance associations are encouraged to provide dust-free surfaces or pursue dust control measures on roadways under their jurisdiction. *SEE CONSERVATION GUIDELINES: C, I*
23. Economic development efforts should focus on clean air industries. *SEE CONSERVATION GUIDELINES: H, I*

Renewable Energy

Virtually all the energy used in Coconino County comes from nonrenewable resources. Coal mined in northern Arizona and New Mexico produces electricity, natural gas from Texas produces fuel for heating and cooking, and oil from both national and international sources produces gasoline for motor vehicles.

We can mitigate the environmental impacts of traditional energy production and consumption by adopting good policies. Local government entities, for example, can encourage the efficient use of energy and promote the energy production from clean, renewable sources. They can also model good energy use by properly designing and maintaining government buildings and by using efficient vehicles. Sound energy policies provide both economic and environmental benefits for county residents.

Fortunately, Coconino County has abundant sources of renewable energy that, if developed, would help protect air quality, reduce greenhouse gas emissions, minimize impacts to natural resources, reduce the need for transmission lines, and increase energy security. These sources include passive solar, photovoltaic panels, solar thermal generators, wind, biomass, and geothermal; another renewable fuel that we already use extensively is wood for home heating. The viability of developing these renewable sources depends on how much energy the source can provide and how much it will cost to obtain and transmit it safely.

Sensible policies can also reduce the amount of energy we consume to meet transportation needs. Carpooling, increased use of transit systems, bicycling, and walking are examples of ways to reduce energy consumption in the transportation sector. Land use planning and transportation infrastructure decisions can also affect the amount of energy consumed to meet the county's transportation needs.

Goal: **Promote the use of renewable sources of energy.**

Policies:

24. The County supports efforts to pursue renewable energy production alternatives such as wood biomass energy facilities, landfill methane gas collection, solar electricity, wind power, and other alternative energy technologies. *SEE CONSERVATION GUIDELINE: G, I*



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25. The County encourages and supports public transit initiatives and development of travel corridors for nonmotorized transportation. *SEE CONSERVATION GUIDELINES: G, I*

Sustainable Building

SUSTAINABLE BUILDING

Building techniques and materials that minimize the use of nonrenewable natural resources.

SUSTAINABLE BUILDING, also called “green building” or “intelligent building,” involves implementing various practices that minimize the depletion of natural resources, water and energy consumption, and construction waste. In April 2003, the County adopted a sustainable building program that includes a checklist, a certification program for green builders, education on alternative building techniques, and specific technical guidelines for local owners and builders. Many sustainable building technologies require new codes, standards, and processes that, once adopted, will expedite efficient resource use in Coconino County.



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Sustainable building practices are healthier for the occupants and the environment. They conserve energy and water, limiting environmental impacts. Buildings constructed using these practices have superior indoor environmental quality. They incorporate environmentally sensitive site planning and resource-efficient materials. One example is a hogan (a traditional Navajo dwelling) built using locally harvested, small-diameter logs. Although the trees that supply these logs are often unusable in the timber industry, they must be thinned to maintain forest health and prevent catastrophic wildfires. Many alternative building materials are readily available on the market; alternative building styles, such as earth homes and straw-bale houses, are also available.

An important function of sustainable building is to reduce energy consumption through architectural design. Techniques such as installing more efficient insulation, heating, and cooling systems, placing windows where they can best take advantage of solar energy, and weatherizing can dramatically reduce the amount of energy we consume. Many of these approaches cost less than power from either traditional or renewable sources.

Goal: Promote sustainable building practices and processes.

Policies:

26. The County encourages and supports the efforts of local organizations, developers, and individual residents to utilize sustainable building techniques in their development projects. *SEE CONSERVATION GUIDELINE: G*
27. For the construction of new County buildings and other facilities, the County shall set an example in using designs and specifications that include sustainable building practices and energy conservation techniques. *SEE CONSERVATION GUIDELINES: G, I*

