

What is a Forest?

Definition of a Forest

Identifying what constitutes a forest provides students the basis for examining forests in a broader context.

1. Forests are **ecosystems** characterized by a dominance of tree cover and they contain a variety of other organisms (e.g., other plants, animals).
2. Forests differ in **composition** and **structure**. These are both affected by biotic (e.g., animals, plants, humans) and abiotic (e.g., soil, moisture, sunlight, climate) factors.
3. Forests are renewable resources. They can be used and regenerated at regular intervals.

Classification of Forests

Classifying and differentiating forests into biomes and types help students make connections among the forests in their community, the forests in Pennsylvania, and other forests in the world.

4. Different forest **biomes** exist around the world. Examples of forests that grow in some of the biomes include **tropical forests, temperate forests, and boreal forests**.
5. Different types of forests exist within a biome. Some of the types of forests include **coniferous, deciduous**, and deciduous and coniferous mixes.

Glossary

biome

A regional ecosystem characterized by distinct types of vegetation, animals, and microbes that have developed under specific soil and climatic conditions.

boreal forest

A forest that grows in regions in the northern hemisphere with cold temperatures. Dominant tree species usually include spruces, fir, aspen, and birch.

composition

The species in a community.

coniferous forest

Type of forest containing cone-bearing trees.

deciduous forest

Type of forest containing trees that shed their leaves for part of each year.

ecosystem

An area that contains organisms (e.g., plants, animals, bacteria) interacting with one another and their nonliving environment. Ecosystems can be of any size (e.g., forest, meadow, log).

structure

The horizontal and vertical distribution of layers in a forest.

temperate forest

A forest that grows in regions with moderate temperatures, found north and south of tropical forests.

tropical forests

A forest that grows in "winterless" tropical climates with high temperatures and generally high annual rainfall.

Trees as Part of the of Forest

One of the defining characteristics of forests is the trees in them. The following information helps students appreciate the uniqueness of trees and comprehend how individual trees function and fit into a forest ecosystem.

6. A tree is a perennial plant (lives more than one growing season) with a well defined woody stem, crown, and roots.
7. Trees compete for nutrients, sunlight, space, and water.
8. Trees have life stages that include germination, growth, maturity, reproduction, decline, and death.
9. As part of the forest community, trees have various roles (e.g., providing habitat, holding soil). The presence of trees alters the surrounding environment.

Forests as Ecosystems

*Understanding basic **ecological principles** and how they apply to forest **communities**, helps students appreciate the characteristics of living systems and how they relate to humans.*

10. An ecosystem is characterized by its composition, structure, and function.
11. Ecosystem structure consists of different types of organisms (e.g., producers, consumers) interacting with one another and their environment. Humans are part of ecosystems.

Glossary

community

A group of plants and animals living and interacting with one another in a given area.

ecological principle

Governing principles about natural systems and how they operate (e.g., food chains, predation, water cycle.)

12. Ecosystem functions include the fixation of energy through the process of photosynthesis, the flow of energy through **food chains** and **food webs**, and the cycling of matter.
13. Ecosystems are continuously undergoing natural change. This natural change occurs through such processes as long-term evolution or through relatively short-term processes such as succession, in which one plant community gradually supplants another.
14. Ecosystems are dynamic and altered by natural or human disturbance. Disturbance plays an ongoing role in ecosystem structure and function.
15. Forest ecosystems are interconnected with other terrestrial (e.g., prairies) and aquatic (e.g., wetlands) ecosystems.

Biodiversity and Forests

*Understanding the following information helps students make connections between forests, **biodiversity**, and **sustainability**.*

16. Biodiversity (or biological diversity) encompasses the variety and variability of all life on earth. It includes three levels: **ecosystem diversity**, **species diversity**, and **genetic diversity**.
17. There is biodiversity within a forest. Different forests have different levels of biodiversity.
18. Regions differ in climate (e.g., precipitation, temperature) and the results of glaciation (e.g., soil, topography). These variations lead to different forest communities with differing species, thereby contributing to biodiversity.

Glossary

biodiversity

The variety and complexity of all life on earth.

ecosystem diversity

The variety of communities or ecosystems in a given area over time.

food chain

A series of organisms in which one eats or decomposes another and the transfer of food energy occurs.

genetic diversity

Genetic variation within a population or species.

species diversity

Variety of species present in a given area.

sustainability

The ability of natural resources to provide ecological, economic, and social benefits for present and future generations.

Why are they important?

Historical Importance

Historical perspectives on forests provide students an understanding of how forests have been important to humans throughout time.

19. Forests have always been important to the inhabitants of the area we now call “Pennsylvania” (Latin for “Penn’s Woods”).
20. Pennsylvania’s forests provided basic resources (e.g., food, clothing, shelter) for early Native Americans and European settlers.
21. In the late 1800’s to early 1900’s, Pennsylvania was the country’s leading producer of lumber.
22. The lumber era shaped Pennsylvania’s economic, cultural, social, and environmental landscapes. Influences of this time period are still visible.

Current Importance

Understanding the following information provides students the opportunity to see the wide range of ways forests impact their lives.

23. Humans value forests for their aesthetic, cultural, ecological, economic, educational, and recreational benefits.
24. The degree of emphasis individuals place on forest values may vary. Reasons can include wealth, health, religion, culture, ecological knowledge, and personal experience.

25. Forests impact air and water quality, prevent soil erosion, and provide habitat for wildlife.
26. Pennsylvania’s forests have multiple economic values including forest products, recreation, tourism, and jobs. Forests provide a variety of raw materials for many industries.
27. Forests can shape the economic, social, and cultural composition of local communities.
28. Humans depend on forests for products and services they use every day.

Future Importance

The following information helps students identify the continuing need for forests in the future.

29. Our worldwide economic system is based on resources – both natural and human. (Pennsylvania forests are part of this system.) Changes in the use of these forests may affect forests worldwide.
30. As the human population continues to grow, demands on forest resources will increase. Maintaining forest ecosystems through sustainable forestry can help perpetuate ecological systems and ensure the delivery of goods and services to society over time.

How do we Sustain Them?

Forests Owners

Understanding who owns forests helps students identify the basis for different forest management decisions.

31. Forests are under private (e.g., **industrial, non-industrial private forests**), and public (e.g., county, state, national forests) ownership; each may have different objectives.
32. Forests are ecosystems that can cross over property lines.
33. The scale of forest ownership can vary from hundreds of thousands of acres in a national forest to an individual tree in an **urban forest**.

Definition of Forest Management

Understanding what forest management is helps students explore further topics or management

34. Forest management is the use of techniques (e.g. planting, harvesting) to **promote, conserve, or alter** forests to meet desire outcomes.
35. Management can lead to changes in composition, structure, and growth of forests.

Glossary

alter

To change the composition or structure of a forest

conserve

To use or manage a certain type of tree or type of forest in a sustainable manner.

industrial forest

A forest which is owned by a company or corporation that operates a primary wood-using plant (e.g., sawmill, paper mill).

non-industrial private forest

A forest which is owned by an individual or group of individuals who do not own a primary wood using plant.

promote

To encourage the growth of a particular tree or type of forest.

urban forest

The trees and associated living organisms in an urban area.

Reasons to Manage Forests

Understanding the reasons forests are managed helps students develop informed attitudes about forest management.

36. Forests can be managed for ecological (e.g., water resources, wilderness, wildlife), economic (e.g., forest products, recreation), and social (e.g., aesthetic appreciation, recreation) outcomes. Many of these outcomes are interrelated and can be managed for simultaneously.
37. As global demand for forest resources increases, more pressure is placed on existing forests. Forest management and advances in research and technological systems can help to ensure forest resources remain sustainable.

Forest Managers

By understanding that many individuals and groups are involved in forest management, students will recognize that the responsibility of forest management is shared.

38. The **public trust** empowers governments to have a role in conserving, maintaining, and sustaining forest resources by enacting laws, creating policies, establishing agencies, creating public lands, and providing management incentives for forest landowners.
39. A variety of agencies, companies, and individuals manage forests. Forest resources professionals in each of these areas have training and responsibilities to meet individual, societal, and environmental needs through forest management and/or education.

40. Organizations, communities, and individuals play a part in forest management efforts by volunteering, raising and allocating funds, voting, participating in the planning process, and making consumer choices.

Forest Management Decisions

Understanding how forests are managed helps students participate in forest management decisions.

41. Forests can be managed for single or multiple uses. These uses may require different management methods.
42. There are environmental (e.g., forest composition, **topography**, endangered species), social (e.g., laws, knowledge, recreation, aesthetics), and economic (e.g., cost, return) factors that can influence management decisions.
43. The type and intensity of forest management is dependent on desired outcomes, **forest type**, ownership, parcel size, and location.
44. Management starts with planning. Pennsylvania foresters prepare forest management plans based on land owner goals and objectives, capabilities of the forest site, and tools available (e.g., planting harvesting, using **prescribed fire**).
45. Forests can be managed sustainably, while not limiting future options. **Sustainable management** of forests includes maintaining forest **health**, productivity, diversity, and **integrity** for both current human needs and the needs of future generations.

Forest Management Issues

The following information helps students understand the complexity of forest management decisions by examining management issues and the factors that contribute to them.

46. Management may have positive or negative social, economic, or ecological effects, which may affect resource sustainability.
47. People's perceptions of forest management decisions may differ when their beliefs, values, and knowledge differ. Issues can arise from these differences. Management decisions can be affected by many factors (e.g., politics, science, emotion, economics).
48. The use of some management techniques (e.g., fire, **clearcutting**) can be controversial because they may have safety issues, aesthetic impact, and their current and past use is sometimes misunderstood.
49. Managing forests for **multiple use** can meet the needs of many users. Some forest uses are not compatible, so conflict may arise.

Glossary

clearcutting

Harvesting all trees in a given area at the same time. This is sometimes used as a management technique to encourage species that do not tolerate shade during regeneration.

forest type

A category of forest usually defined by its dominant vegetation.

health

The general condition of the forest in reference to soundness and vigor (growth).

integrity

The condition of a forest as a whole including composition, structure, and function.

multiple use

A type of forest management that promotes at least two types of forest use (e.g., for recreation and wildlife habitat).

prescribed fire

A fire planned and conducted to achieve management goals.

public trust

Responsibility the public places on government to care for their interests.

sustainable management

Maintenance of forests to meet current and future ecological, economic, and social needs.

topography

The relative elevation and configuration of features in a landscape.

What is the future?

Studying Forests

The following information helps students better understand how forests are studied and that there is more to be learned about forests and their management.

50. Science and technology contribute to the understanding of forests, the impacts of human actions on these systems, and how forests can be sustained. As knowledge is gained, forest management is adapted.
51. Increased population and demand on forest resources lead to the need for increases and improvements in management (e.g., harvest techniques, genetics), technological systems (e.g., **GIS**, tools), and **wood utilization**. Without advances in these areas, sustainability of forests is more difficult.
52. Forest research and management involves professionals with backgrounds in many fields, including forestry, biology, wildlife, soils, water, land management, urban planning, engineering, sociology, geography, technology, environmental education, and chemistry.

Your Connection to Forests

Students will recognize their role as citizens in making decisions regarding resource use and the ways those decisions influence forests.

53. All citizens have a responsibility to **stewards** of the environment that sustains human life. This includes making informed decisions about forest resources.
54. A citizen, acting individually or as part of a group, can make lifestyle decisions and take a variety of actions to ensure the sustainable use of our forests.
55. Forest-related decisions can be affected by politics, science, emotion, and economics. The current and future relationship between the quality of human life and the quality of forests will be determined by these decisions.

The Future of Forests

Understanding current and future trends in forestry helps students predict how scientific, technological, and societal changes will influence forests. Students will also be able to evaluate how personal and societal actions affect forests.

56. Management for sustainable forests will continue to require creativity, innovation, and collaborative thinking by individuals, organizations, governments, and industry.
57. Challenges related to forestry will change over time. As new challenges arise, forestry professionals will need to respond. Examples of current challenges include **fragmentation** of forest lands, **non-native species**, **threatened species**, and **endangered species**.
58. Individuals, organizations, and governments base decisions and actions on underlying beliefs, values, and knowledge. As the human population continues to grow, values and needs will change and affect the decisions made about forest resource use.
59. The role that public and private forest lands play in meeting human needs will change over time.
60. Choices humans make today directly affect our ability to sustain forest ecosystems essential to meeting future needs.

Glossary

endangered species

A species that is in danger of becoming extinct.

fragmentation

The process of dividing a forest into smaller patches of forest and non-forest land.

GIS (Geographic Information System)

A computerized system that gives resource managers the ability to organize and access information (e.g., soil type, watershed, population density) about a specific area.

non-native species

A plant or animal species found outside its natural range.

steward

A person who takes responsibility to make decisions and take actions today that will allow resources to be maintained in a healthy manner.

threatened species

A species that is likely to become endangered.

wood utilization

The manufacture of raw materials into saleable goods with as little waste of the resource as possible.

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For additional information visit: <http://www.uwsp.edu/cnr/leaf/educators/original.shtml>