



# Natural Resource Management

<b>Primary Career Cluster:</b>	Agriculture, Food, & Natural Resources
<b>Consultant:</b>	Steven Gass, (615) 532-2847, <a href="mailto:Steven.Gass@tn.gov">Steven.Gass@tn.gov</a>
<b>Course Code(s):</b>	6117
<b>Prerequisite(s):</b>	<i>Plant and Soil Science</i> (5950)
<b>Credit:</b>	1
<b>Grade Level:</b>	12
<b>Graduation Requirements:</b>	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Agriculture courses.
<b>Programs of Study and Sequence:</b>	This is the fourth and final course in the <i>Environmental and Natural Resources Systems</i> program of study.
<b>Aligned Student Organization(s):</b>	FFA: <a href="http://www.tnffa.org">http://www.tnffa.org</a> Stena Meadows, East Tennessee FFA Consultant, (423) 414-8669, <a href="mailto:Stena.Meadows@tn.gov">Stena.Meadows@tn.gov</a> Courtney Halfacre, Middle Tennessee FFA Consultant, (615) 253-5207, <a href="mailto:Courtney.Halfacre@tn.gov">Courtney.Halfacre@tn.gov</a> Stuart Watson, West Tennessee FFA Consultant, (731) 431-1183, <a href="mailto:Stuart.Watson@tn.gov">Stuart.Watson@tn.gov</a>
<b>Coordinating Work-Based Learning:</b>	All Agriculture students are encouraged to participate in a Supervised Agricultural Experience (SAE) program. In addition, Teachers are encouraged to use embedded WBL activities. For information, visit <a href="https://tn.gov/education/topic/work-based-learning">https://tn.gov/education/topic/work-based-learning</a> .
<b>Available Student Industry Certifications:</b>	Hunter Education License
<b>Dual Credit or Dual Enrollment Opportunities:</b>	There are no statewide dual credit opportunities for this course. If interested in establishing local opportunities, reach out to a local postsecondary institution. Dual enrollment opportunities are available through Tennessee State University and the University of Tennessee, Martin.
<b>Teacher Endorsement(s):</b>	048, 150, 448
<b>Required Teacher Certifications/Training:</b>	None
<b>Teacher Resources:</b>	<a href="https://tn.gov/education/article/cte-cluster-agriculture-food-natural-resources">https://tn.gov/education/article/cte-cluster-agriculture-food-natural-resources</a>

## Course Description

*Environmental and Natural Resource Management* is an applied course for students interested in learning more about becoming good stewards of our environment and natural resources. This course covers major types of natural resources and their management, public policy, and the role of public education in managing resources, as well as careers, leadership, and history of the industry.

Upon completion of this course, proficient students will be prepared for further study and careers as an environmental scientist, conservationist, forester, or wildlife manager.

### **Program of Study Application**

This is the fourth and final course in the *Environmental and Natural Resources* program of study. For more information on the benefits and requirements of implementing this program in full, please visit the Agriculture, Food & Natural Resources website at <https://tn.gov/education/article/cte-cluster-agriculture-food-natural-resources>.

## **Course Standards**

### **Occupational Awareness & Safety**

- 1) Review common laboratory safety procedures for tool and equipment operation in the natural resource management laboratories, including but not limited to accident prevention and control procedures. Demonstrate the ability to follow safety and operational procedures in a lab setting and complete a safety test with 100 percent accuracy.
- 2) Investigate opportunities to expand and diversify a Supervised Agricultural Experience (SAE) program in the area of natural resource management. Demonstrate the ability to prepare basic personal and business records to complete employment, taxes, and SAE related applications, including resume, budgets, income statements, balance sheets, cash flow statements, profit and loss statements, and equity statements.
- 3) Use local news media, organizational websites, and real-time labor market information to investigate occupations in natural resource management. Compare and contrast the knowledge, skills, and abilities necessary for employment, as well as the typical level of education required.

### **Managing Water Resources**

- 4) Research the physical and chemical properties of fresh and salt water. Create a chart or graph depicting the essential uses of water, differentiating the amount of water available for human use from that which is inaccessible to humans.
- 5) Research major issues with water quantity and quality impacting global water supply using government reports and news media. Distinguish between point source and non-point source pollution. Debate benefits and costs of various management strategies that have been implemented to solve water quality and quantity issues by creating a rubric that can be used to judge each technique, citing specific textual evidence.
- 6) Evaluate water sources and uses in the local community. Compare and contrast how various water uses (such as agricultural, industrial, power-plant cooling, recreational, and public) impact overall water quality and quantity. Describe how legal issues and water costs impact consumption in an informational narrative.

## **Managing Mineral Resources**

- 7) Research the global distribution of mineral resources. Compare the distribution of various minerals to the regions of the world with the highest demand and/or usage. Investigate current and projected rates of depletion and assess the extent to which reasoning and evidence presented by news media on the consequences of the depletion of readily available reserves support claims or recommendations for management of resources.
- 8) Describe the four step process of extracting minerals for human consumption (locating a mineral deposit, mining the mineral, processing/refining the mineral, and using the mineral to make a product) using domain-specific words and phrases. Develop an argument about the environmental impact of one, or more, steps in the process, supporting claim(s) and counterclaim(s) with valid evidence and reasoning from research.
- 9) Using the Copper Basin Mine in Tennessee as an example, research claims made about the environmental impact of the mining operation and the methods and processes that have been used to restore the land to its present state. Prepare a presentation of lessons learned from Copper Basin, or another major mining site in modern or contemporary times, citing specific textual evidence that supports or refutes investigated claims.

## **Managing Plant and Animal Resources**

- 10) Apply concepts of scientific taxonomy and industry-specific terminology to distinguish different species and types of plants (such as trees, grasses, legumes, food crops). Create a graphic illustration or fact sheet that compares and contrasts common plant species used in the management of environmental and natural resources by classification, care, and use.
- 11) Using information presented by local, state, and national government agencies, prepare a presentation on the importance of fish and wildlife as it pertains to such topics as ecosystem stability, genetic reserves, and medicinal, agricultural, aesthetic, recreational, and industrial uses.
- 12) Investigate research-based practices in wildlife management and conservation used by governmental agencies and non-profit organizations dedicated to wildlife preservation. Compose a persuasive essay justifying the use of one such practice (including but not limited to carrying capacity, population control, and habitat management), and make recommendations for scaling the practice to vulnerable regions or habitats, citing specific textual evidence to develop reasoning.
- 13) Using news media and academic journal articles, research the accidental or intentional introduction of exotic species into an environment. Citing specific textual examples, describe the environmental and economic impact associated with their introduction, including the management and eradication of exotic plant and animal species.

- 14) Research, discuss, and evaluate the effects of fish and game laws and their enforcement on maintaining sustainable wildlife populations. Complete and pass student certification program(s) for appropriate fish and game certification (i.e. Hunter Education, National Archery in the Schools Program (NASP), Boating Safety, and/or ATV Safety). Compare and contrast specific case studies describing both successful and failed legislation. Analyze how ecological principles are used to inform game management regulation by investigating environmental challenges a specific law is meant to address. Describe unique issues that arise in managing migratory species.

### **Managing Land Resources**

- 15) Create a presentation to defend the need for public, state, and federal lands and forest resources, including but not limited to forests, resource areas, wildlife refuges, parks, and wilderness preservation areas, developing claim(s) and counterclaim(s) with valid reasoning and evidence. Describe the increasing pressures being placed on the agencies managing these lands to open them for various forms of development, citing specific examples from news media.
- 16) Explain the importance and impact of state park systems, and justify the use of tax dollars to support them. Differentiate between state parks and state natural areas, their uses, and the ways each are managed.
- 17) Compare and contrast various forest management methods for monitoring ecosystems, harvesting trees, protecting forests from pathogens and insects, managing fire, managing wildlife, and implementing sustainable forestry practices. Draw conclusions about important wildlife management practices after evaluating case studies of recent natural disasters, such as large wildfires in the western United States, citing specific textual evidence.
- 18) Describe, in detail, the thirteen components required in developing an environmental forestry stewardship plan, including how the components relate to, and impact, one another. Develop, edit, and revise an environmental forestry stewardship plan for a specific plot of land with peer reviews.
- 19) Referencing maps that indicate the distribution of the world's rangeland resources, create informational materials that describe the characteristics of rangeland vegetation, the concept of carrying capacity, and the consequences of overgrazing. Based on this research, assess the general quality of the world's rangelands, and outline specific strategies for their management.

### **Impact of Technology on the Management of Natural Resources**

- 20) Research the application of geographic information systems (GIS) and global positioning systems (GPS), including GIS software, GPS receivers, data acquisition, and spatial analysis of data, to solve problems and increase efficiency in the management of natural resources. Develop an informational text explaining the process of how GIS and GPS are used in the environment and natural resource industry.

21) Compare and contrast the types and functions of precision and advanced technologies (such as GIS, GPS, and unmanned aerial vehicles) available to the agriculture industry. Citing technical data and academic research, debate the legal, ethical, and economic impact of using emerging technologies to improve efficiency and efficacy within the environment and natural resource industry by making a claim about the implications of technology use, developing it with reasoning and evidence from the text.

### **Policy and Governance**

22) Compare and contrast Tennessee policies and regulations pertaining to natural resource preservation and management with those of the federal government and international organizations such as the World Wildlife Fund (WWF). Articulate the United States' responsibility to cooperate with the global community to solve issues related to natural resource quality and quantity.

### **Standards Alignment Notes**

References to other standards include:

- SAE: [Supervised Agricultural Experience](#): All Agriculture students are encouraged to participate in a Supervised Agricultural Experience program to practice and demonstrate the knowledge and skills learned in their agriculture courses.
  - AFNR: [National Agriculture, Food, & Natural Resources \(AFNR\) Career Cluster Content Standards](#): Students engaged in activities outlined above should be able to demonstrate fluency in Standards ESS.01, .02, .03, .04, .05, .06; NRS.01, .02, .04, and .05 at the conclusion of the course.
- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
- Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.