



# Michigan Envirothon

*Inspiring Environmental Stewardship in  
Michigan's High School Students*



## **2013 Michigan Envirothon Learning Objectives**

### **Agriculture**

1. Look at food and fiber production in Michigan and obtain an understanding of the essential human needs we obtain from our natural resources.
2. Understand the importance of agriculture in Michigan as a major land use.
3. Look at land use trends, the importance of agricultural lands to other natural components of Michigan, and look at the impact of land use policies on land use for agriculture.
4. Understand the basic glossary of agricultural terms and agricultural land use practices.
5. Look at the trend in agriculture - how we got to where we are today - small farms to industrial farming to a sustainable agriculture movement.
6. Sustainable agriculture relies upon four parts. Understand these four parts: a) agricultural product profitability, b) agricultural practices compatible with the environment, c) energy efficiency in agricultural practices, and d) a system which is supportive of rural and urban communities.
7. Understand examples of sustainable agriculture practices and methods: maintenance and improvement of soil / prevention of erosion, rotational grazing, composting, crop rotation, manure spreading, organic farming, cover crop use, integrated pest management, and value-added production.

### **Aquatic Ecology**

1. Identify the processes and phases for each part of the water cycle.
2. Describe the chemical and physical properties of water and explain their importance for freshwater and saltwater ecosystems.
3. Discuss methods of conserving water and reducing point and non-point source pollution.
4. Analyze the interaction of competing uses of water supply: hydropower, navigation, wildlife, recreation, waste assimilation, irrigation, industry and others.
5. Identify common aquatic organisms through the use of the key.
6. Delineate the watershed boundary for a small water body.
7. Be able to explain the different types of aquifers and how each type relates to water quality and quantity.
8. Briefly describe the benefits of wetlands, both their function and value.
9. Describe the changes to the aquatic ecosystem based on alteration to the aquatic habitat.
10. Know methods used to assess and manage aquatic environments and utilize water quality information to assess the general water quality of a given body of water (includes sampling techniques & water quality parameters used to monitor point and non-point source pollution).
11. Be familiar with major methods and laws used to protect water quality (surface and ground water) and utilize this information to make management decisions to improve the quality of water in a given situation.

## **Energy**

1. Energy is an essential human need we obtain from our natural resources. What is energy? What are our needs for energy? Understand the different sources of energy - sun, coal, oil, gas, hydro, geothermal, nuclear - and look at how supply and demand are related to our choices of energy resources.
2. Understand that energy conservation is a consequence of our choices. Become familiar with some ways to practice energy conservation - insulation, efficient products, decisions and choices.
3. Become familiar with different energy measurement terminology and basic terms when talking about energy.
4. Learn about “alternative energy” - solar, biomass, geothermal, wind, etc.
5. Understand the different energy requirements for different types of transportation - cars, trucks, buses, airplanes, trains, boats, etc.
6. Identify and study current issues concerning energy production, uses, etc.

## **Forestry**

1. Identify common trees without a key and identify specific or unusual species of trees or shrubs through the use of a key.
2. Understand forest ecology concepts and factors affecting them, including the relationship between soil and forest types, tree communities, regeneration, competition, disturbance and succession.
3. Understand the cause/effect relationship of factors affecting tree growth and forest development (climate, insects, soils, microorganisms, etc.).
4. Understand how wildlife habitat relates to forest communities, forest species, forest age structure, snags and den trees, availability of food, and riparian zones.
5. Understand the value of trees in urban and suburban settings and factors affecting their health and survival.
6. Understand how the following issues are affected by forest health and management: biological diversity, forest fragmentation, air quality, rural development, fire and recreation.
7. Understand basic forest management concepts and tools such as: how various silvicultural practices are utilized, the use of tree measuring devices, use of technology, and best management practices.
8. Identify complex factors which influence forest management decisions (economical, social, ecological and urban interface).
9. Apply silviculture concepts and methods to develop general management recommendations for a particular situation and management goals.

## **Soils/Geology**

1. Recognize soil as an important resource.
2. Describe basic soil properties and formation factors.
3. Understand soil drainage classes and know how wetlands are defined.
4. Determine basic soil properties and limitations, such as mottling and permeability, by observing a soil pit or soil profile.
5. Identify types of soil erosion and discuss methods for reducing erosion.
6. Utilize soil information, including soil surveys, in land use planning.

7. Discuss how soil is a factor in, or impacted by, non-point source pollution.

### **Wildlife**

1. Identify common wildlife species and wildlife signs (keys will be used for more extensive identification).
2. Identify basic wildlife survival needs.
3. Describe specific adaptations of wildlife to their environment and role in the ecosystem.
4. Describe predator/prey relationships and examples.
5. Describe the potential impact of the introduction of non-native species.
6. Describe the major factors affecting threatened and endangered species and methods used to improve the populations of these species.
7. Describe ways that habitat can be improved upon for specific species by knowing their requirements.
8. Discuss the concepts of carrying capacity and limiting factors.
9. Discuss various ways the public and wildlife managers can help in the protection, conservation, management, and enhancement of wildlife populations.
10. Describe food chains/webs and cite examples.
11. Describe factors that limit or enhance population growth.
12. Evaluate a given habitat for its suitability for designated species, give a description of their habitat needs.

## **2013 North American Environmental Issue (CEI): *Sustainable Rangelands***

### Key Topics

1. Basic rangeland and pastureland knowledge, to include: identification of state grass, plant I.D. and definitions, importance of grazing lands in Montana.
2. Range Ecology Processes – definition of ecological sites (soil – plant relationships), ecological processes (energy flow, nutrient cycle, water cycle and plant succession).
3. Rangeland and pastureland management – stocking rates/carrying capacity, general types of grazing systems, improvement practices (fencing and water development), wetland, riparian and upland communities
4. Basic knowledge of livestock and wildlife interactions, forage preferences, forage overlap, and habitat requirements.

### LEARNING OBJECTIVES

1. Define rangeland and pastureland, percentage of state encompassed by rangeland and pastureland, importance of grazing lands.
2. Identify state grasses of Montana, differentiate between plant types (grass, forb, shrub, and trees), identify parts of a grass and/or grass like species.
3. Define rangeland ecological sites, understand ecological process, understanding of all definitions inclusion to all key topic areas.
4. Understanding of basic rangeland and pastureland management concepts, i. e. grazing systems, stocking rates, and rangeland improvements.
5. Understanding of Best Management Practices (BMPs) on rangeland and pastureland and how different communities (wetland, riparian, and upland areas) interact.

6. Recognize different classes of livestock and understand their interaction with wildlife species.
7. Understanding of the historical use of the land by humans, domestic livestock and wildlife and its effect on the plant community.
8. Understanding the rights of the private landowner and citizens' rights to public land.

**Background:** Rangeland in Montana and across the nation contributes immensely to a sustainable agricultural economy. Montana's number one "industry" is agricultural production, and the number two "industry" is tourism. Rangeland provides forage and habitat for domestic livestock and wildlife. Recently there has been increasing demands on the rangeland for a multi use concept. Multi use includes hunting, precious metals, fuel (gas, coal) exploration and recreational uses such as; access to fishing, bird-watching, hiking, snowmobiling, cross-country skiing, trail bike/ATV riding. Today, management methodologies vary greatly while attempting to balance rangeland uses that result in maximized benefits to all. Montana alone has approximately 93.2 million acres. Rangeland in Montana is located in the short grass prairie and mountain regions. Of that, there are approximately 36.3 million acres of Private Rangeland, 31.2 million acres of Public Rangeland, 3.7 million acres of Dryland Pasture, and 454,000 acres of Irrigated Pasture. Rangeland and Pastureland in Montana would comprise about 70% of the total land area – this would include the prairies, mountain parklands, forested areas with 25% or less canopy openings, alpine plant communities, wetlands, introduced tame pastures - dryland and irrigated.

**History:** Rangeland has seen major changes from the large bison herds on the prairies during the 1800's, to the homesteading days during the early 1900's, to the multi uses and management of today's rangeland. Native prairie once covered nearly a quarter of the continental United States, providing a home for specially adapted, diverse plant and animal life. Prairie ecosystems thrive on the intermittent disturbance brought by frequent fire and the irregular mosaic of vegetation carved out by the periodic passage of native grazers (bison, elk, mule deer, white-tailed deer, and antelope). These disturbance and subsequent renewal have shaped the life cycle of every native prairie organism.

As our knowledge of Rangeland has increased, it became evident that what helps the rancher is often good for wildlife. In this grazing-dependent ecosystem, many species of both plants and animals rely on the presence of large grazing animals. Properly managed rangeland can provide a sustainable agriculture economy and healthy rangelands for future generations.

**Definitions:**

- Rangeland – land on which the plant community is comprised of predominately native or indigenous grasses, grasslikes (e.g. sedges), forbs and/or shrubs. Rangeland includes natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes and wet meadows.
- Pastureland – grazing lands comprised of introduced or domesticated native forage species that are used primarily for the production of livestock. They receive periodic renovation and/or cultural treatments such as tillage, fertilization, mowing, weed control and may be irrigated. They are not in rotation with crops.
- Grazing Management – the manipulation of grazing and browsing animals to accomplish a desired result.

- Ecological Site – a distinctive kind of land with specific soil and physical characteristics that differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its ability to respond similarly to management actions and natural disturbances.
- Stocking Rate – the amount of land area allocated to each animal unit for the entire grazing period in one year.
- Homestead Act of 1862 - An act passed by Congress in 1862 promising ownership of a 160-acre tract of public land to a citizen or head of a family who had resided on and cultivated the land for five years after the initial claim.