Arizona Envirothon: Aquatic Ecology Study Guide

Water is one of the main natural resources necessary for all living things to exist on our planet. Over the last two decades, the Southwest has experienced significant drought conditions. These conditions can lead to changes in our state's water supply availability. Each year, the supply becomes a little scarcer and users (agricultural, municipal, industrial, natural environment, etc.) are trying to hold onto their precious share of this vital resource. Arizona has developed a diverse portfolio of water supplies and management strategies which serve as the foundation of our State's water system. This diversity allows Arizona to manage water resources more effectively, allows the two major metropolitan areas of the state to subsist with the effects of existing drought conditions, and provides more options in planning for our state.

Our state competition focuses on Arizona water sources and will include questions about identifying water resources, assessing water quality, and utilizing water conservation and management practices. Students should enter the competition with a *basic* understanding of:

- Processes and phases for each part of the hydrologic cycle.
- Chemical and physical properties of water.
- Interaction of competing uses of water for a limited water supply: agriculture, hydropower, navigation, wildlife, recreation, waste assimilation, irrigation, industry, and others.
- Methods of conserving water and reducing point and non-point source pollution.
- Common aquatic organisms.
- Ecosystem services provided by wetlands and riparian areas.
- Impacts to an aquatic ecosystem due to artificial or natural events.
- Methods used to assess and manage aquatic environments.
- Major methods and laws used to protect water quality (both surface and ground water).

Learning Outcomes

I. Identify Arizona's Water Resources

- Identify the processes and phases for each part of the hydrologic cycle.
- Summarize the role of the hydrologic cycle in soil nutrient erosion, salinization of agricultural lands, and climatic influences.
- Analyze the functions and interactions of groundwater and surface water systems.
- Explain the concept of a watershed and identify stream borders and watershed boundaries.
- Communicate the importance of effluent as a water source.

II. Water Quality

- Distinguish between features of a healthy and an unhealthy watershed.
- Conduct, analyze, and interpret water quality tests
- Discuss how physical, chemical, and biological conditions of the water affect both aquatic organisms and water quality.

III. Water Conservation and Management

- Identify the purpose of the Arizona Municipal Water Users Association (AMWUA).
- Explain the role and capabilities of the Active Management Areas (AMAs) in Arizona.
- Elaborate upon the roles of state and federal agencies in water conservation and management: the Arizona Department of Water Resources (ADWR), the Arizona Department of Environmental Quality (ADEQ), and the United States Bureau of Reclamation (USBR).

IV. Challenges for Arizona Water Sources

- Assess challenges in meeting the demand for water due to groundwater overdraft and population growth.
- Examine the implications of climate change upon Arizona's water resources.
- Understand the needs for and purpose of the Colorado River Drought Contingency Plan .

Additional resources to prepare:

- Groundwater and Surface Water: A Single Resource. USGS Circular 1139 - pages 2-76
- CAP Know Your Water Newsletter (post 1/6/2021) Colorado River Basin "Super Models" Predict Future Trends
- AZ Chamber Business news article on new groundwater study and its economic impact in Arizona
- Circle of Blue article on the impact of rapid environmental change on water globally
- Various timely articles on environmental water issues
- USBR Water Reliability in the West - 2021 SECURE Water Act Report to Congress