2023 Area IV Envirothon Current Environmental Issue Questions

1. One of the major contributors to climate change is the greenhouse effect. Through this process, human emissions have caused most of the warming since the 1950s. Which of the following gases is the primary contributor to the greenhouse effect?

    A. Methane
    B. Nitrous Oxide
    C. Carbon Dioxide
    D. F-Gases

2. Climate feedbacks are natural processes that respond to changes in global temperature by influencing further changes in the climate system. Feedbacks that amplify these changes are called positive feedbacks. Which of the following is not a positive feedback?

    A. Warmer temperatures lead to an increase in the rate of evaporation and amount of water vapor in the atmosphere
    B. An increase in high clouds across the tropics traps more heat in the atmosphere
    C. An increase in low-level clouds in the mid-latitudes increases reflected sunlight back to space
    D. Melting Artic sea ice leads to warmer ocean temperatures

3. Factors that contribute to climate change can be put into two distinct categories – factors that are related to natural processes and factors that are related to human activity. Which of the following is not a natural factor contributing to climate change?

    A. Volcanic Activity
    B. Automobile combustion
    C. Earth's orbit around the sun
    D. Solar Output

4. Carbon dioxide remains in the atmosphere for a long time and continues to affect the climate system (long residence time). However, human activities such as fossil fuel combustion and agriculture emit other substances that have short- and long-term impacts on climate. What is a long-lived climate factor that contributes to long-term climate change?

    A. Sulphate Aerosols
    B. Tropospheric Ozone
    C. Methane
    D. Nitrous Oxide

5. There are many sectors that contribute to greenhouse gas emissions. Which sector contributes the least?

   A. Industry (cement and chemicals)
   B. Waste (wastewater and landfills)
   C. Energy (in industry, in buildings, and transportation)
   D. Agriculture, Forestry & Land Use (crops and livestock)

6. A major contributor to climate change is the amount of greenhouse gases that are emitted by humans. How much greenhouse gases are emitted by the world each year?

   A. 50 billion tons
   B. 10 billion tons
   C. 150 million tons
   D. 30 billion tons

7. Since 2000, an annual average of 72,600 wildfires have occurred in the U.S. and have resulted in an average of 7 million acres of land being consumed by fire. How do fires in forests, grasslands, shrub lands, and agricultural lands affect the climate?

   A. Transporting carbon from the land to the atmosphere
   B. Increasing the concentration of small particles (aerosols) in the atmosphere
   C. Increasing the release of polyfluoroalkyl substances into the atmosphere
   D. Both A & C

8. The second highest contributor to global greenhouse gas emissions is the Agriculture, Forestry and Land Use sector. Of this sector, which category emits the most greenhouse gases?

   A. Rice cultivation
   B. Crop burning
   C. Livestock and manure
   D. Cropland

9. Burning natural gas is a more efficient and economical energy source than coal or petroleum. However, the use of natural gas has some environmental and safety issues involved. What greenhouse gas is emitted when natural gas leaks occur?

   A. Carbon Dioxide
   B. Methane
   C. Aerosols
   D. Polyfluoroalkyl Substances

10. While most dams in the United States are built for flood control, municipal water supply, and irrigation, many of these dams have hydroelectric generators. What is a negative environmental effect of hydropower generators and dams?

    A. Obstructs fish migration
    B. Changes natural water temperatures, chemistry, and river flow
    C. Alters downstream ecosystems
    D. All the above

11. Climate change indicators are visible across the world with scientists from a wide range of disciplines working to understand their feedbacks and effects. Which of the following are climate change indicators in oceanography?

    A. Increase in ocean temperatures
    B. Sea level rise
    C. Increase in ocean acidity
    D. All the above

12. Over the last 30 years there have been numerous international negotiations to deal with the threat of climate change. How much has the amount of carbon dioxide in the atmosphere changed over this period?

    A. It has stayed the same
    B. It has decreased
    C. It has doubled
    D. Carbon emissions have gone to zero

13. In the last 50 years, many groups have been formed to study how the climate is changing and what can be done to help prevent climate change. Which group was formed in 1988 and is the United Nations body for assessing the science related to climate change?

    A. The Intergovernmental Panel on Atmosphere and Development
    B. The Intergovernmental Panel on Climate Change
    C. United Nations Framework Convention on Doubling Carbon Dioxide
    D. United Nations Conference on Atmosphere and Development

14. Climate change can alter where certain species live, how they interact, and the timing of biological events, which can fundamentally transform current ecosystems and food webs. As temperatures increase, habitat ranges of many North American species are moving north and toward higher elevations. What is a positive outcome for some species that are moving north with increased temperatures?

    A. Increased competition
    B. Range reduction
    C. Range expansion
    D. Less hospitable habitats

15. After setting up climate targets, countries and companies need to consider how to quantify, reduce, and monitor their emissions. This process can be challenging for countries that are unsure of what to do. What is another challenge that countries and companies will face when quantifying, reducing, and monitoring emissions?

    A. It is expensive
    B. It takes a lot of time
    C. It can be prone to errors
    D. All the above

16. Using Chart 1, under the higher carbon dioxide emissions scenario, about how much higher are mean annual temperatures in Ohio expected to be by the year 2100 when compared to the historical mean?

    A. 2.5°F
    B. 5.0°F
    C. 15.0°F
    D. No change

17. Using Chart 2, what was the 30 year mean annual precipitation value for the Great Miami River Watershed in 1985 (nearest whole number)?

    A. 42 inches
    B. 37 inches
    C. 39 inches
    D. 38 inches

18. According to Chart 2, how much has the 30-year mean annual precipitation increased from 1985 to the last year in the chart (2021), rounded to the nearest half inch?

    A. 4.5 inches
    B. No change
    C. 5.0 inches
    D. 5.5 inches

19. From your examination of the data presented in the maps and charts, which phrase best captures the climatic changes that have occurred in southwest Ohio for recent decades?

    A. warmer with less spring rainfall
    B. cooler and drier
    C. warmer and wetter with more frequent downpours
    D. not much change

20. The data presented in the maps and charts show evidence of a changing climate in the Great Miami River Watershed of southwestern, Ohio. Based upon the information conveyed in these charts, what natural hazards do you think should be given the highest priority for future adaptability strategies in southwest Ohio?

    A. Flooding
    B. Summer Heat Waves
    C. Tornados
    D. A and B

21. The image labeled *Image A* shows flooding that occurred on Interstate 70 just north of Dayton, Ohio when thunderstorms on May 14, 2014 dumped as much as 5.5 inches of rain in a two hour period of time. A small stream located nearby was quickly overwhelmed by the runoff and overtopped its banks leading to the flooding. Recent development to the west of the site increased the amount of impervious surfaces such as asphalt, concrete, and building roofs. This may have contributed to the flooding. What are some adaptability strategies that urban planners could consider to reduce the impact of impervious surfaces and improve drainage of stormwater?

    A. Increase the capacity of stormwater drainage systems in future land development
    B. Install bioswales along curbs and parking lots to collect stormwater runoff
    C. Increase the urban tree canopy so that trees can absorb some of the stormwater before it enters streams and storm sewers
    D. All of the above

22. The image labeled *Image B* shows one of the impacts of increased precipitation leading to increased runoff and higher stream flows. What impact do you see in the image?

    A. Flooding
    B. Drought
    C. Landslide
    D. Streambank Erosion

23. Given the information conveyed in the maps and charts, what are some strategies that emergency managers in southwest Ohio could implement to help them more effectively manage potential hazards associated with climate change?

    A. C and D
    B. Provide more timely fire hazard warnings for forested lands and grasslands
    C. Establish cooling centers in the summer for people without air conditioning to go to prevent heat stress
    D. Coordinate and conduct emergency training exercises for flood emergencies

24. The frequency of storage events at the Miami Conservancy District (MCD) flood protection dams has increased in recent decades. The dams temporarily store water to reduce downstream river flows on the Great Miami River and prevent flooding. Which of the following factors do you think might contribute to higher river flows upstream of the dams?

    A. More frequent heavy precipitation events
    B. Increased density of tile drains in agricultural lands
    C. Increased urban development leading to more impervious surface area
    D. All of the above

25. Given the observed climatic changes in Ohio, what are some factors of climate change you think Ohio agricultural producers are dealing with or may have to deal with in the future?

    A. Increased flooding may lead to crop loss and/or make it more difficult to plant
    B. Higher summer temperatures may not be optimal for maximizing crop yields
    C. Longer growing seasons may help to offset some of the effects of climate change on crop yields
    D. All of the above