



AP[®] Environmental Science 2015 Free-Response Questions

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2015 AP[®] ENVIRONMENTAL SCIENCE FREE-RESPONSE QUESTIONS

ENVIRONMENTAL SCIENCE

SECTION II

Time—90 minutes

4 Questions

Directions: Answer all four questions, which are weighted equally; the suggested time is about 22 minutes for answering each question. Write all your answers on the pages following the questions in this book. Where calculations are required, clearly show how you arrived at your answer. Where explanation or discussion is required, support your answers with relevant information and/or specific examples.

1. Read the article below and answer the questions that follow.

The Floridian Daily May 21, 2013

The small community located on the edge of the magnificent wetlands of Florida's Everglades was the site of a press conference today where Governor Gayle Moss announced that the restoration of the Everglades is successfully underway. She noted that the Everglades ecosystem has suffered threats to its water quality, water quantity, and habitats in recent decades. Moss noted that intensive urban and agricultural development in adjacent areas has diverted substantial amounts of freshwater resources and impaired water quality. Governor Moss then emphasized that the preservation and enhancement of the Everglades, key goals of the restoration program, are absolutely essential for the continued environmental and economic health of the state. She closed the press conference by saying, "The Everglades is a gem not only for Florida but for the entire world. Each of us has the responsibility to do our part to preserve this magnificent resource."

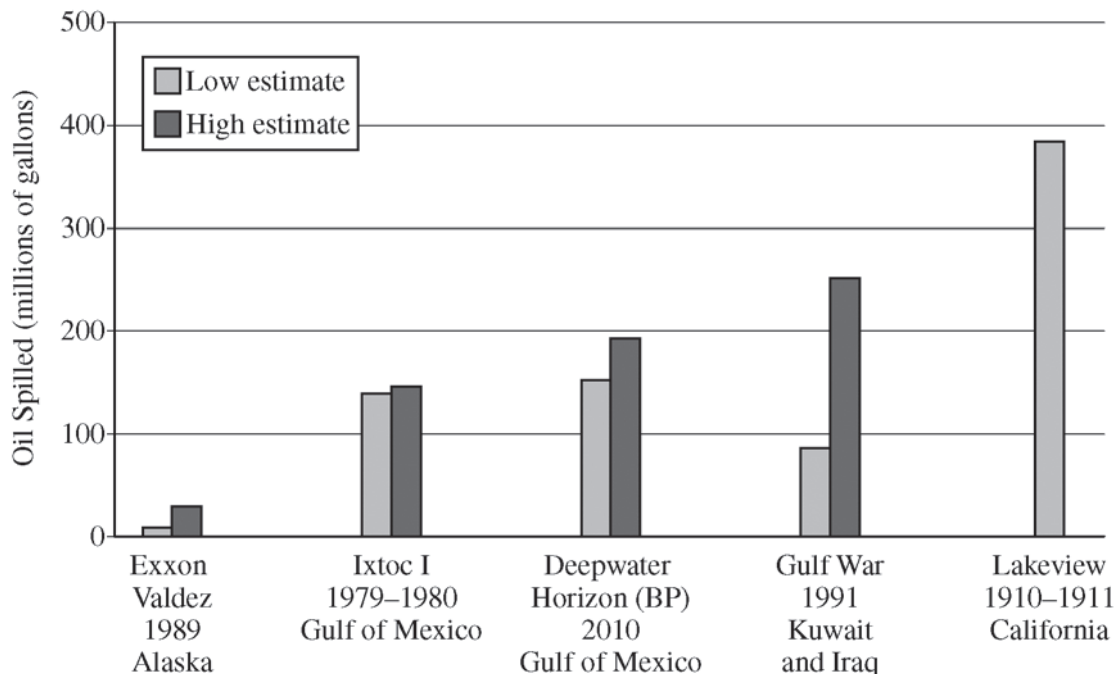
- (a) **Describe** how TWO human activities, other than those that result in anthropogenic climate change, have resulted in a decrease in the amount of freshwater flowing into the Everglades ecosystem.
- (b) In addition to water quantity problems, the Everglades is faced with a variety of water quality issues. For example, phosphorus concentrations in the Everglades have increased since the 1960s.
 - (i) **Describe** how one specific human activity contributes to increased phosphorus levels in the Everglades.
 - (ii) **Explain** one way in which an increase in phosphorus levels can adversely affect the Everglades ecosystem.
 - (iii) **Describe** one step that could be taken to reduce phosphorus inputs from the activity you identified in part (i).
- (c) Climate change could have a variety of impacts on water quantity, water quality, and habitat. For EACH of these three factors, **identify and describe** one specific example of an impact on the Everglades likely to result from climate change.
- (d) The article states that Governor Moss believes that the "preservation and enhancement of the Everglades, key goals of the restoration program, are absolutely essential for the continued environmental and economic health of the state."
 - (i) **Describe** one way that restoring water quantity and water quality in the Everglades is expected to improve the structure and function of the ecosystem.
 - (ii) **Describe** one way that restoring the Everglades is expected to provide economic benefits to Florida.

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2. Approximately 30 million mobile devices were sold in 1998 in the United States. The number sold increased to 180 million devices in 2007.
- (a) **Calculate** the percent increase of mobile device sales from 1998 to 2007.
 - (b) Each mobile device sold in 2007 contained an average of 0.03 gram of gold. **Calculate** the number of grams of gold that were used in the production of the mobile devices sold in 2007.
 - (c) Assume that the average mass of each mobile device was 0.1 kilogram. The United States Environmental Protection Agency estimates that about 10 percent of the mobile devices sold in 2007 were recycled. **Calculate** the mass (in kilograms) of the mobile devices sold in 2007 that were not recycled.
 - (d) Discarded mobile devices become part of the electronic waste stream (e-waste). Mercury is often present in e-waste. **Identify** one negative human health effect, other than death, associated with exposure to mercury.
 - (e) Improper disposal of e-waste has harmed human health and caused environmental damage in developing countries.
 - (i) **State** TWO reasons why large quantities of e-waste from the United States are shipped to developing countries rather than being recycled in the United States.
 - (ii) Retailers or manufacturers could take specific steps to dramatically reduce the amount of e-waste. **Describe** a realistic change in current practices that would accomplish this.

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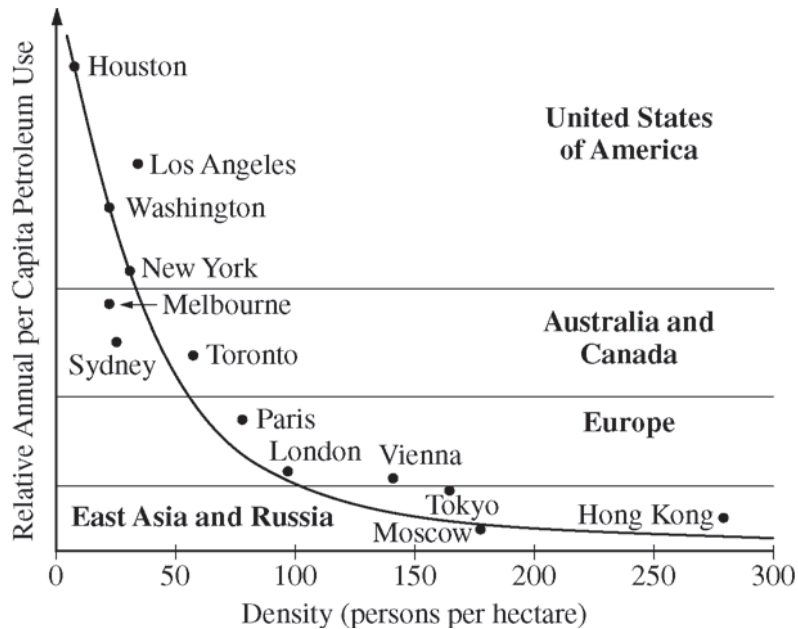
VOLUME OF OIL RELEASED IN SELECTED INCIDENTS



3. Oil spills can be devastating in scope and damage. Since 1900, there have been many oil spills around the world that have had significant ecological and economic impacts.
- Using the data in the graph above, **determine** the maximum volume of oil estimated to have been spilled during the Deepwater Horizon (BP) incident.
 - Describe** TWO environmental problems that can result from oil spills in coastal areas.
 - Identify** one economic impact that results from oil spills in coastal areas.
 - Chemical dispersants have been used in cleanup efforts following major oil spills.
 - Discuss** both one advantage and one disadvantage of the use of chemical dispersants for oil spill cleanup.
 - Identify** either one biological or one physical method (other than chemical dispersal) used for oil spill cleanup in coastal waters or on beaches and **describe** how the method is used.
 - Catastrophic spills make up less than 20 percent of the oil that pollutes marine waters. **Identify** one other source of oil contamination and **explain** how the oil from this source enters marine waters.
 - Petroleum has many uses as a raw material for consumer goods. **Identify** one substitute for petroleum in a specific consumer product (other than fuel).

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4. The term “urban sprawl” describes the expansion of cities into rural areas. This phenomenon has occurred around the world and has had economic, health, and environmental consequences.
- (a) **Describe** TWO causes of urban sprawl.
- (b) **Discuss** TWO human health effects associated with urban sprawl.
- (c) The graph below shows the relationship between population density and petroleum use in selected cities. **Describe** the relationship between population density and petroleum use shown in the graph.



- (d) Smart growth focuses on ways to encourage sustainable urban development. **Describe** TWO steps a municipality could take to encourage smart growth in order to limit urban sprawl.
- (e) Highway systems and urban sprawl often threaten wildlife populations. **Describe** TWO methods to reduce harmful effects on wildlife populations from highways and urban sprawl.
- (f) Urban sprawl often results in the loss of productive agricultural land near cities. **Describe** one practical way to increase food production within urban areas.

STOP

END OF EXAM