Crime, Violence, and Global Warming

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Chapter 2 – What Is Global Warming?

Outline

1. Global warming defined as process by which the average temperature increases globally
    A. Calories in calories out metaphor
        I. If the number of calories taken in exceeds more than those burned, you gain weight
        II. If the quantity of energy from the sun is greater than the ability of the planet to absorb it, then the planet will heat up
2. The atmosphere and heat-trapping greenhouse gases
    A. The greenhouse effect is necessary for life
    B. However, too much of a good thing is not always good
    C. Human contribution to elevation in levels of greenhouse gases
        I. Burning of fossil fuels and deforestation
        II. Livestock
        III. Use of chlorofluorocarbons (CFCs)
        IV. Agricultural activities
3. The problem of feedbacks
    A. Carbon cycle feedbacks
        I. Methane gas
        II. Rain forests releasing CO_2
        III. Forest fires and CO_2
        IV. Warmer oceans absorb less CO_2 and could possibly start releasing it
    B. Ice-albedo feedback
        I. The fraction of solar energy reflected back into space

II. Snow and ice reflect energy back

III. Dark water absorbs more, thereby causing more warming

C. Water vapor feedback

I. A warmer atmosphere has a greater capacity for saturation

D. Secondary feedbacks

I. Occur due to the heating of the planet that has already occurred

II. There is nothing that be done about it

4. Tipping points

A. A temperature at which a climatic change occurs and takes an ecology or state to a new norm

B. Concern that we have already reached a tipping point

C. Critical tipping points

5. Climate sensitivity

A. The Charney sensitivity

I. The measure of the climate system response to sustained radiative forcing

6. Basic evidence for warming

A. Global surface temperatures

B. Comparison of record highs to record lows

C. Arctic sea ice volume over time

7. Projected temperature

A. How hot will it get?

Multiple-Choice Questions

1. The Holocene period is also sometimes referred to as:
   a. the long summer
   b. the short winter
   c. the never ending spring
   d. the incredibly dull fall

2. Based on Figure 2.2 in the text, 51% of incoming solar energy is absorbed by:
   a. clouds

b. the atmosphere
c. land and oceans
d. birds

3. Some of the most abundant greenhouse gases in the earth's atmosphere include:
a. nitrous oxide
b. methane
c. ozone
d. all of the above

4. The use of fertilizers can lead to higher:
a. methane concentrations
b. nitrous oxide concentrations
c. CO_2 concentrations
d. none of these

5. Methane gas produces about___ times as much heat as does carbon dioxide.
a. 30
b. 60
c. 10
d. 50

6. The world's largest frozen peat bog, which appears to be melting for the first time since it formed 11,000 years ago, is located in:
a. Antarctica
b. Canada
c. Siberia
d. Alaska

7. We passed the milestone of 400 parts per million CO_2 in the air in May of:
a. 2014
b. 2013
c. 2012
d. 2010

8. A civilization-level threat occurs at what level of ppm:
a. 650
b. 450
c. 800
d. 400

9. The Charney sensitivity measure has been in use since the early:
a. 1940s
b. 1960s
c. 1980s
d. 1990s

10. Eight of the 10 hottest years ever recorded occurred in which century:
    a. 18th
    b. 19th
    c. 20th
    d. 21st

11. Which two years are tied as the two hottest years ever, worldwide?
    a. 2005 and 2010
    b. 2008 and 2009
    c. 2001 and 2007
    c. 2012 and 2013

12. The hottest year on record for the United States is:
    a. 2005
    b. 2010
    c. 2012
    d. 2013

13. Richard Alley observed that the Arctic was already melting how many years ahead of schedule?
    a. 10
    b. 100
    c. 20
    d. 50

14. In 2012, which state enacted a law prohibiting the inclusion of scientific estimates of ocean rise related to global warming in coastal planning?
    a. North Carolina
    b. New York
    c. California
    d. Florida

15. In the United States, what percentage of our greenhouse gas emissions are CO_2?
    a. 25
    b. 63
    c. 100
    d. 82

16. The current composition of earth's atmosphere is 78% _____.
    a. oxygen
    b. methane
    c. nitrogen
    d. carbon dioxide

17. During its "daytime," the temperature on the moon is about:
    a. 100 degrees Celsius

b. 150 degrees Celsius
c. -50 degrees Celsius
d. 100 degrees Fahrenheit

18. Some researchers claim that the United States will experience significant oil shortages by the year:
a. 2018
b. 2030
c. 2080
d. 2020

19. Higher concentrations of methane in the atmosphere is the result of:
a. newer, vented septic systems
b. wetland changes
c. livestock manure management
d. all of the above

20. Forest fires add _____ to the atmosphere.
a. methane
b. oxygen
c. carbon
d. nothing

Answers

1. a
2. c
3. d
4. b
5. a
6. c
7. b
8. a
9. c
10. d
11. a
12. c
13. b
14. a
15. d
16. c
17. a
18. d
19. d
20. c

Essay Questions

1. Identify and explain the anthropogenic sources of greenhouse gases that were discussed in the chapter.

2. Define the albedo effect and provide examples.

3. Identify and describe the four examples of carbon cycle feedbacks.

4. Explain why some scientists have an issue with the Charney sensitivity measure.

5. List the critical tipping points and their associated consequences.