**CHAPTER 19-1,2,3 - Climate Change Name**

**Core Case Study: Studying a Volcano to Understand Climate Change**

1. In 1991, Mount \_\_\_\_\_\_\_\_\_\_\_\_\_\_ erupted, which allowed scientists to further study global \_\_\_\_\_\_\_\_\_\_\_\_ change.
2. Scientists studied that amount of \_\_\_\_\_\_ released by the volcano to determine if pollutants would indeed change theclimate of the Earth on a larger scale. It does.

**19-1: How Might the Earth’s Temperature and Climate Change in the Future?**

For the past 900,000 years the Earth has experienced period of global \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and global \_\_\_\_\_\_\_\_\_\_\_\_\_\_. For the past 1,000 years the temperature has been \_\_\_\_\_\_\_\_\_\_\_\_\_, but has begun to \_\_\_\_\_\_\_\_\_\_\_ in the last century when people began

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Using Figure 19-2, describe the trend in average temperature seen over the past 130 years.

How are past temperatures determined?

* Radioisotopes in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Bubbles of ancient \_\_\_\_\_\_\_ in ice cores
* Temperature taken at different depths in Earth
* Historical records

Life on Earth wouldn’t be possible without the natural

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:

\_\_\_\_\_\_\_\_\_\_\_\_\_ the Earth’s lower atmosphere and surface due to greenhouse

gasses like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that trap heat from the sun.

The problem is when we have \_\_\_\_\_\_\_\_\_\_\_\_\_ greenhouse gases and \_\_\_\_\_\_\_\_\_\_\_\_ activities have led to this increase.

- Mainly due to agriculture, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and burning \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

- At our current rate of emission of CO2 we will have a concentration of \_\_\_\_\_\_ ppm by 2050, and according to research the \_\_\_\_\_\_\_\_\_\_ point is \_\_\_\_\_\_ ppm.

\* Top 2 CO2 emitting countries:

1. \_\_\_\_\_\_\_ (25%) 2. \_\_\_\_\_\_\_ (5%)

- Data from \_\_\_\_\_\_\_ cores also shows that 60% of \_\_\_\_\_\_\_\_\_\_\_\_\_ emissions is due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ activity from extracting fossil fuels, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and livestock.

- Nitrous Oxide levels have also increased due to use of nitrogen \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| Evidence that Supports Climate Change: | Evidence For and Against Climate Change | Arguments Against Climate Change: |
| 1. Between 1906-2000, average global surface temp has increased by \_\_\_\_\_\_\_\_\_ 2. Greenhouse gas emissions has risen \_\_\_\_% since 1970 3. \_\_\_\_\_\_\_\_\_ temps have risen twice as fast in the past 50 years 4. \_\_\_\_\_\_\_\_\_\_\_\_\_ and floating sea ice are melting 5. Rainfall patterns are changing 6. Sea level has risen by \_\_\_\_\_\_\_ inches |  |

What Role Does the Ocean Play?

- Oceans absorb \_\_\_\_\_\_\_ of all of the \_\_\_\_\_\_ released and help moderate temperature

- Some Carbon is converted to \_\_\_\_\_\_\_\_\_\_\_\_\_ salts that are buried in the sediments for millions of years

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of CO2 decreases with \_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperatures

- As water heats, the CO2 could be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and amplify global warming= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ feedback loop

- Higher levels of CO2 increases the \_\_\_\_\_\_\_\_\_\_\_ of the ocean, which decreases the ability of \_\_\_\_\_\_\_\_\_\_\_\_ to make calcium carbonate shells

**19-2: What are Some Possible Effects of a Warmer Atmosphere?**

|  |  |  |
| --- | --- | --- |
| Browning of the Earth: | Ice & Snow are Melting: | Sea Levels are Rising |
| Permafrost Likely to Melt: | Ocean Currents Changing: | Extreme Weather: |
| Threats to Biodiversity: | Agriculture: | Health: |

**19-3: What Can We Do to Slow Climate Change?**

Why this complex problem is difficult to tackle:

1. The problem is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- much international cooperation
2. Effects of climate change will last a long time- CO2 stays in atmosphere \_\_\_\_\_\_\_\_\_
3. It is a long term \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ issue.
4. Impacts of climate change are not spread \_\_\_\_\_\_\_\_\_\_\_\_ across the globe.
5. Phasing out changing our lifestyles would disrupt \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and lifestyles.

Solutions: Three Major Prevention Strategies-

1. Improve energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to reduce fossil fuel use.

2. Shift from nonrenewable \_\_\_\_\_ based fossil fuels to a mix of Carbon \_\_\_\_\_\_\_\_ renewable energy resources.

3. Stop cutting down tropical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\*\* Effectiveness of these strategies would be enhanced by reducing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and reducing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Use Figure 19-13 and describe 4 solutions for preventing global warming and 4 solutions for cleaning up global warming.

Output Strategies for Reducing Climate Change: Using Figure 19-15, list several methods for removing carbon from the atmosphere.

What Can the Government Do to Slow Climate Change?

- Strictly regulate \_\_\_\_\_\_\_ and \_\_\_\_\_\_ pollutants. - Carbon \_\_\_\_\_\_\_\_\_\_

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Approach -\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to businesses who use green technologies

- Technology transfer to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ countries

\*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Protocol- a treaty to slow climate change (2005)

- requires countries to cut emissions of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by 5.2% of their 1990 levels by 2012.

- countries can \_\_\_\_\_\_\_\_\_\_\_ greenhouse gas emissions- the “cap and trade” system

- 174 countries agreed to this. The US \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Who’s been successful?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ aims to be the first carbon \_\_\_\_\_\_\_\_\_\_\_ country. They currently generate 78% of their electricity from renewable \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ power and 18% from \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy!

Some US States are tired of waiting on the federal government to take charge.

Portland, Oregon- 1st city to cut greenhouse gas emissions back to \_\_\_\_ levels.

* + - The city promotes energy efficient \_\_\_\_\_\_\_\_\_\_\_ and use of electricity from \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_ sources.
    - Has built many bicycle trails & has greatly expanded \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - This has actually produced an economic \_\_\_\_\_\_\_\_\_ and has saved the city $\_\_\_\_\_\_\_\_\_\_\_\_\_/year in energy costs!

California- 12th largest producer of greenhouse gases (GHG) in the world!

* + - 2006- CA passed a law to cut GHG to \_\_\_\_\_ below 1990 levels by 2020.
    - Set fuel efficiency and carbon emissions standards and let the free market find the best ways to meet standards- EPA refused this request. CA and 17 other states are now suing the federal government to allow states to set tougher CO2 emission standards.
  + Companies and Schools are reducing their Carbon Footprints
    - DuPont, IBM, Toyota, & Walmart have cut GHG emissions

What Can You Do to Reduce Your CO2 emissions? Pick 3

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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Preparing for the Harmful Effects of Climate Change:

Global climate models say we must make a \_\_\_\_\_\_\_\_\_% cut in GHG emissions by 2050 so prevent Earth from heating up more than 3.6°F, which will likely be difficult to do. Therefore, analysts have compiled a list of things we need to do to prepare for the long-term effects of climate change. See Picture.

Using Figure 19-17, describe 3 ways we can prepare for possible long-term effects of climate change.

**CHAPTER 7 - CLIMATE AND TERRESTRIAL BIODIVERSITY**

Summarize this chapter using a concept map or a series of graphics to illustrate the connections between wind, climate and biomes. Be sure to:

* Distinguish between weather and climate
* Describe how air and heat circulates
* Define and give examples of greenhouse gases, and describe the greenhouse effect
* Include the major terrestrial biomes