This group of chimpanzees contributed minimally, or not at all, to global climate change and likely are not discussing the issue. However, they must adapt to the changes that will occur. Unlike humans, chimpanzees, along with plants and other animals, don’t argue with each other about whether climate is changing. They just attempt to adapt to the ever-changing world, which can affect their way of life including their access to food, water, and habitat. For example, as the climate changes, food availability shifts, thus forcing animals such as the chimpanzee to adapt in order to obtain enough calories to survive. The changes also affect their habitat, with variations due to differing weather patterns.

Like much of the planet, the salt water in the oceans has no voice, but it still responds to climate change and has a story to tell. In colder climates, it quietly freezes to form sea ice when temperatures drop. And perhaps more noisily, this ice breaks up with the return of warmer temperatures in the spring. This freeze–thaw cycle has been occurring for thousands of years, gradually shifting to form more or less ice as the temperatures on Earth have shifted. In recent years, however, the freeze–thaw cycle has been more pronounced and the waters in the Arctic have been free of ice for longer periods of time. Might carbon dioxide be the culprit of changes witnessed in the Arctic? As a greenhouse gas, carbon dioxide plays a role in keeping our planet comfortably warm and able to support life, but there can be too much of a good thing. John Holdren has said several times, “Global warming is a misnomer, because it implies something that is gradual, something that is uniform, something that is quite possibly benign. What we are experiencing with climate change is none of those things.”
Having studied this chapter, you should now be able to:

- name and identify carbon-containing compounds (4.1)
- illustrate, interpret, and predict sources of carbon using carbon cycle diagrams (4.1)
- identify where carbon is located on Earth (4.1)
- write formulas and names of ionic compounds and transition metal compounds (4.1)
- name and identify the charges for polyatomic ions (4.1)
- summarize photosynthesis, combustion, and respiration using chemical reactions (4.2)
- describe molecule--mass relationships, and relate this relationship to real-world reactions (4.3)
- convert among grams, moles, and number of molecules, ions, or atoms using molecule--mass relationships (4.3)
- calculate the average atomic mass based on the relative percentages of isotopes (4.3)
- use molar masses to calculate the amount of carbon in gas molecules and ionic compounds (4.4)
- estimate the amounts of carbon in various carbon reservoirs (4.4)
- outline the path(s) of incoming and outgoing radiation in Earth’s atmosphere (4.5)
- diagram the greenhouse effect and explain how it influences the temperature on Earth (4.6)
- describe the characteristics of a greenhouse gas (4.6)
- construct and use Lewis structures to predict molecular shape (4.7)
- describe how IR radiation interacts with molecules and can lead to asymmetrical stretching and bending (4.8)
- model and explain how radiation is released from molecules and further warms Earth (4.8)
- interpret graphs to make claims about climate conditions in the past (4.9)
- explain the processes for collecting historical and current climate data and assess the reliability of data (4.9)
- distinguish between weather and climate (4.9)
- differentiate between causation and correlation (4.9)
- recognize that elements can exist as different isotopes and identify that the presence of isotopes allow scientists to determine age (4.3, 4.9)
- make predictions based on trends and models (4.10)
- differentiate between observation and inference in relation to future climate predictions (4.10)
- relate scientific processes to the prediction of Earth’s future climates (4.10)
- evaluate conclusions from a scientific report on climate change and interpret how data supported those conclusions (4.9, 4.10, 4.11)
- estimate the possible global consequences of climate change and describe factors that can mitigate the severity of these potential consequences (4.11)
- identify factors that influence individual carbon footprints (4.12)
- devise actions that can lower individual carbon footprints (4.12)
- predict how changes in individual carbon footprints, cities, and nations can mitigate climate change consequences (4.12)