glucose to synthesize energy-rich carrier molecules, such as ATP, and carbon dioxide is produced as a waste product. Therefore, the synthesis of glucose and its breakdown by cells are opposing processes.

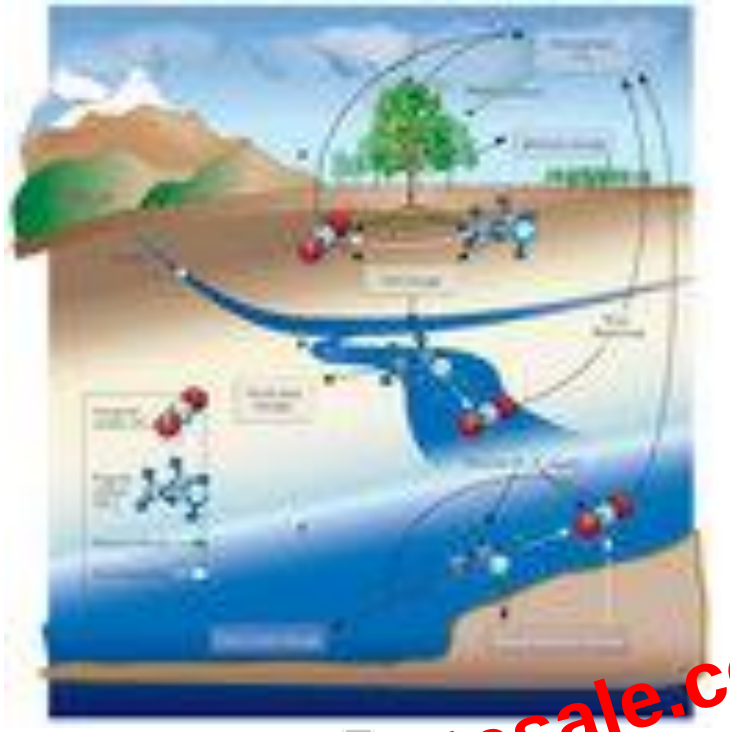

Figure 2

The building and breaking of carbon-based material — from carbon dioxide to complex organic molecules (photosynthesis) then back to carbon dioxide (respiration) — is part of what is commonly called the **global carbon cycle**. Indeed, the fossil fuels we use to power our world today are the ancient remains of once-living organisms, and they provide a dramatic example of this cycle at work. The carbon cycle would not be possible without photosynthesis, because this process accounts for the "building" portion of the cycle (Figure 2).

However, photosynthesis doesn't just drive the carbon cycle — it also creates the oxygen necessary for respiring organisms. Interestingly, although green plants contribute much of the oxygen in the air we breathe, phytoplankton and cyanobacteria in the world's oceans are thought to produce between one-third and one-half of atmospheric oxygen on Earth.