In September 1993, eight tired, hungry people emerged from two years of isolation in a high-tech megaterrarium in the desert near Oracle, Arizona. Designed as an ecotechnological model for space exploration and colonization, this bioengineered facility was intended to grow food, cleanse the air, and recirculate and purify water for its eight inhabitants without exchange of materials (including atmospheric gases) with the outside world. Called Biosphere 2 (Biosphere 1 being the earth), the 13,000 square meter (3.15 acres) complex consisted of living quarters and greenhouses containing food crops and small, but photogenic, areas representing deserts, rainforests, savannas, and an ocean.

Almost from its beginning, Biosphere 2 experienced controversy and problems. By the end of the first year of their mission, the Biospherians reported deteriorating air and water quality. Oxygen concentrations in the air had fallen from 21 percent to 14 percent. This is equivalent to oxygen levels at an elevation of 5300 m (17,500 ft) and was barely sufficient to keep the occupants alive and functioning. At the same time, carbon dioxide concentrations were undergoing large daily and seasonal variations and nitrous oxide (N$_2$O) in the air had reached mind-numbing levels. In January 1993, fresh air was pumped in to replenish the dome's atmosphere and rescue the inhabitants.

Subsequent investigations showed that the missing oxygen was being consumed by microbes in the excessively rich soil in which food crops were being grown. At the same time, fresh concrete used in construction was absorbing carbon dioxide released by microbial metabolism. If this carbon dioxide sink hadn't been available, the air would have become unbreathable long before it did. Water systems also became polluted with excess nutrients, degrading aquatic habitats and contaminating drinking water supplies. Species losses were much higher than originally anticipated. Of the 25 introduced vertebrate species, for example, 18 became extinct. All insect pollinators also died, so that most plants were unable to produce seeds and food supplies dwindled to alarming levels. Weedy vines, particularly morning glories (*Ipomoea hederacea*), flourished in the carbon-rich atmosphere and threatened to choke out more desirable plants. Although the majority of the insects disappeared, ants, cockroaches, and katydids thrived and overran everything. Biosphere 2 cost nearly $200 million to build, with an additional cost of about $1 million per year for fossil fuel energy to keep all the systems running. That averages out to about $25 million per human occupant for the two-year experiment. How much more would it cost to produce a truly balanced ecological system that could maintain life indefinitely? Although the experiment failed to meet its original objectives, it illustrates the value of ecological services provided by the natural world that most of us take for granted. What will we have lost and what might it cost to replace resources and services on which we now depend if we deplete or destroy the natural world? In this chapter, we will examine how ecological economists assign prices and values to natural resources and ecological services.