Settling the Solar System

Water, water everywhere,
And all the boards did shrink;
Water, water everywhere
Nor any drop to drink.

Samuel Taylor Coleridge, from “The Rhyme of the Ancient Mariner”

The thought is not new, but it is profound and it can help guide humanity as we deal with the myriad environmental challenges facing us at the beginning of the 21st century: we all inhabit one giant spaceship on a voyage together through the dark emptiness of space. We call it “Spaceship Earth.”

Clearly visible from the hotels in Orlando, Florida, is Disney’s Spaceship Earth at the Epcot Center (Fig. 15.1). When visiting the dome, tourists experience the history of human communication, from the dawn of humankind to today. For many, seeing the dome reminds them of the interconnection we have with each other and with our home planet—a more far-reaching outcome than is intended.

As we learn to be better stewards of Earth and thereby protect it for habitation and use by future generations, we will also be learning how to better extend the human presence beyond Earth and into the nearby solar system. The reverse process is also true. Many of the technologies being developed to support human life beyond Earth may have application here at home as well. This chapter examines the essential parts of a self-sustaining outer space habitat, and discusses how this relates to similar processes on Spaceship Earth.

The essential elements of a crewed space mission include Earth-to-orbit transportation, transportation in space and away from Earth, energy, food, water, waste disposal or recycling, and the commodities of everyday life. We will not dwell on the transportation systems required for space exploration. For more complete background on both Earth-to-orbit and in-space transportation systems, see the authors’ previous books, Living Off the Land in Space (New York: Springer-Praxis, 2007) and Solar Sailing: A Novel Approach to Interplanetary Travel (New York: Springer-Praxis, 2008). We