Preface

> But the care of the earth is our most ancient and most worthy and, after all, our most pleasing responsibility. To cherish what remains of it, and to foster its renewal, is our only legitimate hope.
>
> —**Wendell Berry**[1]

Although prehumans (termed *hominids*) and humans have impacted Earth since the beginning of their evolution, the cumulative effects were, at first, minor. (Cumulative effects are the collective changes in the environment instigated by nature's biophysical processes, in this case augmented by the behavior of prehumans and humans.) As evolution progressed, however, and the various groups of hominids multiplied and spread across Earth, the cumulative effects not only became increasingly complex, affecting ever-greater areas of the globe, but also compounded more rapidly with every human innovation, beginning with the use of fire 790,000 years ago.[2] Then came tools, followed by the domestication of plants and animals, both of which have been accompanied by a continual progression of technological advances. Cohabitation of people and their newly domesticated animals provided the bridge for a variety of diseases to migrate from animals to humans. This relationship brought its own set of issues, which we still face today.

As the human populations fanned out across Earth, the cumulative effects of their interactions with the environment began to spread across the globe from the forest to savannahs, river valleys and deltas, coastlines, and beyond, especially as their populations grew. With the advent of agriculture, which arose in the "Fertile Crescent" of the Middle East, around 8000 BCE, human-influenced land-sea interactions commenced to accelerate, but still in unrecognized ways. The Fertile Crescent refers to a crescent-shaped valley stretching from just south of modern-day Jerusalem, northward along the Mediterranean coast to present-day Syria, eastward through present-day Iraq, and then southward along the Tigris and Euphrates Rivers to the Persian Gulf.

Here, one of the most dramatic developments in human evolution took place—the successful shift from hunter-gatherer subsistence, based on foraging, to one based predominantly on food production derived from cultivated plants and domesticated animals. The ability to grow one's own food was a substantial hedge against hunger and thus proved to be the impetus for settlement that, in turn, became the foundation of civilization. Farming gave rise to social planning as once-nomadic tribes settled down and joined cooperative forces. Irrigation arose in response to the need to support growing populations—and so the discipline of agriculture was born.

Then, around 5000 BCE, the first cities were constructed in the southern part of this long valley, near the Persian Gulf, by an intelligent, resourceful, and energetic people who became known as the Sumerians. Gradually extending their civilization northward over the decades, the Sumerians created the first great empire—Mesopotamia.[3]

Over time, as the farming population grew, groups of people migrated northwestward out of the Fertile Crescent and colonized much of what is Europe today. As they did so, they replaced the indigenous hunter-gatherers, some of whom may have taken up farming rather than surrender their home territories to the newcomers. Nevertheless, data indicate that the newly arrived farmers bred at a rate sufficient to keep their population expanding northwestward.[4]

The shift from a hunter-gatherer way of life to one of increased sedentism (the term archaeologists use to describe the process of settling down) brought with it the concomitant social interaction and the maintenance of permanent agricultural fields and irrigation. As these populations grew and needed more food, the concept of fertilization was born, with its use increasing over time. So, human activity began to dramatically alter the global cycling of nitrogen.

Today, the majority of industrial farmers not only are addicted to synthetic chemicals, such as nitrogen, but also have addicted the soils they farm. Because too much fertilizer is often applied to agricultural fields, the excess leaches into the soil and is carried by runoff from rain and melting snow into the ditches, streams, and rivers, which ultimately deliver it to the ocean, where it accumulates. Where the accumulation is concentrated enough, it causes a veritable explosion in marine algae, which use up the available oxygen in the water, thus suffocating other marine life.

On the other hand, systematic fishing of the world's oceans has increased over the last 42,000 years since its apparent beginning in East Timor.[5] As the numbers and kinds of fish caught and the distances they are transported to continental markets has increased, nitrogen from the ocean has returned to the land through the occupation of marine fishing.

Nevertheless, although the runoff of fertilizer from the land into the ocean and the removal of nitrogen from the ocean through commercial fishing have both increased since the 1970s, the terrestrial input has exceeded that withdrawn from the ocean. That runoff increasingly exceeds the nitrogen returned from the sea through fishing because overfishing greatly reduces the reproductive capacity of the fish to maintain viable populations at sea.[6] This chemical trade-off represents but a single aspect of the myriad human-influenced complexities that today plague the sustainability of both land and sea through self-reinforcing, increasingly negative, biophysical feedback loops.

Can we arrest this deleterious process? Yes, but it will take a dramatic shift in human behavior worldwide. Why? Just as the collective human behavior and lack of awareness caused the problems in the first place, the level of consciousness that causes the problem is not the level of consciousness that can fix it.

We must shift our thinking from that which is symptomatic to that which is systemic if we are to enjoy a sustainably productive environment through time.

How, you might ask, can we accept responsibility for relationships we do not understand? Thomas Jefferson, the third president of the United States, wrote an eloquent response to this query in a letter to William Charles Jarvis on September 28, 1820: "I know of no safe depository of the ultimate powers of the society but the people themselves; and if we think them not enlightened enough to exercise their control with wholesome discretion, the remedy is not to take it from them, but to inform their discretion by education."[7]

This said: "The conundrum for the [land-] ocean commons is how to explain to the student, teacher, and broader public, which often lack such a strong attachment to the sea, why they should care about the state of the world's oceans."[8,p.234] It is, therefore, with a great deal of humility, that I accept Jefferson's wisdom and commit to paper my understanding of the biophysical interactions among the lands, oceans, and peoples of the world. I do this not only to highlight what the global commons means to the quality of our lives through all generations but also that I might leave this magnificent planet spinning miraculously in space a little better for the privilege of having been here amid the untold beauty of its creation.

In this endeavor, I am encouraged by the words of Robert F. Kennedy: "Each time a person stands up for an ideal, or acts to improve the life of others, or strikes out against injustice, they send a tiny ripple of hope; and those ripples, crossing each other from a million different centers of energy, build a current that can sweep down the mightiest walls of oppression and resistance."[9]

Because of the complexity of the topic herein discussed, it is necessary to reiterate some things now and then to reinforce a concept, principle, or crucial point throughout this book.

NOTES

1. Wendell Berry. *The Unsettling of America: Culture and Agriculture*. Sierra Club Books, San Francisco, 1996.
2. David Robson. Proto-Humans Mastered Fire 790,000 Years Ago. *NewScientist*, October 27, 2008. http://www.newscientist.com/article/dn15048-protohumans-mastered-fire-790000-years-ago.html#.U1xK2Bwj950 (accessed February 27, 2009).
3. The discussion of the Fertile Crescent is based on (1) Stacey Y. Abrams. The Land between Two Rivers: The Astronomy of Ancient Mesopotamia. *The Electronic Journal of the Astronomical Society of the Atlantic*, 3 (no 2). Georgia State University Press, 1991. (2) The Fertile Crescent. http://visav.phys.uvic.ca/~babul/AstroCourses/P303/mesopotamia.html (accessed January 7, 2012).
4. Wolfgang Haak, Peter Forster, Barbara Bramanti, and others. Ancient DNA from the First European Farmers in 7500-Year-Old Neolithic Sites. *Science*, 310 (2005):1016–1018.

5. The preceding two paragraphs were drawn from Sue O'Connor, Rintaro Ono, and Chris Clarkson. Pelagic Fishing at 42,000 Years before the Present and the Maritime Skills of Modern Humans. *Science*, 334 (2011):1117–1121.
6. R. Marange, N. Caraco, J. Duhamel, and M. Amyot. Nitrogen Transfer from Sea to Land via Commercial Fisheries. *Nature Geoscience*, 1 (2008):111–112.
7. Thomas Jefferson. http://www.quotedb.com/quotes/2346 (accessed October 13, 2012).
8. Peter J. Auster, Rod Fujita, Stephen R. Kellert, and others. Developing an Ocean Ethic: Science, Utility, Aesthetics, Self-Interest, and Different Ways of Knowing. *Conservation Biology*, 23 (2009): 233–235.
9. Bobby Kennedy. The Ripple of Hope. http://bobby-kennedy.com/rfkintro.htm (accessed October 13, 2012).