PART I: OUR CONVERGING CRISES

Biodiversity

Most people are accustomed to thinking of the world only as it relates to human wishes and needs. After all, the vast majority of our attention is taken up with politics, the economy, family, entertainment—human interests. It's become all too easy to forget that nature even exists—as our communities have grown more and more urbanized, and the processes of growing food, making clothes and buildings, and producing energy are handled in large industrial operations far from view. There are millions of kids in North America who've never seen the stars at night, visited a national park, or picked a wild blackberry.

Earth's wild flora and fauna provide an entertaining stage-set for nature documentaries and tourism, but appear to have little further significance. Yet we humans are part of a living system extending from viruses and bacteria all the way up to redwood trees and whales—one with myriad checks, balances, and feedbacks. We evolved within this living system, and cannot persist without it.

As our human populations and consumption habits grow, we displace other species. We turn wild lands supporting a great variety of animals and plants into plowed fields dominated by a single crop. Our greenhouse gas emissions change the climate, reducing habitat still further. And we introduce toxic chemicals into the environment, which work their way up through the food chain all the way to mothers' breast milk.

The results are apparent everywhere in declining numbers of species of insects, fish, amphibians, birds, and mammals. It has been estimated that humans—along with our cattle, pigs, and other domesticates—make up about

97 percent of all terrestrial vertebrate biomass.[1] The other three percent are comprised of all the songbirds, deer, foxes, elephants and on and on—all the world's remaining wild land animals. Meanwhile deforestation and other land uses are wreaking devastation on the world's *plant* biodiversity, with one in five plants now threatened with extinction.

Biological richness is being lost even at the microscopic level. Our use of agricultural chemicals has led to the disappearance from farm soils of bacteria, fungi, nematodes, and other tiny organisms that provide natural soil fertility. As these microscopic soil communities are destroyed, immense amounts of carbon are released into the atmosphere. Even in the human gut microscopic biodiversity is on the decline, leaving us more prone to immune disorders, multiple sclerosis, obesity, and other diseases.

Biologists call this widespread, rapid loss of biodiversity ***the Sixth Extinction***. The geological record tells of five previous events when enormous numbers of species perished; the most severe occurred at the end of the Permian period, 250 million years ago, when 96 percent of all species disappeared. Evidently we are now in the early stages of another massive die-off of species on the same scale as those five previous cataclysmic events.

Some Earth scientists say we are creating a new era in Earth's history—the ***Anthropocene***. If there are geologists in the distant future, they will easily be able to identify the rock layer associated with our modern presence by higher radioactivity, evidence of global warming, and a sudden mass extinction of species.

Well, what does loss of biodiversity mean for people? At the very least, it means that today's children are set to inherit a world in which many of the animals that filled the lives, dreams, and imaginations of our ancestors, that provided the metaphors at the root of every human language, will be

[1] *source: Vaclav Smil,* Harvesting the Biosphere *(2012). Data prepared by Nathan Hagens and Paul Chefurka.*

remembered only in picture books. But biodiversity loss also has enormous practical implications for public health and agriculture.

Among other things, natural systems replenish oxygen in the planetary atmosphere, capture and sequester carbon in soils and forests, pollinate food crops, filter freshwater, buffer storm surges, and break down and recycle all sorts of wastes. As we lose biodiversity, we also lose these ecosystem services—which, if we had to perform them ourselves, would cost us over $30 trillion annually, according to several estimates.

Yet our very tendency to be preoccupied with the *human* impacts of the biodiversity crisis may tell us a great deal about why it is happening in the first place.

Many indigenous cultures believed that other species have as much right to exist as we do. But as cities, houses, and communications media have come to contain and dominate our attention, we have become ever more self-absorbed. We barely notice as the oceans are emptied of life, as the sound of birdsong disappears from our lives.

Throughout the world, successful programs for biodiversity protection have centered on limiting deforestation, restricting fishing, and paying poor landowners to protect habitat. Biologist Edward O. Wilson has recently proposed setting aside fully *half* of Earth's land and seas for biodiversity recovery. He estimates that doing so would reduce the human-induced extinction rate by 80 percent.

That's a bold proposal that faces enormous political and economic obstacles. But unless we do something equally bold, all of life on Earth faces an immense threat, one with a distinctly human face.