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UNIT 1 Sustainability—An Indictment of Human Actions?

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- 1. World Scientists' Warning to Humanity**, Henry Kendall, *Union of Concerned Scientists*, 1997
This pamphlet, released in 1997, provides what might be considered an indictment, in the legal sense, of **human actions**. It lists some specific examples of **environmental degradation** (metaphorical crimes) that human actions are creating for various life-support systems of the planet. It also provides a warning from over 1,700 of the leading scientists in the world at the time of its publication in 1997 about what might happen if humans do not begin to behave in more sustainable ways. It concludes with some suggestions for **behavior changes**. Despite the fact that over 100 Nobel laureates endorsed this Warning, it remains unknown to many, even those interested in sustainability; so, to continue the legal metaphor, no arraignment, or formal reading of the charges against the accused, has occurred. Perhaps, this is why no real indictment of human actions has been issued. **2**
- 2. Population and the Environment: The Global Challenge**, Don Hinrichsen and Bryant Robey, *Population Reports*, Series M, Fall 2000
This report echoes many of the concerns about **environmental degradation** as a result of **human actions** raised by the UCS. It demonstrates that even though several years had past since the Warning, little had improved. In scientific research, the concept of reliability may concern whether data that have been collected are consistent. One way to check for reliability is to measure a particular variable repeatedly and see if the measurement of it stays the same. This report establishes reliability of the condition of the environment because the findings are very similar to the Warning. **5**
- 3. Ecosystems and Human Well-Being: Summary for Decision-Makers**, *Millennium Ecosystem Assessment*, 2005
This report, released in 2005, represented the efforts of nearly 1,400 leading scientists from nearly 100 countries. It has undergone extensive scholarly review by a panel of nearly 100 additional experts who considered nearly 900 reviews. Only the Summary for Decision-makers appears in this unit. It presents the key findings of a critical examination of the state of the world's ecosystems and the **ecosystem services** they provide to all life on Earth. It also contributes to the reliability of the data concerning the status of the life support systems of Earth. **9**
- 4. The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?**, Will Steffen, Paul J. Crutzen, and John R. McNeill, December 2007
The Anthropocene is a name given to the period since 1800, when **human actions** are considered based on their ability to be a geophysical force on the planet. Prior to this period, humans were not perceived as being able to alter the life-support systems of Earth. This article suggests three stages of the Anthropocene from the industrial era through The Great Acceleration to the proposed Stewards of the Earth System. **23**
- 5. The State of the Nation's Ecosystems 2008: What the Indicators Tell Us**, The H. John Heinz, III *Center for Science, Economics and the Environment*, 2008
This report attempts "to lay the groundwork for periodic, high-quality, nonpartisan reporting on the condition and use of U.S. **ecosystems**, the goal being a stable set of broadly accepted and well-tested indicators." It represents the efforts of "hundreds of contributors." It has been subjected to independent scholarly review. The section included in this publication represents only the major findings included in the whole report. It also contributes to the reliability of the data concerning the status of the life support systems of Earth. **31**

The concepts in bold italics are developed in the article. For further expansion, please refer to the Topic Guide.

6. **Global Biodiversity Outlook 3: Executive Summary**, *Secretariat of the Convention on Biological Diversity*, 2010

This report, released in 2010, specifically addresses the issue of loss of **biodiversity**. Messages from the Secretary-General of the United Nations, the Executive Director of the United Nations Environment Programme, and the Executive Secretary of the Convention on Biological Diversity highlight the urgency of protecting biodiversity and serve as an advance organizer for the Executive Summary that is included in this unit. It also contributes to the reliability of the data concerning the status of the life support systems of Earth.

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UNIT 2 Sustainability—A New Paradigm?

Unit Overview

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7. **Top 10 Myths About Sustainability**, Michael D. Lemonick, *Scientific American: Earth 3.0*, 2009

What is sustainability? What isn't it? For some, mostly those not directly involved with the field, the term sustainability is misperceived. Borrowing from the popular 'top ten' list used by talk show hosts and others; this article attempts to clarify the top 10 myths about sustainability.

44

8. **The Century Ahead: Searching for Sustainability**, Paul D. Raskin, Christi Electric, and Richard A. Rosen, *Sustainability*, 2010

If sustainability is simply a new worldview—a new paradigm—for humanity, and not an indictment of human behavior, it might be useful to understand how the new paradigm will be brought into practice and alter **human actions**. This article envisions life in the 21st century by examining how humanity might achieve sustainability in the context of four contrasting scenarios.

47

9. **The Invention of Sustainability**, Paul Warde, *Modern Intellectual History*, 2011

This article examines the historical roots of the concept of sustainability. Such an examination is useful when considering if sustainability represents a new paradigm for humanity. Indeed, much of the debate about sustainability concerns how it is operationally defined and how it may be implemented. Often, understanding the history of events helps us understand the present as well as the future. In order to understand where we must go regarding sustainability, it might be helpful to understand where we have been.

63

10. **The Future of Sustainability: Re-thinking Environment and Development in the Twenty-First Century**, W. M. Adams, *IUCN*, January 2006

This report is the outcome of a meeting instigated by the IUCN (International Union for Conservation of Nature), during which the advances as well as the stagnations or retreats regarding sustainable **development** were examined. This report elaborates on some of the key topics considered during the meeting at least insofar as Adams perceived them.

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11. **Sustainable Co-evolution**, John Cairns, Jr., *International Journal of Sustainable Development & World Ecology*, 2007

In biological terms, co-evolution is when two closely interacting species develop adaptations to enhance each of their survival. Cairns uses this concept to argue that humanity should co-evolve with Earth's **life support systems** so that the likelihood of survival of each is improved. He argues that the connection between humanity and the life support systems of the planet are not adequately acknowledged, even though it is the *sine qua non* of sustainability.

79

12. **Framing Sustainability**, David W. Orr, *Conservation Biology*, April 2006

What do Abraham Lincoln, slavery, and the Civil War have in common with sustainability? According to Orr, the way in which Lincoln framed the issues of slavery and the war, and thereby gained support for his position on both, should provide an example of how to frame the issue of sustainability.

83

13. **Synthesis**, John C. Dernbach, *Stumbling Toward Sustainability*, 2002

This reading is a synthesis of the book *Stumbling Toward Sustainability*. It summarizes the major findings and recommendations in it. It explores in detail the role the United States should, perhaps must, play in helping humanity transition from a model of **development** that is unsustainable to one that is sustainable.

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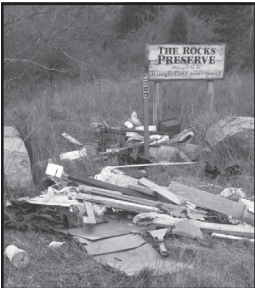
The concepts in bold italics are developed in the article. For further expansion, please refer to the Topic Guide.



UNIT 3

Earth's Life Support Systems and Ecosystem Services

- Unit Overview** 92
- 14. Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems**, Gretchen C. Daily et al., *Issues in Ecology*, Spring 1997
Published in the same year at the Costanza et al. effort, but by an entirely different group of scientists, this report explores and describes several benefits the life support services provided by ecosystems provide to humanity. They do so without calculating a dollar value to replace said services. 94
- 15. How Have Ecosystems Changed?**, *Millennium Ecosystem Assessment*, www.maweb.org/documents/document.356.aspx.pdf, 2005
That human actions “inflict harsh and often irreversible damage” on ecosystems is well established. So, too, is the fact that humans would not be able to survive on Earth were it not for the life support services that ecosystems provide. But how, exactly, have human actions degraded ecosystems? This section of the MEA provided a detailed analysis of that question. 104
- 16. How Have Ecosystems Services and Their Uses Changed?**, *Millennium Ecosystem Assessment*, www.maweb.org/documents/document.356.aspx.pdf, 2005
If human actions are altering ecosystems, then it follows that they are likely altering the services provided by ecosystems. This reading explains precisely how ecosystem services have been and continue to be altered by humans. 109
- 17. The Competitive Exclusion Principle**, Garrett Hardin, *Science*, April 29, 1960
The ecological basis for why human actions are so detrimental to ecosystems and the life-supporting services they provide is rooted in the fact humans often behave in a manner that competitively excludes other species from benefiting from ecosystem system services. Ironically, they also competitively exclude themselves from benefiting from the same services because certain actions competitively exclude certain benefits from being realized. 115



UNIT 4

Why Do Humans Behave in Unsustainable Ways?

- Unit Overview** 122
- 18. The Historical Roots of Our Ecological Crisis**, Lynn White, Jr., *Science*, March 10, 1967
Why a species would potentially destroy its own life support system is an intriguing question, especially if the species in question is our own. In this essay, White suggested the root cause is religion; in particular, Christianity. He concluded that religion is responsible for the ecological crisis and only religion, not science and/or technology, will resolve it. 124
- 19. The Cultural Basis for Our Environmental Crisis**, Lewis W. Moncrief, *Science*, October 30, 1970
This rebuttal to White's essay, published 3.5 years later, suggests that it is the nature of Western cultures and not the religious beliefs or practices of them that is the root of the ecological crisis. In other words, it is the practice of a culture and not the theory on which it is based that matters. 129

- 20. The Tragedy of the Commons**, Garrett Hardin, *Science*, December 13, 1968
Published in between White's and Moncrief's point-counterpoint, Hardin's masterpiece explores a topic at the intersection of their respective arguments: human population. In a world of finite life-supporting services, how many people can exist before the available services are no longer able to service everyone and some are left without service? **134**
- 21. The Narcotizing Dysfunction**, Paul F. Lazarsfeld and Robert K. Merton, *Mass Culture: The Popular Arts in America* (The Free Press), 1957/1948
Former U.S. Senator and Vice President Al Gore is often credited with coining the term "information superhighway" when referring to the Internet and its ability to bring information to the masses in the same way that the interstate highway system brought heretofore unconsidered destinations to the masses. But is access to an ever-increasing amount of information useful to the mission of sustainability? In this excerpt from a book chapter published over half a century ago, the effect of exposure to a "flood of information" was already a point of concern. **139**
- 22. Mind the Gap: Why Do People Act Environmentally and What are the Barriers to Pro-environmental Behavior?** Anja Kollmuss and Julian Agyeman, *Environmental Education Research*, August 2002
Why do some people behave in ways that are ecologically sustainable while others do not? Understanding the latter is probably more important than understanding the former, since it is the behaviors of those in that group that need to be modified. If we could understand the causal agents for what has been described as "maladaptive behaviors," perhaps we could provide the necessary interventions to bring about the transformation of said behaviors to those that are ecologically sustainable. This article presents something of a meta-analysis of research into this question. **140**
- 23. Do Global Attitudes and Behaviors Support Sustainable Development?**, Anthony A. Leiserowitz, Robert W. Kates, and Thomas M. Parris, *Environment*, 2005
What do we know about how people actually feel about sustainability and behave regarding it? In order to understand the roadmap of how to arrive at a destination of sustainability, we need to know where we are as we start the journey. Do people all over the world share a concern about sustainability, or is such concern that of only environmentalists or the lunatic fringe? **154**
- 24. The Latest On Trends In: Nature-Based Outdoor Recreation**, H. Ken Cordell, *Forest History Today*, 2008
A great deal of empirical evidence exists that suggested that attitudes and behaviors that support sustainability are formed early in life and require direct and persistent contact with nonhuman-dominated nature. What would happen if masses of people suddenly stopped communing with nature and became almost addicted to sedentary activities dependent upon electronic gadgetry? This article provides an overview of the status of outdoor recreation in the U.S. Specific attention is given to nature-based recreation. **170**



UNIT 5

What Are the Impacts of Our Actions?

Unit Overview **176**

- 25. New Consumers: The Influence of Affluence on the Environment**, Norman Myers and Jennifer Kent, *Proceedings of the National Academies of Science*, April 15, 2003
The general concept of sustainability is for each generation to use the resources of Earth and to benefit from the life support services provided by ecosystems in a manner that does not diminish the opportunities for future generations to do the same. Unfortunately, recent generations have become addicted to consumption of both in an unrestricted manner. This has had a profound effect on the prospect of achieving sustainability. As more people find themselves in the position to consume more, the problem is exacerbated. **178**

- 26. Human Domination of Earth's Ecosystems**, Peter M. Vitousek et al., *Science*, July 25, 1997
It is generally agreed that human actions are changing Earth's life support systems and that these changes are increasing in both intensity and frequency. The idea of "human domination" of the ecosystems of Earth now applies to the entire planet. What does this mean for sustainability? **186**
- 27. Human Alteration of the Global Nitrogen Cycle: Causes and Consequences**, Peter M. Vitousek et al., *Issues in Ecology*, Spring 1997
It has been suggested that life on Earth is dependent on a one-way flow of energy and on the continuous cycling of matter (nutrients). Both conditions have evolved over millennia. Human actions have begun to have a profound effect on the later with limited understanding of the long-term effects of such alterations. **194**
- 28. The Story of Phosphorus: Global Food Security and Food for Thought**, Dana Cordell, Jan-Olof Drangert, and Stuart White, *Global Environmental Change*, 2009
Much has been written and discussed about the decline in the known reserves of crude oil. Already, some are preparing for the age of Earth minus oil. Surprisingly, little discussion has occurred about the decline in the known reserves of phosphorus, even though it is a critical element in food production, especially on the scale that is needed to feed the current and growing human population. **201**
- 29. Biodiversity Loss Threatens Human Well-Being**, Sandra Díaz et al. *Public Library of Science Biology*, August 15, 2006
That humanity depends on the life support services provided by ecosystems is increasingly being recognized. Often missing from such recognitions is the vital role that biodiversity plays in shaping the magnitude of said services. **215**
- 30. Soil Diversity and Land Use in the United States**, Ronald Amundson, Y. Guo, and P. Gong, *Ecosystems*, October 2003
Former president of the University of Illinois Andrew Sloan Draper stated, "The wealth of Illinois is in her soil, and her strength lies in its intelligent development." Stated today, Illinois could, perhaps should, be replaced with "the United States." Unfortunately, soils are rarely considered when sustainability is the issue of interest, which is surprising given the vital role they serve. **219**



UNIT 6

How Do We Correct Our Actions and Embrace Sustainability?

Unit Overview **228**

- 31. Can Selfishness Save the Environment?**, Matt Ridley and Bobbi S. Low, *The Atlantic Monthly*, September 1993
Will people embrace sustainability and adopt behaviors that support it because it is the right thing to do? Will they do so only if there are incentives? Will they do so because by not doing so, they bring shame to themselves? What must be done to assure that people do embrace sustainability and do adopt behaviors that support it? Biologists and economists have been working collectively to explore these types of questions. **230**
- 32. Toward A Sustainable World**, William D. Ruckelshaus, *Scientific American*, September 1989
Two-time administrator of the U.S. E.P.A. William Ruckelshaus provides recommendations for how we might return to the "original economy" of humanity: sustainability. He outlines the beliefs that will be required to make the back-to-the-future journey. **237**

33. Abolishing GDP , Jeroen C. J. M. van den Bergh, <i>Tinbergen Institution</i> , February 2007	
Why do people behave in ways that are unsustainable? Perhaps it is because most current economic systems either do not accurately account (punish) for environmental degradation or (reward) environmental protection. The dominant measure of economic progress globally is the Gross Domestic Product (GDP) is so limited. So, if sustainability is to be achieved, a different economic evaluation must be developed and implemented.	242
34. The Efficiency Dilemma , David Owen, <i>The New Yorker</i> , December 20 & 27, 2010	
Prominent economist Herman Daly has suggested, “to do more efficient that which should not be done in the first place is no cause for rejoicing.” Still, many concerned about sustainability look only to improving the efficiency of human use of natural resources and ecosystem services without carefully examining the benefits of simply using less of almost everything; in other words: conservation. Owen uses the Jevons paradox to examine this question of efficiency versus frugality.	260
35. Consumption, Not CO₂ Emissions: Reframing Perspectives on Climate Change and Sustainability , Robert Harriss and Bin Shui, <i>Environment</i> , November/December 2010	
Few issues are receiving more attention regarding sustainability than climate change. Human-induced increases of CO ₂ in the atmosphere are thought to be a prime factor. The challenge is to understand the accounting for carbon increases. Is it simply a matter of tracking the carbon emitted only by producers or do consumers need to be included as well?	265
36. The Rise of Vertical Farms , Dickson Despommier, <i>Scientific American</i> , November 2009	
Globally, soil degradation is increasing. Already, vast areas have soil that is incapable of support plant growth. Human population is increasing. So, with more mouths to feed and decreasing potential to grow food, what is humanity to do? Additionally, production agriculture inflicts serious damage to the environment in the form of pesticide, herbicide, and fungicide applications, fossil fuel use in both production and transport of foods, and wasted water use. A second Green Revolution that reduces all of these impacts might be necessary. It might be that the current model of “amber waves of grain” might not be sustainable given the current human population.	271
37. Climate 2030: A National Blueprint for a Clean Energy Economy , <i>Union of Concerned Scientists</i> , May 2009	
Life on Earth is dependent upon a one-way flow of energy and the continuous cycling of matter. When sustainability is the topic of conversation, energy efficiency and independence often dominate the dialog. To be sure, meeting current energy demands in more ecologically benign ways will be essential if sustainability is to be achieved; however, conventional thinking will not be adequate. Thinking as much about how not to use energy as well as how to use it more efficiency will be essential.	276
38. The Power of Green , Thomas L. Friedman, <i>New York Times Magazine</i> , April 15, 2007	
Many have suggested that the United States should be leading the way to sustainability, but that it is not. Some lament that other nations and/or regions of the world are quite a bit ahead of the United States regarding tangible efforts to become more sustainable. What should, perhaps must, the United States do if it is to lead the world toward sustainability?	283
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