1. What Is Sustainability?

Further Reading

Articles, Chapters, and Papers

A review of evidence that, as with individual ecosystems, the global ecosystem as a whole can shift abruptly and irreversibly into a new state once critical thresholds are crossed, and that it is approaching a critical threshold as a result of human influence, and that there is a need to improve the detecting of early warning signs of state shift.


Clark, William C. “Sustainability Science: A Room of Its Own.” *Proceedings of the National Academy of Sciences*, vol. 104 no. 6 (February 6, 2007):1737–38.
A report on the development of sustainability science as a maturing field with a core research agenda, methodologies, and universities teaching its methods and findings.

Estimates the current economic value of 17 ecosystem services based on both published research and original calculations.

A discussion of the possibilities of addressing the growing condition of global overshoot through reducing inequity, stabilizing population and securing natural capital, while also enhancing the social role of academia.

The meaning of resilience in complex social-ecological systems and the importance of fostering resilience of smaller social-ecological systems that contribute to the resilience of the Earth System.

An overview of the history, definitions, and concepts of sustainability by a senior fellow at the Post Carbon Institute whose work focuses on the transition to a resilient, sustainable, post-carbon world beyond the end of economic growth.


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Scholars from the Stockholm Resilience Centre, the Tellus Institute, and the STEPS Centre at the University of Sussex argue that, given what is now known about the dimensions of a “safe operating space” for humanity, ambitious sustainable development goals and major transformations in policy, technology, and modes of innovation are now required. A brief review of the current state of climate and biodiversity, with the assessment that humanity needs to move beyond a consumptive, destructive lifestyle, and that integrated planning and integrated management are needed.

In anticipation of the 2012 United Nations Rio+20 conference, preeminent biologists Paul Ehrlich and Gretchen Daily look at how far we as a species are from sustainability.

Discussion of the concept of resilience by a fellow of the Post Carbon Institute who originated and developed the Ecological Footprint method (with his former student, Mathis Wackernagel). These two important articles report on research by an international team of 28 leading scientists to identify thresholds for nine Earth-system processes which have boundaries that mark the safe zone for the planet, the crossing of which could result in irreversible environmental changes.
Serious, intertwined global challenges and crises are increasing beyond the ability of human institutions to deal with them. While nation-states can each elicit cooperation within their sovereign boundaries, motivation for cooperation between nations is undermined by national interest.


An exploration of the links between institutions, social and technical innovations for navigating large-scale transformations towards global sustainability, and whether social and technical innovations can reverse the trajectory that is approaching critical planetary thresholds.


A discussion of the convergence of climate change, population growth, and overconsumption, a global bottleneck that could drive half the current species to extinction by the end of the century.

Books


Written by the prolific and influential Lester Brown, founder and president of the Earth Policy Institute, founder and former president of the Worldwatch Institute, this is a comprehensive and thoroughly researched analysis of the environmental, social, and economic challenges facing the planet together with a plan for how to address them, which Brown tells us must be done “with wartime speed.”


The book that is best known for Commoner’s four laws of ecology: Everything is connected to everything else; everything must go somewhere; nature knows best; and there is no such thing as a free lunch.


An expanded description of the Earth Charter, a declaration of shared ethical principles from a participatory civil process that grew out of the 1992 Rio de Janeiro Earth Summit.


A comprehensive and engaging survey of environmental science, with lots of color diagrams, graphs, and photographs.


A survey of sustainability in the late twentieth and early twenty-first centuries, with clear explanations for people new to the field and numerous exemplars from around the world, providing a glimpse of what is possible.


An optimistic collection of examples from around the world of how individuals, organizations, and communities are putting sustainability principles into practice.


Revised edition of the 1993 classic about how to bring capitalism and environmental concerns together under one framework.


A groundbreaking work aimed at economists, business leaders, and policymakers, as well as general readers, that promotes long-term over short-term thinking and systems thinking over siloes. It explores the meaning of natural capital, applies market principles to natural resources, and shows how successful businesses can be simultaneously profitable and environmentally responsible. First edition published in 1999, with a second edition in 2010.


This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.


An outline of the ideas underlying green building design, from the architect who originated the rating system known as the Living Building Challenge.


An updated version of the scientifically rigorous and influential 1972 study by a team of systems analysts, which concluded that if current trends continued, the planet would reach its limits to growth within 100 years.

A concise primer on systems thinking by the lead author of the influential *Limits to Growth*. Published posthumously.


A paper from environmental policy strategists who are critical of the planetary boundaries framework.


David Orr is a significant figure in education for sustainability. A professor at Oberlin College, he is the founder and executive director of the visionary Oberlin Project, a prolific author, sought-after speaker, and winner of numerous honors. Dr. Orr is a tireless, passionate advocate for ecological literacy in education whose writing is articulate and literate.


A detailed inventory of the challenges facing the planet and the transitions we must make—the bridge to be crossed—by a leading environmental law expert who was the former administrator of the United Nations Development Programme, former dean of the Yale School of Forestry & Environmental Studies, founder of the World Resources Institute, and co-founder of the Natural Resources Defense Council.


Guidance on ways to live more sustainably for individuals who want to make changes at a personal scale.


A collection of essays by experts in sustainability and other fields exploring the skills that will be needed in order to survive and thrive through the challenges of the coming century. Covers a range of sustainability topics including systems thinking, ecological literacy, and transition skills.


An introductory overview of a range of topics in the field, available for download.


The report often referred to as “the Brundtland report,” source of the most frequently quoted definition of sustainable development: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”


The authoritative textbook in the field of sustainability science.

Authoritative discussion of resilience and complexity, with primary authorship by an expert in the field.


A straightforward discussion of humanity’s unsustainable trajectory at the limits of growth: the declining state of the global environment, the increasing depletion of resources, and the major political and economic implications. Describes how economic systems can be transformed and provides directions for policy. Like the 1972 *Limits to Growth*, this work is a report to the Club of Rome. Wijkman is a former member of the European Parliament and former policy director of the United Nations Development Programme. Rockström is the director of the Stockholm Resilience Centre and led the development of the Planetary Boundaries framework published in 2009.


A comprehensive and engaging overview of environmental science, illustrated by case studies.


*State of the World* reports are edited collections published annually by the authoritative Worldwatch Institute. Each edition explores a different sustainability theme with essays by recognized experts in their respective fields.


**Websites**


Originally known as the Sustainability Institute. Founded by the late Donella Meadows to apply systems thinking and organizational learning to economic, environmental, and social challenges.


Founded by Lester Brown, founder of the Worldwatch Institute and author of *Plan B 4.0*, to provide a plan (Plan B) for moving the world onto a sustainable path. Website’s data center posts spreadsheets with data for the 12 indicators tracked by the Institute. Conducts research, provides examples from around the world, and conducts outreach and education.

Forum on Science and Innovation for Sustainable Development. [http://sustainabilityscience.org](http://sustainabilityscience.org)


An international public policy research institute for sustainable development.


An organization of practitioners in sustainability planning.


Resilience Alliance. [http://www.resalliance.org/1.php](http://www.resalliance.org/1.php)


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Complete collection of papers in sustainability science published in PNAS to date. 


A peer-reviewed, open-access journal.


Researcher’s toolkit from this open-access online journal, including a database of academic programs, a network of sustainability scholars and experts, sustainability datasets from US Government agencies, and a database of sustainability theses and dissertations.


Handbooks of best practices developed by the Natural Step for individuals, businesses, nonprofit organizations, municipalities, and planners.

World Resources Institute. [http://wri.org/](http://wri.org/)

A large and robust research and policy organization. Collaborates via partnerships with governments, the private sector, and nonprofit organizations. Issues scholarly reports on a range of topics related to environmental, economic, and social sustainability.


Former source for environmental information. No longer maintained.

World Resources Institute: Maps & Data. [http://www.wri.org/resources](http://www.wri.org/resources)

A database of maps, charts, data sets, infographics, and other visual resources based on World Resources Institute’s data and research.


A public policy research organization working to accelerate the transition to a sustainable world. Publishes *World Watch* magazine, the annual *Vital Signs* and *State of the World* reports, as well as reference guides, blogs, and reports on particular issues. Excellent source of detailed information about sustainability issues.


Data and analysis of global trends in energy and transportation, environment and climate, food and agriculture, global economy and resources, and population and society.

Yale Environment 360. [http://e360.yale.edu/](http://e360.yale.edu/)

An online magazine from the Yale University School of Forestry and Environmental Studies offering opinion, analysis, reporting and debate on global environmental issues. An email newsletter is available for weekly updates on the latest content.
2. A Brief History of Sustainability

Further Reading

Articles, Chapters, and Papers


Books


Websites


The best and most complete online collection of astronaut photographs of the Earth.
3. The Biosphere

Further Reading

Articles, Chapters, and Papers


The complex ecosystem of the bacteria and other microorganisms in and on our bodies.

Angier, Natalie. “Listening to Bacteria.” *Smithsonian*, July/August 2010: 77–82.


An exploration of the science of scale-free networks, a recurring feature of complex systems throughout the biosphere and thus an important concept in systems thinking.


Approaching education for sustainability through the perspective known as Big History.


http://e360.yale.edu/feature/urban_nature_how_to_foster_biodiversity_in_worlds_cities/2725/


http://www.uri.edu/news/releases/?id=6568


Discussion of planetary boundaries and the Earth system, from a highly regarded expert on resilience, ecosystems, and sustainability science.


An examination of the challenges and opportunities of new modes of governance and collaboration with the biosphere in the face of planetary boundaries and tipping points.


Introduction to these sophisticated and remarkable organisms who span the boundary between individual and community.


Description of the biodiversity hotspot approach to conservation.
Research on how the first living organisms arose from inanimate matter.

An essay on ways that non-native species, anthropogenic habitat changes, and hybridization can lead to increases in the numbers of species.

An innovative approach to thinking about our place in the biosphere, this essay discusses humans as benthic organisms of the atmosphere, creatures of the bottom of the sky.


Books

A discussion of human relationships to nature as a synthesis of science and religion.

A discussion by two prominent ecologists of the instrumental value of preserving biodiversity, for lay readers.

A succinct and engaging overview of what is known about a remarkable group of organisms who function as both individuals and communities, with sophisticated divisions of labor.

An accessible explanation of scale-free networks, a recurring feature of complex systems throughout the biosphere and thus an important concept in systems thinking.

An examination of environmental ethics by Aldo Leopold scholar J. Baird Callicott that extends the concept of the land ethic to a global scale, including climate change in its scope. The title is a reference to two of Leopold’s most well-known essays, “Thinking Like a Mountain” and “The Land Ethic.”


An electronic reference about the planet’s natural environments and their interaction with human society, written collaboratively and peer reviewed by scholars and practitioners, and aimed at a broad audience: scholars, students, professionals, and the general public.

A range of chapters illustrating the interconnected systems of the biosphere. This collection approaches Earth system science, the biosphere, and the human sphere from a variety of perspectives including science, environmental ethics, and education, written by authorities in their respective fields.

A comprehensive and engaging survey of environmental science, with lots of color diagrams, graphs, and photographs.


Provides not only a biography of James Lovelock, but also a clear understanding of the concepts of Earth system science, known as the Gaia Theory.

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A portrait of the biosphere that provides a clear understanding of the connectedness of the Earth system and its components, while helping the reader to appreciate the system as a living entity. Harding has collaborated on Earth system science research with James Lovelock.


An accessible approach to quantitative thinking about energy, water, food, pollution, climate, habitat, and population.


Clear description of the interconnected components of the biosphere and their development. Written for nonscientists, but full of detail.


A detailed look at the life of the social insects including bees, ants, and termites that reveals how the separation between individual and community is more of a complex transition than it is a distinct dividing line. Wilson is considered the leading authority on social insects.


A rigorous science textbook that explores the details of Earth system science from an interdisciplinary, whole-systems perspective, written by acknowledged experts in the field.

Collection of important essays by the twentieth century ecologist and writer, influential in the field of environmental ethics. The essay “Thinking Like a Mountain” describes how his killing of a wolf changed his worldview. “The Land Ethic,” his best-known essay, explores the idea of ethics as a process of ecological evolution and extends the concept of the intrinsic rights of nature to the land itself.


The classic works on Gaia Theory, or Earth system science, by the atmospheric scientist whose research developed the theory.

Description of microbial evolution by the microbiologist who first discovered that multicellular life was originally the result of symbiosis between separate organisms.

Discussion of the origin of life and exploration of its structure by microbiologist Lynn Margulis, who also collaborated on the development of Gaia Theory with James Lovelock. Somewhat lyrical, and aimed at the general reader, yet provides solid scientific understanding.


Classic work on chaos and complexity, written for scientists but still accessible. Prigogine won the Nobel Prize for his work in nonequilibrium thermodynamics.


Essays by one of the leading figures in environmental ethics, including detailed philosophical analyses of distinctions or connections between individuals and communities.


Earth system science textbook with a focus on the four spheres (lithosphere, hydrosphere, atmosphere, biosphere), their interconnections, and the cycling of materials and energy.


A cosmologist’s description of the birth, death, and rebirth of stars and galaxies that illustrates how broader principles such as the recycling of nutrients apply at even cosmic scales.


Although intended as a high school textbook, this highly illustrated work is useful for providing context and solid understanding of scientific concepts, with a focus on interconnections and themes.


The authoritative textbook in the field of sustainability science.


Authoritative discussion of resilience and complexity, with primary authorship by an expert in the field.


An interdisciplinary collection of essays on biodiversity, overconsumption, population, bioregionalism, and ethics by E.O. Wilson, James Lovelock, Paul Ehrlich, Herman Daly, and other significant figures in sustainability that present the concept of Earth as a living entity.


Discussions of biodiversity and extinction by the renowned entomologist known for his work to preserve biodiversity. Wilson is considered the leading authority on social insects also developed the Biophilia Hypothesis.


A comprehensive and engaging overview of environmental science, illustrated by case studies.

**Websites**

A grant-funded research institute investigating the nature and extent of the deep microbial biosphere.

A peer-reviewed collection of online science Earth system science activities for teaching with data, including data sets, analysis tools, and case studies, written for high school and college educators.

An electronic reference, published by the National Council for Science and the Environment, about the planet’s natural environments and their interaction with human society, written collaboratively and peer reviewed by scholars and practitioners, and aimed at a broad audience: scholars, students, professionals, and the general public.

A joint initiative hosted by the College of William and Mary and the Yale Center for Environmental Law and Policy.

International Environmental Agreements website. [http://iea.uoregon.edu/](http://iea.uoregon.edu/)
Hosted by the University of Oregon. Provides a storehouse of information on environmental agreements.

A U.S. nonprofit organization dedicated to improving the scientific basis for environmental decision-making through advocacy, education, research and collaboration. Includes a network of affiliate organizations and institutions, organizes conferences, and publishes the open-source Encyclopedia of Earth.

Simple, nonquantitative animations which illustrate the carbon cycle, water cycle, thermohaline circulation or global conveyor belt, nutrient cycle, and the processes of phytosynthesis and oxygen production in the ocean, with concise descriptions.

[http://css.snre.umich.edu/facts](http://css.snre.umich.edu/facts)
One of a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.

USDA Natural Resources Conservation Service, National Biology handbook.

World Resources Institute: Maps & Data. [http://www.wri.org/resources](http://www.wri.org/resources)
A database of maps, charts, data sets, infographics, and other visual resources based on World Resources Institute’s data and research.

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4. The Human Sphere

Further Reading

Articles, Chapters, and Papers


Approaches to solving the problem of economic growth, by a senior fellow of the Worldwatch Institute.


An introduction to the complexities of human culture and the challenges of transforming modern culture to one that is compatible with a living planetary system.


http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1201695/


One of a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.


An early set of discussions on an alternative to the Gross National Product (GDP), the Index of Sustainable Economic Welfare (ISEW)


Articles about human population and demographics from a highly regarded authority on population.


Discussion of the implications of full-world, steady state economics, from a leading ecological economist.


The short article in which Nobel laureate Paul Crutzen proposed the Anthropocene as a new geological epoch.


Explanation of how human impact has led to a new geological epoch, the Anthropocene, by the two leading scholars on the subject.

One of the clearest and most succinct explanations of the principles of ecological economics by the leading scholar in the field.


A brief overview of initiatives around the world to develop alternatives to GDP.


Early research in the study of well-being and economics which suggested that growth does not always increase happiness; the correlation between income and happiness reaches a threshold of sufficiency and tends not to increase further.


The article in which Ehrlich and Holdren introduced their now-famous “IPAT” formula.


A discussion of the possibilities of addressing the growing condition of global overshoot through reducing inequity, stabilizing population and securing natural capital, while also enhancing the social role of academia.


A brief overview of carrying capacity and calculations of potentially sustainable levels of greenhouse gas emissions and natural resource consumption.


Explanation of the concepts of ecological economics, by one of the leading scholars in the field.


An introductory framework for the transition to a post-carbon world, with examples including food, energy, local economy, reskilling, and preservation of local ecosystems;
Heinberg is a senior fellow at the Post Carbon Institute whose work focuses on the transition to a resilient, sustainable, post-carbon world beyond the end of economic growth.


An examination of current research on economic degrowth and the conditions under which it could be socially sustainable.


Analysis by a Stanford University biologist who became an administrator and political figure.


Discussion of the importance of ecosystem services by two highly regarded ecological economists.


Analysis of why the economic growth model is no longer viable, by one of the leading figures in the field of sustainability.


A two-paragraph summary of research on the role of women in fostering resilience.


An examination of Ecological Footprint and what will be required in order to live within the planetary carrying capacity.


A perspective on sustainable development that examines the relationships between the research on planetary boundaries, the safe operating space for humanity, and a quantification of social boundaries.

Analysis by a fellow of the Post Carbon Institute who originated and developed the Ecological Footprint method (with his former student, Mathis Wackernagel).


Analysis by a fellow of the Post Carbon Institute, a population expert and president of the Population Institute.


Analysis by a lead author of the 2001 IPCC report, past president of Greenpeace Germany, and senior researcher at the Wuppertal Institute for Climate, Environment, and Energy.


Analysis by a leading environmental law expert and former administrator of the United Nations Development Programme, former dean of the Yale School of Forestry & Environmental Studies, founder of the World Resources Institute, and co-founder of the Natural Resources Defense Council.


Description of the details of the new geological epoch, the Anthropocene, by the recognized authorities on the subject.


An annual report on progress made in specific regions under eight development goals.


A report on employment and potential job creation in several sectors, with recommendations for policymakers, business, and labor. Produced by the Worldwatch Institute in connection with the UN Green Jobs Initiative.


Books


Brown, Lester R. Plan B 4.0: Mobilizing to Save Civilization. New York: W.W. Norton & Company, 2009. Written by the prolific and influential Lester Brown, founder and president of the Earth Policy Institute, founder and former president of the Worldwatch Institute, this is a comprehensive and thoroughly researched analysis of the environmental, social, and economic challenges facing the planet together with a plan for how to address them, which Brown tells us must be done “with wartime speed.”

_____., World on the Edge: How to Prevent Environmental and Economic Collapse. New York: W.W. Norton, 2011. An update of Brown’s Plan B 4.0, this is a comprehensive and thoroughly researched analysis of the environmental, social, and economic challenges facing the planet, with a focus on urgently needed solutions.

© 2014 Margaret Robertson


A detailed and informative look at why an impending global crisis is now unavoidable and at why a global transformation to a sustainable economy is plausible.


A groundbreaking work aimed at economists, business leaders, and policymakers, as well as general readers, that promotes long-term over short-term thinking and systems thinking over siloes. It explores the meaning of natural capital, applies market principles to natural resources, and shows how successful businesses can be simultaneously profitable and environmentally responsible. New editions published in 2008 and 2010.


Revised edition of the 1993 classic about how to bring capitalism and environmental concerns together under one framework.


A clear discussion of the physical limits of the economic growth model by a senior fellow at the Post Carbon Institute whose work focuses on the transition to a resilient, sustainable, post-carbon world beyond the end of economic growth.


This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience. IEA. *Energy for All: Financing Access for the Poor*. Paris, 2011.


A vision for a sustainable approach to economics and human society on a planet with finite resources. Based on the author’s report to the UK government’s Sustainable Development Commission.


Detailed technical analyses of the science of quantifying, modeling, and mapping ecosystem services at a variety of spatial scales, by recognized authorities in the field.


Evaluations of the current state of planetary issues in 2006, including water, energy, climate, biodiversity, population, food, and health, by leading experts in each of those fields.


An essay on the failings of the growth economy and proposals for moving beyond growth.

An updated version of the scientifically rigorous and influential 1972 study by a team of systems analysts, which concluded that if current trends continued, the planet would reach its limits to growth within 100 years.


A detailed overview of the phenomenon in which governments, corporations, and investors with power take land from people without power.


A study of the interactions between human societies and their surroundings and the environmental transformations that resulted. Beginning with hunter-gatherer societies, moving through Sumerian, Egyptian, Mayan, and other settled societies including China and Europe, through the impacts of modern industrialized societies, this environmental history provides a broad but concise overview.


A rigorous and data-driven assessment from one of the three co-authors of the seminal 1972 study *Limits to Growth*. Forty years after the publication of *Limits to Growth*, the author reviews and synthesizes research data from over 30 experts in a range of specialties, from which he develops plausible scenarios for changes in population, consumption, social structure, food, energy, and climate for the next 40 years.


The classic and influential work by British economist Ernest Schumacher that first introduced a general public to the idea that perpetual economic growth is not sustainable.


Three works in the American Crisis series by a leading environmental law expert, detailing the challenges facing the planet and the transitions we must make, including transformations of governance. Speth was the former administrator of the United Nations Development Programme, former dean of the Yale School of Forestry & Environmental Studies, founder of the World Resources Institute, and co-founder of the Natural Resources Defense Council.

An influential work by the former chief economist of the World Bank, sometimes referred to as “the Stern report.” Forecasts the economic and social impacts of climate change; analyzes the benefits of early action on climate mitigation and the considerable costs of not acting.


An introductory overview of a range of topics in the field, available for download.


The authoritative textbook in the field of sustainability science.


*State of the World* reports are edited collections published annually by the authoritative Worldwatch Institute. Each edition explores a different sustainability theme with essays by recognized experts in their respective fields.

**Websites**


Organization dedicated to promoting a steady state economy, with stabilized population and consumption, as an alternative to the economic growth model. Publishes the *Steady Stater Newsletter* and a blog, *The Daly News*.


A nonprofit research, policy and advocacy organization focused on population, reproductive health, empowerment of women, and sustainable development.


Nonprofit organization for research, education, and advocacy related to ecological economics.

*The Economics of Climate Change: The Stern Review.*

[http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_economics_climate_change_w_report.cfm](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_economics_climate_change_w_report.cfm)

Download the entire *Stern Review* here.

An influential work by the former chief economist of the World Bank, sometimes referred to as “the Stern report.” Forecasts the economic and social impacts of climate change; analyzes the benefits of early action on climate mitigation and the considerable costs of not acting.

*Foreign Policy*. Failed States Index. [http://www.foreignpolicy.com/failedstates](http://www.foreignpolicy.com/failedstates)
The Failed States Index is published annually on the Fund for Peace website and in the July/August issue of Foreign Policy magazine. The searchable index can be accessed from either of these websites.

Research institute at the University of Vermont. Fellows, current and past scholars include prominent names in the field of ecological economics.

Nonprofit organization: conducts research on food, poverty, land grabs, trade, and other issues; publishes reports; provides advocacy.

The professional organization for ecological economics. Publishes a research journal, books, and reports, develops educational materials, and holds scientific meetings and conferences.

A viable example of a Genuine Progress Indicator being used by a state government.

Research and advocacy related to land grabs, poverty, climate change, and international aid.


International nongovernmental organization that conducts research and advocacy programs in reproductive health, empowerment of women, and sustainable development.

Website for the Genuine Progress Indicator.


Sustainable Scale Project: Carrying Capacity.

Sustainable Scale Project: Limits to Growth.
The Sustainable Scale Project was a nongovernmental organization providing educational resources, originally launched by ecological economists Brian Czech, Herman Daly, Joshua Farley, and David Batker. Useful information is still available on the website, but the site is not updated.

The international organization which monitors and evaluates population trends. Publishes population projections every two years in the World Population Prospects, with low, medium, and high population projection scenarios.

United Nations Department of Economic and Social Affairs, Population Division.
Location of the United Nations Population Division listed above.

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United Nations Development Programme Millennium Development Goals.
An agreement signed by the member nations in 2000 to cut all forms of extreme poverty by half within 15 years, using a set of 8 goals.

United Nations Development Programme Resource Efficiency.
http://www.unep.org/resourceefficiency/
Works to promote resource efficiency, sustainable consumption and production in developed and developing countries. Formerly known as the Sustainable Consumption Programme.

UNEP describes itself as “the voice for the environment.” Its many programs include environmental assessment, education, and advocacy.

A project of the United Nations Development Programme. An agreement signed by the member nations in 2000 to cut all forms of extreme poverty by half within 15 years, using a set of 8 goals.

United Nations agency to promote reproductive health and empowerment of women.

The population research division of the U.S. Department of Commerce, with databases and interactive graphics on a range of population and demographic subjects.

The U.S. division of the International Society for Ecological Economics (ISEE).

Official population clock from the U.S. Census Bureau. Continuously updated counters show U.S. and world populations.

Facts, data, and other information about global research on shifting investment toward sustainable development.
5. Putting Sustainability into Practice

Further Reading

Articles, Chapters, and Papers


Banerjee, S. “CSR: The Good, the Bad and the Ugly.” *Critical Sociology*, vol. 34 (2008): 51–79. A critique of corporate social responsibility that argues it is still built on a profit model and can be used to deflect criticism and to reinforce corporate power rather than challenge it. The article is a summary of the author’s book by the same name.


Handbook commissioned by UNEP. Describes how to craft a story, bring it to life, and use it to translate theory into practice.

Books


How to use group process and hands-on activities as part of AtKisson’s ISIS method (Indicators, Systems, Innovation, and Strategy). Republished in 2010 with the title *The Sustainability Transformation: How to Accelerate Positive Change in Challenging Times*.


Developing, measuring, and communicating sustainability indicators at a community and regional scale.


Measuring and reporting performance in companies.


An update of Brown’s Plan B 4.0, this is a comprehensive and thoroughly researched analysis of the environmental, social, and economic challenges facing the planet, with a focus on urgently needed solutions.


Useful information about industries and career types. As with any book about careers, some information can go out of date.


Provides detailed and practical guidance for business leaders. Includes a background in sustainability issues and using green business strategies to increase profit.


Tools and strategies for implementing the principles in Esty and Winston’s *Green to Gold*.


Data and detailed explanation of the Ecological Footprint methodology. Data tables and the atlas itself are available for download from the Global Footprint Network website.


A concise but thorough guide to sustainability principles, planning, making the business case, organizational strategies, and implementation for businesses.


A detailed and informative look at why an impending global crisis is now unavoidable and at why a global transformation to a sustainable economy is plausible.

A highly useful, nuts-and-bolts guide to setting up and measuring indicators at the community scale, with examples. Can be ordered from Sustainable Measures; typically not available in bookstores.

Detailed guide to planning, implementing, and reporting sustainability efforts in an organization. Includes details about the planning process itself, together with information about frameworks, assessment and reporting tools, lists, and checklists.

Practical guide for implementing sustainability programs in organizations, with guidelines for various sectors from corporations to nonprofit organizations and government agencies, and for various responsibilities including management, purchasing, information technology, marketing, and accounting.

Descriptions of the work of successful Transition Towns from around the world, with details for communities about how to organize and implement a local Transition initiative.
Examples of approaches to providing food and energy, building local economies, relearning skills, and building community illustrate how the transition to a post-carbon world can be pleasant and joyful.

A handbook for organizing and implementing a local Transition initiative, building and expanding on the 2008 *Transition Handbook*.

Lays out details of a proposed “Green New Deal,” a reimagining of the New Deal that helped bring the US out of the Great Depression, with a focus on diversity and environmental justice.

A book that provides practical strategies for business within the context of a larger framework. Chapters give an overview of green business and consumer demand, examine the question, “how good is good enough?” then evaluate how and whether those efforts can be sufficient to address modern environmental challenges.


A guide to working collaboratively with diverse groups of people in businesses and other organizations in developing more sustainable approaches.

A collection of essays by experts in sustainability and other fields exploring the skills that will be needed in order to survive and thrive through the challenges of the coming century.
Covers a range of sustainability topics including systems thinking, ecological literacy, and transition skills.


**Websites**

The Prince’s Accounting for Sustainability Project. [http://www.accountingforsustainability.org](http://www.accountingforsustainability.org)

Accounting and finance tools for decisionmaking and reporting in businesses and the public sector, established by the Prince of Wales.


Provides research, tools, workshops, and activities to apply systems thinking and collaborative learning to economic, environmental, and social challenges.


Indicators and fact sheets about Europe’s environment.


Provides footprint calculator, data on ecological footprints of countries, research and information on a wide variety of related topics.


The atlas itself.


Detailed sustainability reporting framework, the international standard for sustainability reporting.


The internationally recognized, standardized method for reporting and verifying greenhouse gas inventory data, reporting and monitoring greenhouse gas emission reductions, and validating and verifying inventory and reduction data. Provides calculation tools and reporting protocols.


Professional organization for people involved in sustainability and environmental management, based in the UK.


International Society of Sustainability Professionals (ISSP).


An organization of practitioners in sustainability planning.

Overview and some helpful cautions from the nonprofit Global Development Research Center.

Website that illustrates global trends using clear, attractive displays of data.

An interdisciplinary print and online journal and forum for discussions focusing on sustainable solutions to complex problems from the perspective of whole systems design.

Sustainability Accounting Standards Board. http://www.sasb.org

Sustainable Measures: Sustainability Indicators 101.
http://www.sustainablemeasures.com/indicators
The former consulting firm led by Maureen Hart, now executive director of the International Society of Sustainability Professionals (ISSP). Although the consulting firm is no longer active, its resources remain freely available on the website.

An initiative whose sustainability indicators, developed through community participation, are often cited as exemplars and used as models for others. The program has expanded and now promotes a broad range of community sustainability initiatives and activities.

A project of the United Nations Development Programme. An agreement signed by the member nations in 2000 to cut all forms of extreme poverty by half within 15 years, using a set of 8 goals.

http://www.unep.org/labour_environment/features/greenjobs.asp
A report on employment and potential job creation in several sectors, with recommendations for policymakers, business, and labor. Produced by the Worldwatch Institute in connection with the UN Green Jobs Initiative.

Online community dedicated to research, education, and training about water issues, headquartered in the Netherlands and co-founded by Arjen Hoekstra, creator of the water footprint concept. The website includes water footprint statistics for individual crops and products and water footprint calculators, both quick and in-depth versions, for individuals, corporations, nations, and the world.
6. Climate

Further Reading

Articles, Chapters, and Papers


Arrhenius, Svante. “On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground.” The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, April 1896. The first known warning about climate change, from Swedish chemist Svante Arrhenius who argued that emissions from burning fossil fuels was making the planet warmer and would lead to global climate change.


Summarizes a report by sustainable business advocacy group Ceres.


Crutzen, Paul. “Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?” (essay). Climatic Change, August 2006: 212, 217. Analysis of a potential geoengineering strategy by Nobel laureate Paul Crutzen, who stresses that there are many uncertainties and that geoengineering should be considered only a last resort, used in the likely event that emissions are not reduced enough.


Special report prepared in advance of the 2009 UN Climate Change Conference in Copenhagen. A budget approach to preventing global warming from exceeding the 2°C guard rail thought to be necessary if dangerous climate change is to be avoided, proposing adoption of a binding upper limit on CO₂ emissions.


An opinion piece by leading climate scientist James Hansen, then head of the NASA Goddard Institute for Space Studies, who says that his earlier projections about the impacts of climate change had been too optimistic.


Paper that establishes 350 ppm as the safe limit for atmospheric carbon dioxide concentration.


Article discussing the carbon sequestration potential of biochar.


An analysis of embodied carbon emissions in transportation, energy, water, waste, food, goods, and services, used to quantify carbon footprints of typical U.S. households of various sizes and income levels in multiple locations.


Examines why assessment of risk and uncertainty should be part of the writing and selection of climate policies.


Describes Earth’s most abrupt global warming event that occurred 56 million years ago as a result of greenhouse gases, and describes how its warming rate pales in comparison with the rate of today’s global temperature rise.


A discussion of some geoengineering options.
A Cornell University soil scientist discusses the advantages of using biochar in soil to sequester carbon.

A detailed examination of the science of using biochar in soil to sequester carbon.

An examination of large-scale components of the Earth system that may pass a tipping point, or critical threshold.

Discussion of ways to adapt networks of trade, transport, and production in response to expected impacts of increasingly extreme weather.


A presentation of the realities of climate change for a popular audience, using the device of three numbers “that add up to global catastrophe:” the guard rail of 2°C, the budget limit of 565 gigatons of carbon dioxide, and the amount of carbon already contained in known fossil fuel reserves, 2795 gigatons.

Analyzes probabilities of particular emissions levels and proposes adopting a cumulative budget for carbon emissions.

A global analysis that projects the years in which the climate of each region will permanently shift to a new climate state beyond historical limits. Under a scenario in which greenhouse gas emissions are stabilized, the mean global tipping point will occur around 2069; under a business-as-usual scenario, it will occur around 2047.


The role of governance and political systems in addressing climate change. Reprint of a chapter from Orr’s 2009 book *Down to the Wire: Confronting Climate Collapse.*

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A report on economic modeling and risk assessment commissioned by a coalition of senior political and economic figures in the U.S., funded primarily by three wealthy financiers. Members of both the committee and the funders span the political spectrum from left to right. Economically significant risks forecasted include damage to property and infrastructure (from rising sea levels and storm surges), agriculture, energy, labor, and health.


Discussion of mass migrations that will result from sea level rise, weather extremes, and drought, with three examples of displacements already occurring in Mozambique, Vietnam, and Central America.


A conceptual framework for understanding cuts in carbon emissions needed and strategies for doing so, originally presented in the journal *Science*. The concept of wedges has become familiar and has since been applied in other disciplines.


Annual report on the gap between agreements in international climate accords and scientific reality.


Animations which simulate inundation at various degrees of sea level rise by illustrating areas of low elevation in a blue color.


Comprehensive peer-reviewed interagency report on climate change and its impacts in the U.S., required every four years by U.S. law.


**Books**


Consensus statement issued by leading US scientists following a conference of the National Council for Science and the Environment. Provides a clear description of the science of climate change and approaches for mitigation.


A detailed guide to the steps involved in developing climate action plans.

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A description of the impacts of climate change, documented by high quality photographs from around the world.

An overview of the use of biochar, charcoal made by pyrolysis, for soil fertility and carbon sequestration, including historical background, issues, and benefits.

An introduction to governance and climate change.

Estimates of human and economic impacts of climate change prepared by DARA, an international nonprofit organization focused on humanitarian aid for vulnerable populations of the world affected by conflict and environmental impacts.


A clear discussion of the imminent threat of climate change, with detailed strategies for mitigation.

A comprehensive and accessible explanation of climate change by a highly regarded paleontologist and climate scientist.

A detailed and quantitative handbook for understanding carbon impacts of choices in heating, energy use, travel, and food. Useful for individuals and for sustainability practitioners.

One of a useful series of electronic publications in the Vital Graphics series designed to communicate scientific findings in an accessible format. Communicate concepts clearly using both language and numerous high quality graphics.


Details about the worsening state of global climate, a call to arms by leading climate scientist James Hansen, former head of the NASA Goddard Institute for Space Studies.

This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness.
Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.


A clearly organized and accessible guide to the science of climate change by a meteorologist at the National Center for Atmospheric Research (NCAR).


A thorough and comprehensive textbook on the science of climate change, presented by an atmospheric physicist who was the lead editor of the first three IPCC reports and the co-chair of the scientific assessment working group for the fourth IPCC report.


The definitive peer-reviewed reports on the current state of climate change science.

Summaries and highly detailed reports are available for download from the IPCC website.


A description of climate change by a staff writer at *The New Yorker* with clear and accessible explanations for a popular lay audience.


A rigorous science textbook that explores the details of Earth system science from an interdisciplinary, whole-systems perspective, written by acknowledged experts in the field.

A comprehensive survey of current research, with technical details about the science and economics of biochar.


A detailed and practical guide on how to do climate action planning in a business or other organization.


A colorful and user-friendly guide to climate change for lay readers written by well-known Earth system scientists and amply illustrated with high quality photographs, maps, and diagrams. Although a modestly sized paperback, the quality of information makes it a good candidate for visible displays or coffee tables.


Clear and detailed discussion of the role of cities in reducing dependence on fossil fuels, with strategies for urban structure, sustainable transportation systems, and livable cities.


A lucid and unblinking assessment of the realities of the climate destabilization to which we are already committed, by a leading environmental thinker. Lays out what will be needed in terms of governance and cultural transformation. While presenting a sobering articulation of the unavoidable challenges that await humanity in the decades and centuries ahead, yet also argues for the necessity not for optimism but authentic hope, and examines what that means.


An influential work by the former chief economist of the World Bank, sometimes referred to as “the Stern report.” Forecasts the economic and social impacts of climate change; analyzes the benefits of early action on climate mitigation and the considerable costs of not acting.


A textbook for non-science majors that is both rigorous and clear. The author, a physicist whose research includes astrophysics and climate change, is skilled at making the scientific details of energy and climate change comprehensible.
*State of the World* reports are edited collections published annually by the authoritative Worldwatch Institute. Each edition explores a different sustainability theme with essays by recognized experts in their respective fields.

**Websites**

   Founded by Bill McKibben and dedicated to stabilizing atmospheric carbon dioxide concentrations at 350 ppm.

American Association for the Advancement of Science. “What We Know.”
   An initiative of the nonprofit organization of scientists with the goal of communicating the realities, risks and response to the climate challenge through outreach to scientists, economists, community leaders, policy makers and the public.

   A nonprofit organization based in the UK which shares self-reported greenhouse-gas emissions data for major corporations.

Carbon Trust. [http://www.carbontrust.co.uk/](http://www.carbontrust.co.uk/)
   A company based in the UK that offers consulting and voluntary carbon footprint verification.


The Climate Registry. [http://theclimateregistry.org](http://theclimateregistry.org)
   Sets standards and establishes protocols for calculating and reporting greenhouse gas emissions in North America.

   Carbon offset broker. Assesses, coordinates and facilitates offset projects and programs. Provides education, consulting, and advocacy.

ClimatePrediction.net. [http://www.climateprediction.net/](http://www.climateprediction.net/)
   A cooperative citizen science project led by a team at Oxford University and joined by universities from around the world. Computer models help identify what is likely to happen as the Earth warms. Running climate models requires massive computing power, and signing up allows your computer to run a climate model in background mode at times when it is turned on but not being used at full capacity. You can watch the weather patterns on your model’s version of the world evolve.

   A peer-reviewed collection of online science Earth system science activities for teaching with data, including data sets, analysis tools, and case studies, written for high school and college educators.

   The system for trading greenhouse gas emission allowances in the 28 countries of the European Union plus the three EEA-EFTA states of Iceland, Liechtenstein and Norway.
Research, reports, and advocacy to support the international scientific community through a partnership known as the Earth Systems Science Partnership.
Global Carbon Project provides links to current Internet resources relating to climate change at http://www.globalcarbonproject.org/products/internetResources.htm

Detailed sustainability reporting framework, the international standard for sustainability reporting.

An international certification scheme to ensure that carbon offset projects meet certain quality standards.

The internationally recognized, standardized method for reporting and verifying greenhouse gas inventory data, reporting and monitoring greenhouse gas emission reductions, and validating and verifying inventory and reduction data. Provides calculation tools and reporting protocols.

Hadley Centre for Climate Change. http://www.metoffice.gov.uk/
Climate science research center, a division of the British Meteorological Office.

Intergovernmental Panel on Climate Change (IPCC). http://www.ipcc.ch/
Intergovernmental body under the auspices of the United Nations consisting of hundreds of scientists who work as peer reviewers of existing climate research from thousands of other scientists. The Panel issues very detailed assessment reports approximately every six years.

Large archive of climate data from the U.S. National Environmental Satellite, Data, and Information Service (NESDIS) from NOAA.

Pew Center on Global Climate Change. http://www.pewclimate.org/


One of a useful series of electronic publications in the Vital Graphics series produced by the UN’s GRID/Arendal center and designed to communicate scientific findings in an accessible format. Communicate concepts clearly using both language and numerous high quality graphics.

Includes the Kyoto Protocol.

Links to green purchasing guides through the EPA’s Environmentally Preferable Purchasing program.


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http://www.epa.gov/cleanenergy/energy-resources/calculator.html
Calculator that converts miles traveled or electricity consumed into greenhouse gas emissions and into familiar units: driving a particular number of cars, using a particular amount of gasoline or barrels of oil, using a particular number of tanker trucks’ worth of gasoline, providing energy to a particular number of homes, and growing trees across a particular number of acres for a year. Also converts various greenhouse gases to CO₂e equivalencies.

http://css.snre.umich.edu/facts
One of a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.

http://css.snre.umich.edu/facts
One of a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.

World Glacier Monitoring Service.  
http://www.geo.unizh.ch/wgms/

World Resources Institute. CAIT 2.0.  
http://cait2.wri.org/wri
Climate Analysis Indicators Tool. Greenhouse gas emissions data sets and other indicators related to climate, searchable by country.

World Resources Institute: Climate.  
http://www.wri.org/our-work/topics/climate
Climate facts, data, and information about global research. Includes a link to CAIT 2.0, WRI’s climate data explorer.


World Wildlife Fund Climate Savers.  
http://www.worldwildlife.org/climate/climatesavers2.html
Partnering with corporations to cut greenhouse gas emissions.
7. Water

Further Reading

Articles, Chapters, and Papers


The influential article that described how the accumulated result of decisions by multiple self-interested individuals to maximize their own personal interests leads to the degradation of a public resource.


Part of an authoritative and detailed analysis of significant trends and data on water resources, published every two years.


A survey of modern water scarcity issues by a leading expert on international water issues.

An examination of the possibilities and strategies for achieving a sustainable balance with freshwater in diverse regions of the world.


Books


A method for sustainable site development by a landscape architect and an environmental engineer. The book suggests a system of points similar to LEED and the Sustainable Sites Initiative; readers can choose to study the content without using the point system.


A handbook that explains all of the technical details of designing and installing a rainwater harvesting system for people with little or no technical background.


A thorough guide to best management practices for stormwater infiltration and treatment, with clear explanatory illustrations. The entire manual can be downloaded.


A succinct overview of the world’s freshwater sources, issues, and management strategies, with color diagrams, maps, and data tables that clarify the concepts.


Written by the prolific and influential Lester Brown, founder and president of the Earth Policy Institute, founder and former president of the Worldwatch Institute, this is a comprehensive and thoroughly researched analysis of the environmental, social, and economic challenges facing the planet together with a plan for how to address them, which Brown tells us must be done “with wartime speed.”


A handbook for designers and planners, with explanations of wetland processes, types of wetland systems, technical details for planning and designing, and aesthetic considerations.

A comprehensive and engaging survey of environmental science, with lots of color diagrams, graphs, and photographs.

Explanation of the concept of rain gardens and their benefits, with detailed examples of a range of types, for designers, planners, and interested nonprofessionals.

Technical yet at times lyrical handbook for designers, still the standard manual on stormwater principles and design.

An illustration of how a narrative approach can bring a subject to life for nonspecialists.

A small technical manual on wetlands and watershed planning for designers, planners, and ecologists.

An authoritative and detailed analysis of significant trends and data on water resources, published every two years.


An authoritative and detailed analysis of significant trends and data on water resources, published every two years.

A technical manual for engineers and water conservation technicians.

This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.

Authoritative and thorough discussion of water consumption issues, by the creator of the water footprint concept.

Authoritative and comprehensive overview of the concept of virtual water and how water footprints are calculated at an individual, organizational, and national scale, with strategies for reducing water footprint.

Report on the economic benefits of green buildings, based on a large-scale study of financial analyses, with quantitative answers to the question, “Are green buildings more expensive than conventional?” Written by the chair of the LEED advisory group on Energy and Atmosphere, a former finance director for the US Department of Energy.

Concepts and technical details for designing and installing rainwater harvesting systems.

Concepts and technical details for designing and installing rainwater harvesting systems, with numerous case studies.


A user-friendly and methodical handbook that introduces the concepts of green building design, with diagrams and some technical details, for design students and architects.


Handbook on integrated design of green buildings for architects, with checklists and case studies.


A thorough handbook for using ecological processes to restore self-sustaining streams, for ecologists and planners. Thorough explanations of concepts, restoration techniques, working with groups, choosing alternatives, monitoring and adaptive management, clearly illustrated by color diagrams and photographs. Updated in 2010. Available for download.

A survey of the state of water resources in 30 countries.

A somewhat technical guide to using natural flow patterns and the normal variability of streams to promote healthy, self-sustaining rivers. Includes information about policy and governance.

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An introductory overview of a range of topics in the field, available for download.
A guide to landscape design, installation, and maintenance based on principles of sustainable sites, written by landscape architects.
An introduction to the concepts and processes of Living Machines, a system of wastewater treatment developed by the authors.
A small and useful book, full of color diagrams that clearly explain the principles of stormwater management and low impact development.
Principles of ecology and sustainable site design applied to the small and residential scale, where much of the green fabric of urban areas occurs, by a leader of the Sustainable Sites Initiative.
A detailed handbook for water conservation technicians.
An eloquent assessment of the decline of biodiversity as the ongoing mass extinction progresses, with principles and a plan for saving the diversity that is left, by a renowned biologist.
A comprehensive and engaging overview of environmental science, illustrated by case studies.

**Websites**

A grant-funded consortium of agencies and organizations that advocates for water conservation strategies and water-efficient products.
The organization for water conservation professionals.
A thorough guide to best management practices for stormwater infiltration and treatment, with clear explanatory illustrations.
Center for Watershed Protection. [http://www.cwp.org](http://www.cwp.org)

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A nonprofit organization that provides research; training; direct assistance to state and local governments, watershed organizations, and environmental consultants; and an online library of assessment tools, reports, stormwater manuals and other resources related to watershed protection.

http://www.portlandoregon.gov/bes/64040  
Downloadable manual and extensive appendices dealing with basic principles, policy, design, operations and maintenance, and pollution source controls. Useful reference manual from a city known for its expertise in stormwater management practices.


A three-volume set of manuals. Can be downloaded, or purchased in hardbound format. Volume 1 deals with basic principles and policy, volume 2 with site design, and volume 3 with pollution prevention.

Harvest H2O. http://www.harvesth2o.com/  
Resources dealing with rainwater harvesting.

A consortium of governments, private foundations, international organizations, and researchers.

Low Impact Development Center. www.lowimpactdevelopment.org  
Nonprofit organization. Offers training, consulting, and publications including fact sheets, manuals, and rain garden design templates. Somewhat inactive in recent years.


Online access to selected chapters of The World’s Water, an authoritative and detailed analysis of significant trends and data on water resources, published every two years.


A useful primer on the details of rainwater harvesting at the residential and small commercial scale. Includes description of components, calculations for sizing, installation, and cost.

UN Food and Agriculture Organization (FAO): Aquastat Database.  
Comprehensive, current information about water resources, water uses, dams, and agricultural water management. Includes maps, tables, spatial data, fact sheets, and other data, searchable by country.

One of a useful series of electronic publications in the Vital Graphics series designed to communicate scientific findings in an accessible format. Communicate concepts clearly using both language and numerous high quality graphics.

A project of the United Nations Development Programme. An agreement signed by the member nations in 2000 to cut all forms of extreme poverty by half within 15 years, using a set of 8 goals.

Provides information about water efficiency and conservation, laws, analysis, best management practices, case studies, and links to other resources.

Good source of water efficiency information for residential consumers.

Provides a broad range of information, maps, diagrams, data, and photographs about water, the water cycle, surface and groundwater, water quality, and water use. Some material aimed at K-12 students, but a rich resource for adults as well.

Detailed and comprehensive data, maps, and reports on water resources, groundwater, floods, droughts, streamflow, and water quality for the U.S.

Nonprofit organization offering information and educational programs, with a focus on California and the U.S. Southwest.

Online community dedicated to research, education, and training about water issues, headquartered in the Netherlands and co-founded by Arjen Hoekstra, creator of the water footprint concept. The website includes water footprint statistics for individual crops and products and water footprint calculators, both quick and in-depth versions, for individuals, corporations, nations, and the world.

Comprehensive information on water conservation, efficiency, and demand management for consumers, utilities, and conservation professionals. Maintained by the American Water Works Association (AWWA).


World Resources Institute: Maps & Data. http://www.wri.org/resources
A database of maps, charts, data sets, infographics, and other visual resources based on World Resources Institute’s data and research.

Water facts, maps, data, and information about global research.
8. Ecosystems and Habitat

Further Reading

Articles, Chapters, and Papers


Chapin, F. Stuart, III et al. “Ecosystem Stewardship: Sustainability Strategies for a Rapidly Changing Planet.” Trends in Ecology and Evolution, November 24, 2009: 241–49. Recognizes social-ecological interdependencies of human activities and ecosystem services. Advocates a shift from resource management aimed at maximum or optimum sustainable yield to ecosystem stewardship, whose goal is the capacity to sustain ecosystem services by reducing vulnerability, fostering resilience, and transformation of trajectories. Authors are leading scholars in the field of ecological resilience.


Crutzen, Paul J. and W. Steffen. “How Long Have We Been in the Anthropocene Era?” Climate Change, vol. 61 no. 3 (2003): 251–57. Explanation of how human impact has led to a new geological epoch, the Anthropocene, by the two leading scholars on the subject.


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Research which shows numbers of species in many regions remaining stable yet species composition changing drastically, with novel assemblages of biological communities taking hold rapidly around the globe.

Repairing the modern disconnect between humans and their environments and rethinking human relationships with landscapes.


Wildlife crossings and other strategies to reduce the danger roads pose to wildlife.

Proposes restoration of wetlands to store flood waters, reversing the massive draining of wetlands and building of flood-control levees that exacerbated damage from floods.

Articles about resilience theory, from one of its leading scholars.

Fact sheet about the process of extinction, the factors, the species which are most at risk, and strategies for stopping extinction, with information about the Red List and the IUCN.

Report on efforts to revive dying coral reefs by transplanting corals cultivated in underwater nurseries.

Classic essay on the U.S. Army Corps of Engineers’ monumental but failed attempt to control the Mississippi River through mechanical means. Reprinted from a 1987 issue of The New Yorker.


A rich examination of biodiversity, extinction, interconnectedness, the Earth system, and the rights of nature.
Seminal article on the biodiversity hotspot approach to prioritizing how to spend scarce conservation resources.

Environmental perception research which seemed to demonstrate that humans view nature through a cultural lens which makes them likely to value places with signs of human care and to ignore or modify places without such signs.


Discussion of how social, political, and economic conditions keep us moving in the wrong direction; our efforts to make changes are too small and too disconnected, while the issues we face are systemic and must be solved at a systems scale.


Using the concept of biodiversity hotspots to prioritize efforts.

An examination of the crises of acidification, ocean warming, loss of sea ice, changing marine ecology, depleted fisheries, and pollution in the world’s oceans, with policy proposals for mitigating these challenges.

Description of the details of the new geological epoch, the Anthropocene, by the recognized authorities on the subject.

Discussion of the advent of the Anthropocene epoch and the need to fundamentally alter humanity’s relationship with the biosphere.

Discussion of the scale of human modification of the Earth system, comparison of the Anthropocene and earlier geological epochs, and the implications of formally adopting the Anthropocene as a geological epoch.

Discussion of how a complex system such as a food web can irretrievably flip to a different state, and how models may predict an approaching state change, allowing ecologists to alter the system before it flips and pull it back from the brink.


Examination of the research, ecology, and climate science which underlie Pleistocene Park in Siberia.

**Books**

Apfelbaum, Steven I. and Alan W. Haney. *Restoring Ecological Health to Your Land.*
A practical ecological restoration handbook for nonscientists.

A guide to integrating living systems into the fabric of a city, addressing the innate human need for connection to the natural world. Offers theory together with practical design and planning tools.


Written by the prolific and influential Lester Brown, founder and president of the Earth Policy Institute, founder and former president of the Worldwatch Institute, this is a comprehensive and thoroughly researched analysis of the environmental, social, and economic challenges facing the planet together with a plan for how to address them, which Brown tells us must be done “with wartime speed.” An updated edition of Brown’s earlier *Plan B 3.0.*

A collection of essays by historians and ecologists that examine the concepts of wilderness, environmentalism, and the human place in nature, growing out of an interdisciplinary 1994 seminar, “Reinventing Nature.”

A comprehensive and engaging survey of environmental science, with lots of color diagrams, graphs, and photographs.

Daily, Gretchen, ed. *Nature’s Services: Societal Dependence on Natural Ecosystems.*
Analysis of the social and economic values of ecosystem services, by leading sustainability scholars.

A concise handbook that explains the principles of landscape ecology, based on patches and corridors, with each principle clearly illustrated by a diagram.


A detailed but highly readable history of the North American continent, full of surprising insights, by a highly regarded paleontologist and climate scientist.

A proposal for continental-scale conservation using wildlands networks and corridors.

A survey of the concepts and projects for large-scale migration corridors in the Americas, Africa, and Australia.


High quality science reporting by a staff writer at *The New Yorker,* with ample detail and a clear picture of the magnitude of the ecological change now underway. Although written by a nonscientist for the popular press, the reporting is accurate and the solid bibliography provides sources for further reading.

A thorough and fascinating discussion of the behavior of rivers, appropriate for both scientists and nonscientists, from a leading authority in river morphology.

A report initiated by the United Nations in 2001, synthesizing the work of scientists from around the world into a series of indicators of the health of Earth’s ecosystems.

The standard reference on the subject of wetlands.

A thorough handbook for using ecological processes to restore self-sustaining streams, for ecologists and planners. Thorough explanations of concepts, restoration techniques, working with groups, choosing alternatives, monitoring and adaptive management, clearly illustrated by color diagrams and photographs. Updated in 2010. Available for download.


A thorough overview of habitat loss, conservation, and restoration by a recognized authority.
Although now several years old, this remains the most useful book on stream restoration in urban areas.

An encouraging discussion of ecological restoration, with a focus on accepting the human place in the biosphere, by the author who originated the term “reconciliation ecology.”


An influential paper first published in 1972 in the Southern California Law Review, advancing a legal argument that natural objects should have legal rights. Based on an amicus brief in a lawsuit that reached the U.S. Supreme Court, *Sierra Club v. Morton*.

A book about applications of reconciliation ecology for lay readers by an ecologist, including concepts of native and nonnative species and fundamentals of habitat in residential yards.


The authoritative textbook in the field of sustainability science.

A detailed handbook building on the ideas in *Resilience Thinking*, in which the authors show how resilience concepts can be applied to systems at a range of scales.

An examination of the meaning of nature and wilderness and a discussion of the way forward for environmentalism in an age when no place remains on the planet that has not been touched by humans.


An eloquent assessment of the decline of biodiversity as the ongoing mass extinction progresses, with principles and a plan for saving the diversity that is left, by a renowned biologist.

**Websites**

http://quaternary.stratigraphy.org/workinggroups/anthropocene/
A subgroup of the official body which formally establishes the geological time scale, established to investigate whether a new epoch should be officially designated and, if so, what physical evidence should be used as its marker.


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Also known by its full name, the National Audubon Society. U.S. nonprofit organization
with a mission to conserve and restore natural ecosystems, with a focus on birds and their
habitats.

General informational webpage, with a link to CEPF, the Critical Ecosystem Partnership Fund.

Critical Ecosystem Partnership Fund (CEPF). http://www.cepf.net/resources/hotspots/Pages/default.aspx
Database of the world’s 35 biodiversity hotspots maintained by CEPF, an alliance of
nongovernmental and private sector organizations.

Global organization focused on conserving biodiversity. Maintains a comprehensive global
inventory of the status of species; current data on conservation status and risk of extinction
is maintained in the IUCN Red List of Threatened Species.

The Nature Conservancy. http://www.nature.org/
An international nonprofit organization that works to conserve habitats through land
purchases and by partnering with communities and groups.

Nonprofit organization focused on continental-scale conservation. Programs include
carnivore protection and MegaLinkages, a proposed system of four continental wildlife
movement corridors.

The international organization for conservation professionals and researchers.

The international organization for restoration professionals and researchers.

Research and resources on the governance of social–ecological systems with a special
emphasis on resilience.

Find environmental information on any watershed in the U.S.

A large handbook with information on fish and wildlife habitats for farmers and planners.
The section “Conservation Corridor Planning at the Landscape Level” has details about
principles of landscape ecology, based on patches and corridors, each illustrated with clear
color diagrams.

A thorough handbook for using ecological processes to restore self-sustaining streams, for
ecologists and planners. Thorough explanations of concepts, restoration techniques, working
with groups, choosing alternatives, monitoring and adaptive management, clearly illustrated
download.

World Resources Institute: Maps & Data. http://www.wri.org/resources
A database of maps, charts, data sets, infographics, and other visual resources based on World Resources Institute’s data and research.

Maps, data, and information about global forest health and restoration research.

[http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/](http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/)
9. Pollution

Further Reading

Articles, Chapters, and Papers
A study which compared two similar groups of children, one group exposed to pesticides and the other not exposed. In addition to striking differences in memory and behavior between the two groups, drawings by children who were exposed to pesticides showed a startling inability to draw stick figures.
An analysis of nitrogen fertilizer’s impact on life in the Gulf of Mexico and a detailed proposal to reduce nitrate runoff through restored wetlands.

Books
Technical handbook, for scientists and engineers.
The influential book that alerted the world to the threat of endocrine disruptors.
A comprehensive and engaging survey of environmental science, with lots of color diagrams, graphs, and photographs.
Textbook with thorough coverage of the science fundamentals of environmental engineering.
An accessible, user-friendly guide to recognizing the diverse bacteria around us while learning about how they live, by an authority in microbiology. Helps the reader get to know these remarkable beings beyond abstract pictures in a textbook, getting to know them as living creatures who are part of our local worlds.
Comprehensive introductory textbook for the field of environmental health.

An introduction to concepts of toxicity and pollution. Organization and quality of citations are uneven.


Technical handbook, for scientists and engineers.

Technical handbook, for scientists and engineers.


Detailed and comprehensive textbook on pollution science with ample diagrams, graphs, and data, useful for students of environmental science and environmental engineering.

A practical handbook from a mycologist on the use of fungi in pollution remediation, filtration of runoff, and as an alternative to pesticides.

The influential book that high rates of cancer to high concentrations of toxins in the environment, introducing the public to the concept of cancer clusters.

An introductory overview of a range of topics in the field, available for download.


An accessible examination of chemical hazards from pesticides, fossil fuel emissions, and plastics and the systemic lack of reliable knowledge about these substances, with proposals for moving toward a healthy human environment.

A comprehensive and engaging overview of environmental science, illustrated by case studies.

**Websites**


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The U.S. federal agency that assesses hazardous substances in National Priority List or Superfund sites and hazardous waste storage sites. Conducts research and maintains a database of information about toxic substances.


Conducts research and maintains a database of information about environmental-related respiratory illnesses.


Legislation of the European Parliament which regulates industrial emissions.


Organization established by the Integrated Pollution Prevention and Control (IPPC) Directive. Produces Best Available Techniques (BAT) documents required as part of the IPPC.


A searchable spatial database that allows users to sort by location, demographics, and type of cancer.


A consortium of regional pollution prevention information centers in the U.S., funded in part through grants from the EPA. Centers provide pollution prevention information, networking opportunities, and technical assistance.


The 2001 international treaty that outlaws or restricts persistent organic pollutants such as DDT.


U.S. Environmental Protection Agency (EPA): Pollution Prevention (P2). [http://www.epa.gov/p2/](http://www.epa.gov/p2/)


Information on chemical contamination of ecosystems.

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A database of selected statistics that allows users to sort by location, demographics, and type of cancer.
10. Energy

Further Reading

Articles, Chapters, and Papers

A discussion of the rebound effect proposed by Jevons in 1865, whether efficiency policies are counterproductive, and whether efficiency gains must be balanced with physical caps.

http://www.pnas.org/content/107/37/16054.abstract

An exploration of the science of scale-free networks, a recurring feature of complex systems throughout the biosphere and thus an important concept in systems thinking.

Examines problems and challenges of corn ethanol, the use of cellulose in cornstalks, grasses, and trees, and the extraction of oil from algae.

Clear description of the origins of fossil fuels, with an explanatory color illustration.

Examination of the phenomenon of peak oil.


An energy-efficiency retrofit project in New York City’s most iconic building that saved its owners millions of dollars in energy costs, increased its real estate value, and enhanced the quality of life for building users.

Study conducted by the director of the Harvard Medical School Center for Health and the Global Environment and 11 co-authors that evaluates financial costs of externalities, health...
and environmental hazards at each stage in the life cycle of coal that are external to the coal industry.


A plan to decouple economic growth from resource use and its environmental impact, with policy implications.


Technical discussion of challenges and tradeoffs in the transition to alternative energy, by a scientist at the Lawrence Berkeley National Laboratory with expertise in the energy sector in China.


Analysis of the state of fossil fuel reserves in the U.S. and Canada.


An analysis of how to satisfy global energy demand by 2030 with a mix of wind, solar, geothermal, and tidal power generation sources, with a discussion of costs and problems posed by material shortages.


A brief introduction to the phenomenon of peak oil.


Analysis of the challenges that have slowed efforts to generate electricity from the oceans, including design complexities and the cost of installation in hostile environments.


An examination of the economic and environmental tradeoffs in a range of renewable energy sources, and a discussion of existing solutions to these challenges.


Discussion of the need for a transition to alternative energy, with a comparison of the alternatives.


An annual assessment of reliability, capacity, and security of the power generation and distribution system in the U.S., required by law.


A technical review of the issue of peak oil which concludes that the quantity of fossil fuel which can be extracted economically and profitably is limited and will soon decline.

A discussion of why limiting emissions is not enough; the extraction of fossil fuels must stop in order to prevent disastrous environmental impacts.


A status report issued annually by REN21, a global network of governments, businesses, organizations, and academia focused on a global transition to renewable energy through policy development. REN21 grew out of the 2005 International Conference for Renewable Energies.


A discussion of energy efficiency as a financial opportunity for commercial building owners and investors.


A summary of the evidence in support of Jevon’s Paradox, a discussion of some weaknesses in the arguments, and parallels between these arguments and those used in some areas of discussion in economics.


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A case study of distributed power generation in Denmark, which has led the way globally in distributed power.

A technical paper on the relationships between energy efficiency, energy use, and economic factors.

An exploration of the relationship between the peaking of oil production beginning around 2005 and the global recession which began around 2007.

An examination of ecological economics through the lens of renewable energy issues, arguing that energy should be considered the foundation and most significant driver of the economy.

Books


An accessible explanation of scale-free networks, a recurring feature of complex systems throughout the biosphere and thus an important concept in systems thinking.

A comprehensive and engaging survey of environmental science, with lots of color diagrams, graphs, and photographs.


This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.


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A user-friendly and methodical handbook that introduces the concepts of green building design, with diagrams and some technical details, for design students and architects.


Strategies for reducing energy consumption, replacing fossil fuels, cutting greenhouse gas emissions, and reducing natural resource consumption, from the multiple perspectives of business, technology, and policy.


A book that makes the technical details of energy understandable and shows readers how to use energy data to draw their own conclusions. Written by a British authority on sustainable energy and climate change.


An essay on the failings of the growth economy and proposals for moving beyond growth.


Essential concepts of physics and quantitative thinking made accessible for non-scientists, illustrated with examples from everyday life. Based on a popular course at the University of California, Berkeley.


A large and detailed textbook for students of renewable energy.


Strategies for reducing dependence on fossil fuels through land use decisions, transit-oriented development, public transit, walkable and bikeable streets, high-speed rail, and optimized freight transport, with policy measures.


A collection of case studies of cities which are integrating green infrastructure into the human world.


A selection of works that examine various aspects of energy, from one of the field’s respected and prolific scholars.

An introductory overview of a range of topics in the field, available for download.

The authoritative textbook in the field of sustainability science.


A textbook for non-science majors that is both rigorous and clear. The author, a physicist whose research includes astrophysics and climate change, is skilled at making the scientific details of energy and climate change comprehensible.

Websites
U.S. trade association for the wind energy industry and the standards-making organization for turbine hardware recognized by the American National Standards Institute (ANSI).

Energy standard, from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, that sets energy efficiency requirements for commercial buildings. Updated every three years.

Organization for commissioning professionals.

Resources and information about building commissioning.

Database on State Incentives for Renewables and Efficiency, DSIRE. http://www.dsireusa.org/
A comprehensive list of local, state, federal, and utility incentives which promote renewable energy and energy efficiency in the U.S.

Explains energy topics succinctly, in non-technical language.

Energy Information Administration, EIA. http://www.eia.doe.gov/
Agency within the U.S. Department of Energy charged by Congress with providing energy data, analysis, and projections.

A simplified contracting model to guide building owners and energy managers implementing efficiency measures in collaboration with ESCOs. A joint project of the Building Owners and Managers Association International (BOMA) and the Clinton Climate Initiative (CCI).


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European Commission: Smart Grids.  
http://ec.europa.eu/energy/gas_electricity/smartgrids/smartgrids_en.htm

Documentary for popular audiences highlighting the risks of fracking.

http://grouper.ieee.org/groups/scc21/1547.4/1547.4_index.html
The U.S. standard for interconnection of distributed generation. The introduction of this standard allows islanding, a prerequisite to implementing smart grids.

International Energy Agency (IEA).  
http://www.iea.org/
An intergovernmental organization of representatives from 28 countries of the OECD. Acts as a policy advisor to the member OECD countries and publishes data, projections and analysis in an annual document titled the World Energy Outlook.

National Renewable Energy Laboratory (NREL).
Renewable energy research facility for the U.S. Department of Energy. Conducts research; provides data including wind resource maps and solar resource maps.

National Solar Radiation Data Base.  
http://rredc.nrel.gov/solar/old_data/nsrdb/
Solar radiation and meteorological data through 2010 for the U.S. from the Renewable Resource Data Center of the National Renewable Energy Laboratory (NREL).

http://www.ren21.net/ren21/default.asp
A global network of governments, businesses, organizations, and academia focused on a global transition to renewable energy through policy development. REN21 grew out of the 2005 International Conference for Renewable Energies.

Renewable Resource Data Center.  
http://www.nrel.gov/fredc/
Data, maps, and tools for solar, wind, biomass, and geothermal energy in U.S. locations from the National Renewable Energy Laboratory (NREL).

RenewableUK.  
http://www.renewableuk.com/
Trade and professional nonprofit organization in the UK for wind, wave, and tidal power. Formerly known as the British Wind Energy Association (BWEA).

http://www.rmi.org/Knowledge-Center/ReinventingFire
A research-based initiative of the Rocky Mountain Institute which performs in-house analysis and modeling and proposes large-scale solutions to government leaders, businesses, the military, and others. Categories include Electricity, Transportation, Buildings, and Industry.

http://www.eia.gov/totalenergy/
Links to the Annual Energy Outlook, Annual Energy Review, FAQs, and energy graphs.

http://css.snre.umich.edu/facts
One of a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.

U.S. Department of Energy: Smart Grid Project Information.  
http://www.smartgrid.gov/smartgrid_projects?order=field_total_value_value&sort=asc&category=1

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Information on how to conduct an energy assessment and ways to reduce energy consumption at home, while driving, and at work.
Comprehensive annual report that gives data on energy consumption by country, by fuel type, and by sector and that projects the outlook for energy markets 30 years into the future.
U.S. Environmental Protection Agency: ENERGY STAR. http://www.energystar.gov/
Energy facts, data, and information about global research.
Interactive map and database showing the location, make, model, height, area of turbine blades, and capacity of wind turbines in the U.S. The USGS will use this dataset to study the impact of wind energy on wildlife.
11. Green Buildings and Sites

Further Reading

Articles, Chapters, and Papers


http://www.asknature.org/strategy/8a16bdfd27387cd2a3a995525ea08b3


An essay in landscape theory which argues that ecological landscape design must be high-quality art as well, with some principles for design of such spaces.


http://www.sustainablesites.org/rating-system

A rating system for sites, parts of which have been incorporated into LEED.


The groundbreaking study, often referenced in biophilic design literature, which concluded that patients with views of nature recovered faster than those without, leading to the fields of evidence-based healthcare design and therapeutic garden design.

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Books


A philosophical approach to architecture and design that integrates living process and structures with the design of spaces. One of three in a series of books about architecture: Book 1, The Phenomenon of Life; Book 2, The Process of Creating Life; and Book 3, A Vision of a Living World.


A method for sustainable site development by a landscape architect and an environmental engineer. The book suggests a system of points similar to LEED and the Sustainable Sites Initiative; readers can choose to study the content without using the point system.


A guide to integrating living systems into the fabric of a city, addressing the innate human need for connection to the natural world. Offers theory together with practical design and planning tools.


A guide to planning, design, and restoration of sites with clear explanations of ecological concepts and design principles.


A classic handbook on passive heating, passive cooling, and daylighting using the design of the buildings themselves.


A primer on climate, microclimate, and thermal comfort for design. Communicates principles in clear, accessible language with useful explanatory diagrams.


A comprehensive guide to the selection of materials in the landscape.


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A comprehensive guide to the design and development of sustainable sites, with contributions by some of the experts who also developed the SITES Rating System and Reference Guide.

A guide to the technical details of adaptive reuse of existing buildings based on green building principles with numerous case studies, including but not limited to historic preservation.

A detailed overview of the field of evidence-based design, in which decisions are made based on the best available research evidence.

An innovative, research-based work that brings together aesthetics and ecological design, demonstrating that aesthetics is not superficial but essential to sustainable design.

An explanation of principles of green building for homeowners and builders.

Report on the economic benefits of green buildings, based on a large-scale study of financial analyses, with quantitative answers to the question, “Are green buildings more expensive than conventional?” Written by the chair of the LEED advisory group on Energy and Atmosphere, a former finance director for the US Department of Energy.


A groundbreaking guide to the field of biophilic design, with essays by leading scholars of sustainability and design. Thoroughly covers the theory and science of biophilia and the practice of biophilic design.

A thorough and detailed coverage of the aspects of sustainable design and construction for commercial and institutional buildings, with broad coverage of context, concepts, and practice.

A user-friendly and methodical handbook that introduces the concepts of green building design, with diagrams and some technical details, for design students and architects.

A thorough guide to environmental controls in buildings, with coverage of how to design for passive and active heating, passive cooling, daylighting and to optimize the form and orientation of the building itself.


A concise, simplified study guide for the LEED Green Associate exam, with concepts illustrated by symbolic diagrams.


A step-by-step guide for designers and planners, based on a training program from the National Charrette Institute.


An introduction to the concepts and methods of ecological design, in which landscapes are designed to function using the natural processes of ecosystems.


An early and well-known guide to principles of ecological design in social, physical, and political contexts for designers and planners.


Part of a series on innovative engineering firms, this first volume surveys the work of one U.S. firm. Design concepts for sustainable heating, cooling, and daylighting are illustrated by clear color diagrams.


A classic in the fields of sustainable building and manufacturing, the book explains “why being ‘less bad’ is no good” and proposes two closed-loop metabolisms, a biological nutrient cycle and a technical nutrient cycle.


An outline of the ideas underlying green building design, from the architect who originated the rating system known as the Living Building Challenge.


Handbook on integrated design of green buildings for architects, with checklists and case studies.


Information about energy and mechanical systems for buildings in urban environments.


Theory and practice of designing and operating low-carbon, low-energy buildings for thermal comfort.

Describes the role of buildings in environmental and climate change; provides theory and detailed guidelines for designing and operating buildings and cities in a changing climate.


A discussion of the approaching risks of climate change and how buildings and cities might adapt.


A guide to microclimate and thermal comfort for design, illustrated by numerous historical examples.


A guide to landscape design, installation, and maintenance based on principles of sustainable sites, written by landscape architects.


A small and useful book, full of color diagrams that clearly explain the principles of stormwater management and low impact development.


Principles of ecology and sustainable site design applied to the small and residential scale, where much of the green fabric of urban areas occurs, by a leader of the Sustainable Sites Initiative.


Aerial photographs of modern building practices, contrasted with photographs and watercolors illustrating green, regenerative alternatives. Text is handwritten.


A holistic guide to sustainable buildings and cities for designers and planners that begins with a thorough overview of the principles of sustainability and green building design. Includes case studies.


Green building concepts and terms, primarily arranged alphabetically as in an encyclopedia.

**Websites**


Nonprofit organization with the goal of dramatic reduction in greenhouse gas emissions in the building sector by establishing targets for new construction and renovation. The
American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE).
http://www.ashrae.org
Professional organization of architects, engineers, and technicians with a focus on building systems, energy efficiency, indoor air quality, and refrigeration. Publishes standards and guidelines; conducts research and offers training.
BREEAM. http://www.breeam.org/
BuildingGreen. http://www2.buildinggreen.com/
An organization for building industry professionals. Membership includes a subscription to Environmental Building news; a library of online courses, articles, reports, and webcasts which qualify for continuing education credits; a database of high-performance building case studies; GreenSpec, a product database; and LEEDUser, including checklists, examples, and detailed explanations for all versions of LEED. BuildingGreen Blogs and weekly newsletter are available free of charge.
An energy-efficiency retrofit project in New York City’s most iconic building that saved its owners millions of dollars in energy costs, increased its real estate value, and enhanced the quality of life for building users.
A monthly newsletter for building industry professionals with authoritative information on environmentally responsible design and construction. A publication of BuildingGreen.com and available to members in electronic form. Weekly email newsletter is free of charge.
An organization in Canada working to safeguard migratory birds. Provides education and research about bird-safe design; and rescue and rehabilitation for injured birds.
Life-cycle assessment of building materials in the UK. Includes information about ISO 14001 and BREEAM certification.
A not-for-profit industry organization for green roofs and walls. Provides training courses, separate course manuals, certification, conferences, technical papers, and a quarterly journal.
Nonprofit organization that works to preserve dark night skies to protect wildlife and prevent light pollution. Provides advocacy and education.
A rating system with the goal of moving beyond LEED Platinum toward buildings and sites which are regenerative and sustainable.
A manual for designers, developers, and builders. Categorizes site challenges and provides design strategies in a methodical approach.
Nonprofit organization to foster awareness of noise-related issues. Provides advocacy campaigns, education, and links to related resources.

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A category within the research-based initiative of the Rocky Mountain Institute, Reinventing Fire, which performs in-house analysis and modeling and proposes large-scale solutions to government leaders, businesses, the military, and others. Other categories include Electricity, Transportation, and Industry.

A program that offers evidence-based guidelines and performance benchmarks for designers and planners. Developers of the SITES v2 Rating System and Reference Guide, a rating system for sites, parts of which have been incorporated into LEED.

http://buildingsdatabook.eren.doe.gov/ChapterIntro6.aspx
Statistics on residential and commercial energy consumption in building construction and operation, available online or in downloadable spreadsheets.


Nonprofit organization focused on sustainable building design and construction. Developers of the LEED building rating system.

One of a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.

A program of the National Institute of Building Sciences, with funding from several U.S. government agencies. Provides a portal to a range of building-related information and offers online continuing education courses for designers.

http://www.wbdg.org/resources/swheating.php
12. Livable Cities

Further Reading

Articles, Chapters, and Papers


The introduction to a special issue of the journal *Science*, focused on cities and urbanization.


A report on the transformation of a reach of the Kallang River in Singapore from a concrete drainage channel into a dynamic natural stream system with a people-friendly park.


Incorporating social equity into urban planning.


A look at potential transportation alternatives, including some new uses of technology.


The story of the regeneration of the Mole Hill neighborhood in Vancouver, BC.


[http://www.iclei.org.br/polics/CD/P2_4_Estudos_de_Caso/1_Planejamento_Urbano/PDF106_EC77_Curitiba_ing.PDF](http://www.iclei.org.br/polics/CD/P2_4_Estudos_de_Caso/1_Planejamento_Urbano/PDF106_EC77_Curitiba_ing.PDF)

A study of why Curitiba was successful, from ICLEI—Local Governments for Sustainability.


A survey of the history of urban and exurban sprawl and subsequent trend toward livable, resilient cities.


The role and suggested approaches of government in planning for a post-carbon future.


An analysis of data from various urban areas, which views water, energy, materials, and nutrient flows as metabolism, finds per capita metabolism increasing.
http://insights.wri.org/news/2013/03/developed-nations-must-reduce-emissions-half-2020-says-new-study


Policy approaches for more livable cities.


Partridge, Margaret. “Case Study: Environmental Planning of Dockside Green, Victoria, BC.” First Carbon Solutions, February 12, 2013.
http://info.firstcarbonsolutions.com/blog/bid/263793/Case-Study-Environmental-Planning-of-Dockside-Green-Victoria-BC

A study of an industrial brownfield which was redeveloped into a LEED-ND Platinum neighborhood.


A theoretical examination of ways to link ecology and planning disciplines using “cities of resilience” as a metaphor.


The role of new ways of thinking in addressing urban changes in areas such as the U.S. Midwest, with the Buffalo Commons program as a constructive example.


A background paper prepared by the Thematic Group on Sustainable Cities within the Sustainable Development Solutions Network, an initiative of the United Nations.

Books

An examination of the differences between groups working toward sustainable communities and those working for environmental justice, and the ways they can work together.
A collection of case studies and research on dimensions integrating the natural world into urban settings and establishing connections between humans and nature, illustrated by successful case studies.
A guide to integrating living systems into the fabric of a city, addressing the innate human need for connection to the natural world. Offers theory together with practical design and planning tools.
Historical survey of relationship between cities and nature, with examinations of modern efforts toward more sustainable cities.
A detailed guide to the steps involved in developing climate action plans.
Analysis of the role of cities in energy transitions, including aspects of technology and social equity.
Detailed analyses of a range of transportation policy scenarios, with costs, climate impacts, and other data.
A step-by-step guide for collaborative community process and participation using charrettes.
Principles for smart growth and walkable cities with an emphasis on transportation, particularly streetcars and interconnected road systems.
A still-useful travel guide to sustainability examples in the city of Vancouver.
Design principles and details to create walkable, transit-oriented development for designers, with color illustrations, local code examples, and case studies. Presented in hierarchical order for essential, highly desirable, and worthwhile features.


Research on the role of transportation and urban development in climate change and climate mitigation with technical details about transportation planning, clearly illustrated by color photographs, graphs, and diagrams.


Clear explanations of collaborative community participation processes, with case studies.


Comprehensive overview of the principles of smart growth and sustainable urbanism, by the chair of the LEED for Neighborhood Development (LEED-ND) initiative.


International case studies on urbanization.


A highly useful, nuts-and-bolts guide to setting up and measuring indicators at the community scale, with examples. Can be ordered from Sustainable Measures; typically not available in bookstores.


This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.


Describes how to combine ecology, planning, design, policy, and participatory democracy to create cities that are socially just, healthy, and pleasant for everyone.


The classic and influential work on urban planning, which introduced the ideas of mixed use, walkable streets, and what the author called “eyes on the street.”


A handbook for applying the principles of The Natural Step framework to communities.


A succinct manual for planners and political leaders with an efficient, user-friendly layout. Provides an accessible and comprehensive overview of the implications of climate change and peak oil, and guidelines for preparing communities to thrive in a post-carbon future.

Practical details for implementing sustainable transportation systems and writing public policy, with good coverage of historical precedents.


Clear and detailed discussion of the role of cities in reducing dependence on fossil fuels, with strategies for urban structure, sustainable transportation systems, and livable cities.


A handbook for planning and transforming cities through the framework of integrated water systems, with strategies including wastewater, stormwater, green roofs, permeable paving, stream restoration, transportation, and social equity, illustrated by case studies.


Describes steps in the urban design process, with a focus on sustainability, for designers and planners.


A comprehensive textbook for environmental and watershed planning.


Strategies for reducing dependence on fossil fuels through land use decisions, transit-oriented development, public transit, walkable and bikeable streets, high-speed rail, and optimized freight transport, with policy measures.


An overview of the planning and design processes for water management, and low-impact design, renewable energy power supplies, green streets, and transportation planning, with information about master planning and design guidelines. Illustrated by diagrams and photographs of projects from the author’s design firm.


A collection of case studies of cities which are integrating green infrastructure into the human world.


An introductory overview of a range of topics in the field, available for download.

A comprehensive review of the concepts and methods of transportation demand management.


A technical guide to climate change adaptation for designers and planners.


A beautiful small book with photographs of steel and concrete infrastructure contrasted with watercolors illustrating regenerative visions of the same places embedded in living plants.


An introduction to urban planning theory for livable cities.


A holistic guide to sustainable buildings and cities for designers and planners that begins with a thorough overview of the principles of sustainability and green building design. Includes case studies.

**Websites**


A nonprofit planning and policy program for infrastructure.


The professional organization for U.S. urban and regional planners. Publishes books on planning, conducts research, and provides certification, education, and other resources.


Appendices with research data on travel literature, visual preference surveys, pricing, traffic safety, and transit-oriented development literature, plus an extensive bibliography can be downloaded at [http://www.lib.utah.edu/pedtransit](http://www.lib.utah.edu/pedtransit)

Building Resilient Regions. [http://brr.berkeley.edu/](http://brr.berkeley.edu/)

Assessing and cultivating social resilience. Part of the Institute of Governmental Studies at University of California, Berkeley.


Global network of megacities working toward climate mitigation.


An organization of architects and planners organized around the principles of New Urbanism, documented in their publication *Charter of the New Urbanism*.

Dockside Green. [www.docksidegreen.com](http://www.docksidegreen.com)

An industrial brownfield in Victoria, British Columbia which was redeveloped into a LEED-ND Platinum neighborhood.


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A consortium of worldwide cities, towns, and urban regions. Tools and resources for community resilience and climate action planning.

Masdar City: Masdar City Website. http://www.masdarcity.ae


LEED for Neighborhood Development (LEED-ND). http://www.usgbc.org/leed/nd

Lincoln Institute of Land Policy. http://www.lincolninstitute.edu/

Nonprofit organization focused on land use, regulation, and taxation. Provides research, policy evaluations, publications, training, conferences, and support for demonstration projects.


New York City Street Design Manual.

A comprehensive resource for design standards, guidelines, and policies for the City of New York.

Oberlin Project. http://www.oberlinproject.org/

A partnership among the City of Oberlin, the utility, Oberlin College, and local businesses with the goal of transitioning to a resilient, self-sustaining community based on a green arts district, renewable energy sources, a greenbelt of productive farmland and sustainable forestry, and an educational consortium.

http://oregonencyclopedia.org/articles/land_use_planning/

Article describing the history of Oregon Senate Bill 100, a 1973 land use law designed to preserve agricultural and forest land through urban growth boundaries.


A U.S. non-profit organization that works to transform former rail lines and connecting corridors into a nationwide network of trails.

Smart Communities Network, National Center for Appropriate Technology.
http://www.smartcommunities.ncat.org/

A website that is no longer maintained but that has been kept active, with links to various resources.


A coalition of nonprofit and governmental organizations that serves as a forum for collaboration.

Sustainable South Bronx. http://www.ssbx.org/

An environmental justice organization that works to address economic and environmental issues through a combination of green job training, community greening programs, and social enterprise.

Transportation Demand Management, Victoria Transport Policy Institute.
http://www.vtpi.org/tdm

A detailed and comprehensive resource for efficient transportation planning using transportation demand management, known as the Online TDM Encyclopedia.


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From a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.
Vauban District, Freiburg, Germany. http://www.vauban.de/
See “Transportation Demand Management.”
Reports, data, and other information about global research on smart urban growth.
13. Food

Further Reading

Articles, Chapters, and Papers

   An early essay about the environmental impacts of a meat diet.

   Providing access to healthy food in every community, including disadvantaged neighborhoods, with successful examples from Chicago.


   Discusses problems associated with corn ethanol as a fuel.

   Strategies for low-carbon food, including using organic farming in place of nitrogen fertilizer, using low-energy greenhouses, and growing food close to where it is eaten.

   The inspiring story of the founder of the Watts Garden Club, known as “The Seed Lady.”

CERT (Corporation for Educational Radio and Television). “Food From the ‘Hood.”
   The story of Food from the ‘Hood, a nonprofit organization of high school students in South Central Los Angeles who produce organic food products, learn business skills, and earn college scholarships.

ChangeLab Solutions. “Seeding the City: Land Use Policies to Promote Urban Agriculture.”
   Download at http://changelabsolutions.org
   A nonprofit organization of lawyers, planners, and other professionals which researches and drafts model laws and policies.


A report by the Special Rapporteur on the right to food noting that the existing food system needs urgent reform and promoting agroecology as a sustainable alternative to the existing framework.


Report on a study which shows that transport is a small percentage of greenhouse gas emissions relative to emissions resulting from the production of meat.

http://www.familyfarmed.org/

Food and Agriculture Organization (FAO) of the United Nations. “Food Security Indicators.”
A database of statistics on availability, access, utilization, and stability of food across regions and over time.

http://www.fao.org/ag/magazine/0612sp1.htm

http://www.fao.org/docrep/010/a0701e/a0701e00.HTM
A United Nations report on the serious environmental impacts of livestock, with recommendations for policy strategies to address mitigation.


World Watch Magazine, vol. 23 no. 4 (July/August 2010).

http://www.nxtbook.com/dawson/greenroofs/lam_2010fall/
Special issue focused on urban agriculture, from the journal of the nonprofit industry organization for green roofs and walls.

The story of the Watts Garden Club and an interview with its founder, Anna Marie Carter.

An accessible narrative of the 10,000-year history of agriculture, its modern impacts on the planet, and a proposal for sustainable agriculture.


Pirog, Rich and Andrew Benjamin. “Checking the Food Odometer: Comparing Food Miles for Local Versus Conventional Produce Sales to Iowa Institutions,” Leopold Center for Sustainable Agriculture, Ames: Iowa State University, July 2003. The influential research from Iowa State University from which the term “food miles” originated.


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An analysis of nitrogen fertilizer’s impact on life in the Gulf of Mexico and a detailed proposal to reduce nitrate runoff through restored wetlands.

A report on research suggesting that restoring wild habitat near farms could revive native bee species, of which there are thousands, mitigating U.S. reliance on the domesticated European honeybee and saving the agricultural system from collapse.

Discussion of the triple threats of population growth, food scarcity, and the environmental consequences of food production, and the public policy changes needed to address these challenges, by a leading economist and sustainable development expert.

Download at http://link.springer.com/article/10.1007%2Fs10584-014-1169-1
A study of daily diets in the UK which quantifies the carbon emissions of individual foods and of typical daily diets.


A United Nations report on the serious environmental impacts of livestock, with recommendations for policy strategies to address mitigation.


The story of the Peralta and Northside Community Gardens in Berkeley, California.

Research on the growing impacts of nitrogen pollution from industrial smokestacks, vehicle exhaust, and synthetic fertilizer, with a discussion of mitigation strategies.


Books

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The Growing Communities Curriculum from the American Community Gardening Association (ACGA). This detailed manual for community organizers describes strategies for building community, workshop facilitation, creating a community garden organization, and fundraising, with workshop curricula and handouts. Available from the ACGA.


A thorough discussion of how we provision ourselves, including technical details about social, environmental, and economic food issues together with a range of local solutions from a scholar in the field of sustainable agriculture.


An examination of environmental justice, food security, and sustainable agriculture.


A collection of examples and personal stories, with essays by authorities on the subject of edible landscapes.


An analysis of the cultural value of food, production and consumption, the effects of food production on human health, the effects of food production on the environment, and potential solutions to these issues. Contributors include leading scholars, activists, and political leaders.


Written by the prolific and influential Lester Brown, founder and president of the Earth Policy Institute, founder and former president of the Worldwatch Institute, this is a comprehensive and thoroughly researched analysis of the environmental, social, and economic challenges facing the planet together with a plan for how to address them, which Brown tells us must be done “with wartime speed.”


An update of Brown’s *Plan B 4.0*, this is a comprehensive and thoroughly researched analysis of the environmental, social, and economic challenges facing the planet, with a focus on urgently needed solutions.


An overview of the use of biochar, charcoal made by pyrolysis, for soil fertility and carbon sequestration, including historical background, issues, and benefits.


A survey of successful local food systems in cities around the world.

An examination of the environmental, economic, social, and political issues of global hunger, with a discussion the roles of science, planning, and policy in finding evidence-based solutions.


Details about how to design and implement edible landscapes from an experienced and well-known designer of such spaces.


A manual of permaculture principles and methods, illustrated by diagrams and color photographs.


The influential book about the innovative system of no-till farming, an agroecology approach which produced high yields without pesticides, fertilizers, or tilling.


Detailed accounts of the transformation of Cuban agriculture, written by Cuban researchers who have been participants in this work.


A collection of examples and personal stories, with essays by authorities on the subject of edible landscapes.


This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.


A history of humankind’s relationships with soil and a lyrical description of the processes and ecology of soil.


A report on the varieties of urban agriculture in the U.S., with case studies and detailed guidance for planners.


A discussion of industrial agriculture and a proposal for growing food by working with natural systems in polycultural crops, without tilling, pesticides, or nitrogen fertilizer.


A conversational book for the lay audience with examples of foraging, community gardens, and growing food in unused urban spaces.
A look at the problems of industrial agriculture, with an unambiguous point of view.

A technical examination of a scale of farm often overlooked, neither small nor industrial in scale, often referred to as the family farm.

An updated version of the scientifically rigorous and influential 1972 study by a team of systems analysts, which concluded that if current trends continued, the planet would reach its limits to growth within 100 years.

An overview of environmental and social issues of global food and agriculture, with color diagrams, maps, and data tables that clarify the concepts.

An accessible and thorough history of the relationship between soil health and human civilizations.

A review of the research conducted by the International Development Research Centre (IDRC) on urban agriculture in Africa and Latin America, with a focus on policy. Full text is available for download from IDRC at http://www.idrc.ca/EN/Resources/Publications/Pages/IDRCBookDetails.aspx?PublicationID =327.

An examination of how the food industry influences U.S. policy, law, and governmental programs. The author is a public health and nutrition scholar and former nutrition policy advisor to the Department of Health and Human Services.

A report on the multiple environmental impacts of factory farming, with proposals for alternatives.

A discussion of opportunities for growing food on public land, including parks, rights of way, parking strips, and land around municipal facilities, with examples from around the U.S. Discusses a range of benefits and explores issues of maintenance and aesthetics.

An accessible journalistic investigation of the origins of the food on our plates, an exploration of the food industry, and proposals for alternatives.
A rigorous and data-driven assessment from one of the three co-authors of the seminal 1972 study Limits to Growth. Forty years after the publication of Limits to Growth, the author reviews and synthesizes research data from over 30 experts in a range of specialties, from which he develops plausible scenarios for changes in population, consumption, social structure, food, energy, and climate for the next 40 years.

Photographic survey of urban agriculture from 16 sites across the U.S., with commentary.

A how-to book for gardeners.


A collection of essays by experts in sustainability and other fields exploring the skills that will be needed in order to survive and thrive through the challenges of the coming century. Covers a range of sustainability topics including systems thinking, ecological literacy, and transition skills.

A collection of studies on urban design which incorporates food production.

A detailed and eye-opening look at the ecology of soil.

State of the World reports are edited collections published annually by the authoritative Worldwatch Institute. Each edition explores a different sustainability theme with essays by recognized experts in their respective fields.

Websites
Nonprofit organization of American and Canadian professionals and volunteers who work with community gardens. Provides advocacy, a conference, manuals, reports, model contracts, model land use agreements, and other online resources.

AmpleHarvest.org http://www.ampleharvest.org/
A national database in the U.S. connecting gardeners and nearby food pantries.

Nonprofit organization with resources for urban agriculture, featuring news and examples from around the world.

Community Food Security Coalition (CFSC). http://www.foodsecurity.org/

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   Links to resources for ecological schoolyards.

Edible Schoolyard. [http://www.edibleschoolyard.org/](http://www.edibleschoolyard.org/)
   An initiative for involving students in growing, preparing, and eating food. Offers advocacy, curricula, and other resources.

   Searchable database of statistics related to food and hunger, from the United Nations.


Farm to School Network. [http://www.farmtoschool.org/](http://www.farmtoschool.org/)
   An initiative which works to connect schools with local farms; produce from farms provides local food and educational activities. Offers advocacy and searchable library of case studies and reports.

Food First Information and Action Network. [http://www.foodfirst.org](http://www.foodfirst.org)
   Nonprofit organization, also known as the Institute for Food and Development Policy, provides advocacy, education, research, policy briefs, and other resources related to global food justice and food sovereignty.

FoodForward. [http://foodforward.org/about/](http://foodforward.org/about/)
   Grassroots organization in southern California that finds and distributes excess produce to people in need.

   Online clearinghouse from Ecotrust connecting farmers, ranchers, fishers, wholesale food buyers, food processors, distributors in the Pacific Northwest of the U.S.

Incredible Edible Todmorden. [http://www.incredible-edible-todmorden.co.uk/](http://www.incredible-edible-todmorden.co.uk/)
   A group promoting access to local food in a variety of ways, including community gardens, school gardens, land share, food grown on public land, and food grown in unexpected places.

   Nonprofit U.S. research and advocacy organization that provides support for sustainable agriculture and trade systems through policy and practice.

   Nonprofit organization conducts research on food, poverty, land grabs, trade, and other issues; publishes reports; provides advocacy.

   A well-known garden sharing program headquartered in the UK. In addition to a large registry of landowners and growers, the Land Partnerships program provides information, including the downloadable Land Partnerships Handbook, to help landowners and new farm entrepreneurs work together to create land-based businesses.

Leopold Center for Sustainable Agriculture. [http://www.leopold.iastate.edu/](http://www.leopold.iastate.edu/)
   Research and education center at Iowa State University.

Monterey Fish Market: “Sustainable Fisheries Guide.”
   Illustrated overview of different fishing methods and their impacts.

Not Far from the Tree. [http://www.notfarfromthetree.org/about](http://www.notfarfromthetree.org/about)
Nonprofit organization in Toronto, Ontario that connects tree owners with excess fruit to volunteers who harvest. Food is divided among the tree owner, the volunteers, and community food banks.

A project of the Worldwatch Institute to assess the state of agricultural innovations worldwide, with a focus on sustainability, diversity, and ecosystem health.

People for the Ethical Treatment of Animals (PETA), [http://www.peta.org/](http://www.peta.org/)
International nonprofit organization dedicated to advocating for the rights of animals.

Sample meal plans, menus, recipes, and advice about topics including holidays, restaurant dining, and health.

The farm featured in the book *Omnivore’s Dilemma* and the documentary film *Food, Inc.* Offers tours, education, speakers, and advocacy for sustainable farming.

Portland Fruit Tree Project. [http://portlandfruit.org/](http://portlandfruit.org/)
Nonprofit organization in Portland, Oregon that connects tree owners with excess fruit to volunteers who harvest. Food is shared with volunteers and local food banks. Activities include a Tree Registry, public orchards, and workshops in tree care and food preservation.

A demonstration project comparing organic soil and conventional soil.

A nonprofit garden-sharing organization with programs across Canada for connecting people who want to garden with people who have unused yard space.

Small-plot intensive method of urban gardening website in Saskatoon, Canada.

The agency of the United Nations focused on global hunger.

Program of the United Nations Food and Agriculture Organization focused on enhancing food security, social equity, economic opportunity, and a healthy environment through organic agriculture.

A project of the United Nations Development Programme. An agreement signed by the member nations in 2000 to cut all forms of extreme poverty by half within 15 years, using a set of 8 goals.

One of a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.

Resources related to legal issues surrounding urban agriculture initiatives.

A program that works for food security by promoting the planting of food gardens on unused land in food deserts. A charity adopted by Atlantic Records, with additional support from other corporations and celebrities.

Provides spatial data on food environment indicators including proximity to grocery stores, food prices, food security, obesity rates, demographics, income and poverty, and proximity to recreation. Provides data by county; a related Food Access Research Atlas provides similar data for census tracts.

The program that provides third-party organic certification under the “USDA Organic” label. Issues regulations; offers guidance for producers and information for consumers.

An introduction to soil ecosystems and their role in soil health. Printed copies can be purchased at http://www.swcs.org/

World Resources Institute: Maps & Data. http://www.wri.org/resources
A database of maps, charts, data sets, infographics, and other visual resources based on World Resources Institute’s data and research.

Facts, data, and information about global food and agriculture research.
14. Products

Further Reading

Articles, Chapters, and Papers


An approach to engineering solutions for sustainability with principles applied at the chemical, product, process, and system scales. Authored by a leading scholar in green chemistry and engineering and developer of the well-known 12 Principles of Green Chemistry.


A thorough review of what is included in the Cradle to Cradle certification program, including both positive outcomes and limitations and concerns.


Written by the executive director of the International Society for Industrial Ecology, a highly regarded research scholar in sustainability and industrial ecology.


A story about the Truck Stop Electrification Project in South Bronx.


An examination of the challenges of nonrenewable resource consumption including declining resource quality, rising costs of extraction, rising demand, and scarcity, and the need for a comprehensive effort to create a circular economy for meeting economic needs.

An exploration of possibilities of building on existing systems thinking in order to facilitate innovation. Research conducted at Brunel University for DEFRA, the governmental agency in the UK responsible for policy and regulations on environmental, food, agricultural, and rural issues.

A discussion of industrial ecology by one of the leading scholars in the field.

A review of current state of mining of metals in urban structures, infrastructure, and other products; evaluations of the locations of urban mining stock and processes of recycling; and an assessment of what factors influence rate of recovery.

A detailed discussion of types of certification, processes of competition and selection in the certification marketplace, and the history of forest certification in North America, particularly the FSC and SFI systems.

A history of the Herman Miller company’s programs to implement design for the environment and principles on which those programs are based, with examples of product details.

A description of how engineers were able to reduce the amount of aluminum required in the typical beverage can to its absolute minimum.

A technical exploration of an ecosystem approach for industrial ecology, one that integrates ecology, economics, engineering, thermodynamics, and systems theory.


An introduction to the then-newly launched Sustainability Consortium, a product life-cycle assessment database from a global collaboration of corporations, academics, government agencies, and non-governmental organizations.

One of a useful series of electronic publications in the Vital Graphics series designed to communicate scientific findings in an accessible format. Communicate concepts clearly using both language and numerous high quality graphics.


A discussion of research on how optimizing a product’s lifetime depends upon various replacement motives of consumers.


Parallels between Jevons’ Paradox concerning energy efficiency and the Paperless Office Paradox, with discussion of whether technological advances alone will lead to conservation of natural resources.

**Books**


A consideration of political and social implications of industrial ecology, from one of the leading scholars in the field.


The well-known story of the efforts of the late founder and CEO of Interface to transform the carpet manufacturer into a sustainable corporation. Anderson reported having an epiphany after reading Paul Hawken’s *Ecology of Commerce*. Interface is considered a leader among businesses working toward greater sustainability.


The influential and innovative work that expanded the idea of biomimetics into a design approach that studies nature’s models and uses them to solve design problems.


Technical details of various types of environmental impact assessments in alignment with the U.S. National Environmental Policy Act (NEPA).


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Provides detailed and practical guidance for business leaders. Includes a background in sustainability issues and using green business strategies to increase profit.

An authoritative discussion of DfE, from one of the leading scholars in the field.

An authoritative and comprehensive coverage of industrial ecology, from two of the leading scholars in the field.


Revised edition of the 1993 classic about how to bring capitalism and environmental concerns together under one framework.

A groundbreaking work aimed at economists, business leaders, and policymakers, as well as general readers, that promotes long-term over short-term thinking and systems thinking over siloes. It explores the meaning of natural capital, applies market principles to natural resources, and shows how successful businesses can be simultaneously profitable and environmentally responsible. First edition published in 1999, with a second edition in 2010.

Practical guide for implementing sustainability programs in organizations, with guidelines for various sectors from corporations to nonprofit organizations and government agencies, and for various responsibilities including management, purchasing, information technology, marketing, and accounting.


Guidance on how to approach planning for and designing sustainable packaging as part of a product’s total design, for industrial and packaging designers.

Strategies for reducing energy consumption, replacing fossil fuels, cutting greenhouse gas emissions, and reducing natural resource consumption, from the multiple perspectives of business, technology, and policy.

A classic in the fields of sustainable building and manufacturing, the book explains “why being ‘less bad’ is no good” and proposes two closed-loop metabolisms, a biological nutrient cycle and a technical nutrient cycle.

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Schmidt-Bleek, Friedrich. *Das MIPS Konzept: Faktor 10*. Munich: Droemer Knaur, 1998. The proposal known as Factor 10 from the German Wuppertal Institute for Climate, Environment and Energy which said that humans must reduce their consumption of resources to one-tenth the current levels within a few decades in order to be sustainable.


The proposal known as Factor 4 which said that humans must reduce their consumption of resources to one-fourth the current levels within a few decades in order to be sustainable.


The authoritative textbook in the field of sustainability science.

**Websites**


An open-source database for biomimicry, part of the Biomimicry 3.8 Institute. Biological solutions can be searched by design function.

Biomimicry 3.8 Institute. [http://biomimicry.net/](http://biomimicry.net/)

A nonprofit organization that promotes the study and use of nature’s models. Originally two organizations, the Biomimicry Guild and Biomimicry Institute.


A U.S. partnership of the United Steelworkers Union, the Sierra Club, and 14 of the largest American trade unions and environmental groups, with the triple-bottom-line goal of “good jobs, a clean environment, and a green economy.”


Database from the nonprofit organization Consumers Union to help consumers sort through eco-labels and claims, with eco-labels searchable by product, category, or certifying body.


The website for Cradle to Cradle certification of products.


The nonprofit organization that administers the Cradle to Cradle certification program.


A 71-page handbook from the Minnesota Office of Environmental Assistance, based on a tool developed by industrial ecologists T. E. Graedel and B. R. Allenby.

EcoLabel Index. [http://ecolabelling.org](http://ecolabelling.org)

Global directory of ecolabels.


Third party certification.


Information about the European Union End of Life Vehicle Directive, with links to additional information sources.


Fair Trade certification.


The world’s largest and most recognized fair trade certification and labeling system. Provides the Fairtrade Mark used on Fairtrade-certified products. Also known as Fairtrade Labelling Organizations International (FLO).

Forest Stewardship Council (FSC). [http://www.fsc.org](http://www.fsc.org)

The body that created and oversees the third-party certification for sustainably harvested wood products known as FSC.


A nonprofit organization that researches and promotes sustainable materials management, including chemicals, wood products, and packaging design.
International Organization for Standardization (ISO). http://www.iso.org/iso/about.htm
A consensus-based network of national standards institutes from countries around the world that develops and publishes international standards covering almost every area of modern daily life.


Kalundborg Centre for Industrial Symbiosis. http://www.symbiosis.dk/en
Informational website for the industrial ecosystem in Kalundborg, Denmark. Includes diagrams, animations, video, and an online library of theses and essays about Kalundborg.

A concise summary of principles for sustainable product development and the product life cycle from a top product design firm.

The reuse and recycling initiative from clothing manufacturer Patagonia.

Pharos Project. http://www.pharosproject.net/
A project of the USGBC Cascadia chapter to create a clear graphic product and materials evaluation and labeling tool.

Now known as Upstream. A nonprofit organization working to address the root causes of waste through product-focused environmental policies and governance. Conducts research, develops model policies, and provides education and advocacy.

The third-party auditor responsible for verifying the certification of forests through FSC.

A category within the research-based initiative of the Rocky Mountain Institute, Reinventing Fire, which performs in-house analysis and modeling and proposes large-scale solutions to government leaders, businesses, the military, and others. Other categories include Electricity, Transportation, and Buildings.

Comprehensive list of certification standards.

Society for Environmental Chemistry and Toxicology (SETAC). http://www.setac.org/
SETAC is the primary professional organization connected with LCA. Its website offers detailed technical information, reports, and other publications.

A global-scale collaboration of over 100 of the world’s largest corporations, academics, government agencies, and non-governmental organizations, jointly administered by universities in the U.S. and the Netherlands, with an office in China. The Sustainability Consortium provides a growing set of science-based measurement and reporting systems that can be used by manufacturers, retailers, and consumers to allow them to compare and understand environmental, social, and economic impacts across the entire product supply chain. Participants believe that this index will eventually supersede other product rating systems.


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How a rule devised by UPS engineers called “no left turns” saved 10 million gallons of fuel and 100,000 tons of carbon in its first ten years in effect.

A nonprofit organization working to address the root causes of waste through product-focused environmental policies and governance. Conducts research, develops model policies, and provides education and advocacy. Formerly known as the Product Policy Institute.

U.S. Environmental Protection Agency (EPA), Design for Environment Program.  
http://www.epa.gov/dfe

U.S. Environmental Protection Agency (EPA), Green Chemistry.  
http://www2.epa.gov/green-chemistry
Information about the basics of green chemistry, grant funding, education, and links to additional resources.

U.S. Environmental Protection Agency (EPA), Green Purchasing Guides.  
http://www.epa.gov/epp/pubs/greenguides.htm
Links to green purchasing guides through the EPA’s Environmentally Preferable Purchasing program.

U.S. Environmental Protection Agency (EPA), Life Cycle Assessment Research.  
http://www.epa.gov/ORD/NRMRL/lcaccess
Informational webpages, case studies, and numerous resources for people interested in using or learning about LCA, including both professionals and nonprofessionals.

A global association led by the chief executives of 200 major corporations, working to develop tools and best practices for businesses.

A global network of entrepreneurs established by Gunter Pauli, former CEO of Ecover and president of Worldwatch Europe.
15. Waste and Recycling

Further Reading

Articles, Chapters, and Papers


One of a series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.


A brief introduction to landfill mining in Belgium.


Projections of peak waste under three scenarios and recommendations for mitigation.


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These calculations on U.S. waste and recycling volumes, and the overwhelming percentages that are not household but industrial waste, are difficult to impossible to find elsewhere. They were compiled through research by Makower, a sustainable business consultant and founder of GreenBiz.com.


Platt, Brenda, David Ciplet, Kate M. Bailey, and Eeric Lombardi. “Stop Trashing the Climate.” Institute for Local Self-Reliance, June 2008. www.stoptrashingtheclimate.org/


A report which describes the link between climate change and materials management, the flow of material resources through the economy, as well as climate change and land management, and proposes scenarios to reduce emissions from these areas. Reveals that
choices about production and consumption have larger climate impact than energy use or transportation choices.


A quantitative analysis of production, manufacturing, use, and recycling rates for the global life cycle of iron in various regions, with implications for policy.

Books


The book that is best known for Commoner’s four laws of ecology: Everything is connected to everything else; everything must go somewhere; nature knows best; and there is no such thing as a free lunch.


A thorough investigation of elements of the American infrastructure for lay readers, with color photographs and clear explanations of how systems work; includes resource extraction, dams, water supply systems, farming, fossil fuel extraction, power generation and distribution, communications, roads, railroads, bridges and tunnels, air travel, shipping, and waste and recycling.


This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.


An influential classic, aimed at a wide readership, about human patterns of consumption and waste.


Although a textbook intended for high school readers, provides a thorough overview of how waste management systems work.


A book that provides practical strategies for business within the context of a larger framework. Chapters give an overview of green business and consumer demand, examine the question, “how good is good enough?” then evaluate how and whether those efforts can be sufficient to address modern environmental challenges.

A comprehensive resource for contractors, project managers, and recycling coordinators, providing guidelines and policies for the City of New York.

Detailed and comprehensive textbook on pollution science with ample diagrams, graphs, and data, useful for students of environmental science and environmental engineering.

A readable narrative for general audiences, with a tour through the unseen world of garbage.

An introductory overview of a range of topics in the field, available for download.

**Websites**

A non-governmental organization which monitors the Basel Convention, a treaty to reduce the movement of hazardous waste from industrialized countries to developing countries, and its certification standard for electronics recycling.


Eco-Cycle. [https://www.ecocycle.org/](https://www.ecocycle.org/)
A nonprofit recycling organization headquartered in Boulder, Colorado which operates recycling and Zero Waste programs, provides school programs, and offers publications and online information resources. Operates Eco-Cycle International, a nonprofit consulting and advocacy organization to help communities advocate, plan, and implement Zero Waste systems.

EPEAT. [http://www.epeat.net/](http://www.epeat.net/)
Referred to by its acronym, EPEAT stands for Electronic Product Environmental Assessment Tool. An international environmental rating system from the Green Electronics Council to help purchasers identify environmentally preferable electronics including computers, monitors, printers, copiers, and televisions. Products are evaluated and registered based on recycled content, toxicity of components, and energy use, and manufacturers agree to take back products at the end of their lives.

The certification program for electronics recycling in the U.S.

Statistics on a range of environmental topics for countries in the European Union.

A U.S. consortium of waste reduction activists and recycling professionals that works to promote Zero Waste through advocacy, collaboration, and education. Website provides a broad range of information plus links to recycling and Zero Waste resources from around the country.


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A nonprofit organization that researches and promotes sustainable materials management, including chemicals, wood products, and packaging design.


A list of US and Canadian organizations that recycle fluorescent lamps, maintained by the National Electrical Manufacturers Association (NEMA).

A site with information for making individual efforts and personal progress, recommended by the Zero Waste Alliance.

A nonprofit coalition of U.S. recycling professionals, educators, and consumers.

Online articles, fact sheets, and links to other information resources for reducing waste.


A nonprofit organization working to address the root causes of waste through product-focused environmental policies and governance. Conducts research, develops model policies, and provides education and advocacy. Formerly known as the Product Policy Institute.


A biannual report on waste generation, recovery, and disposal.


A series of two-page factsheets on a range of sustainability topics, produced and updated regularly by the University of Michigan.

Waste Free Oceans. [http://www.wastefreeoceans.eu/about](http://www.wastefreeoceans.eu/about)
An industry led European-wide initiative to clean up European coastal waters.

Worldwatch Institute, [http://www.worldwatch.org/node/1497](http://www.worldwatch.org/node/1497)
Instructions for opting out of unwanted mail.

A nonprofit organization that promotes zero waste in industry and communities through research, consulting, and education including reports, publications, and events.

An organization of environmental professionals working toward zero waste in business, with collaboration from the U.S. Environmental Protection Agency, regional agencies, and a university. Provides Pollution Prevention (P2) planning tools, a materials exchange, and training in P2 and environmental management systems.
16. Working in an Organization

Further Reading

Articles, Chapters, and Papers
A critique of corporate social responsibility that argues it is still built on a profit model and can be used to deflect criticism and to reinforce corporate power rather than challenge it.
The article is a summary of the author’s book by the same name.
Guidance on an approaches to governance and organizational change that will allow organizations to move toward environmental and socio-economic sustainability.
Pearce, Joshua M. and Christopher F. Uhl. “Getting It Done: Effective Sustainable Policy Implementation at the University Level.” *Planning for Higher Education*, vol. 31 no. 3 (March–May 2003).

Books
How to use group process and hands-on activities as part of AtKisson’s ISIS method (Indicators, Systems, Innovation, and Strategy). Republished in 2010 with the title *The Sustainability Transformation: How to Accelerate Positive Change in Challenging Times*.
Bell, Simon and Stephen Morse. *Sustainability Indicators: Measuring the Immeasurable*?
Developing, measuring, and communicating sustainability indicators at a community and regional scale.
A study of Fortune 500 companies which showed that successful companies were learning organizations like living beings.
A guide to using research-based organizational strategies to manage change and lead organizations toward sustainability.
Provides methods for transforming one’s own cognitive patterns and then for fostering change in other people, teams, and organizations.
An optimistic collection of examples from around the world of how individuals, organizations, and communities are putting sustainability principles into practice.


An early work about the sustainability revolution in business, by the British sustainability consultant who invented the phrase, “triple bottom line.” The title comes from a question posed by Polish poet Stanislaw Lec: "Is it progress if a cannibal uses a fork?"


A detailed guide to planning and implementing sustainability initiatives and measuring the results in businesses.


Provides detailed and practical guidance for business leaders. Includes a background in sustainability issues and using green business strategies to increase profit.


Tools and strategies for implementing the principles in Esty and Winston’s *Green to Gold.*


A concise but thorough guide to sustainability principles, planning, making the business case, organizational strategies, and implementation for businesses.


A technical manual of theory and practice of engineering design and development using life cycle analysis.


Detailed guide to planning, implementing, and reporting sustainability efforts in an organization. Includes details about the planning process itself, together with information about frameworks, assessment and reporting tools, lists, and checklists.


Practical guide for implementing sustainability programs in organizations, with guidelines for various sectors from corporations to nonprofit organizations and government agencies, and for various responsibilities including management, purchasing, information technology, marketing, and accounting.


A guide to strategies for planning for the future for planners and community leaders, and individuals, including scenario planning. Illustrated with examples and clear color diagrams.


A thorough handbook of techniques for designing meetings and leading group processes, with examples and guidance on handling facilitation challenges.

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A book that provides practical strategies for business within the context of a larger framework. Chapters give an overview of green business and consumer demand, examine the question, “how good is good enough?” then evaluate how and whether those efforts can be sufficient to address modern environmental challenges.

A guide to understanding and using the voluntary social responsibility (SR) framework contained in ISO 26000. Provides definitions, an overview of content, recommendations for integrating SR into an organization, benchmarking exercises, and case studies.

Case studies of corporations, organizations, and communities who used The Natural Step framework to plan and implement change for sustainability.


Strategic planning to address environmental issues and market demands for businesses.

A rigorous and data-driven assessment from one of the three co-authors of the seminal 1972 study *Limits to Growth.* Forty years after the publication of *Limits to Growth,* the author reviews and synthesizes research data from over 30 experts in a range of specialties, from which he develops plausible scenarios for changes in population, consumption, social structure, food, energy, and climate for the next 40 years.

The story of the evolution of The Natural Step framework and the science and principles behind it, written by the physician who developed it.

The core curriculum for the master’s program, Strategic Leadership towards Sustainability, built upon systems thinking and the principles and strategies of The Natural Step framework.

Detailed discussion of research and theory on innovation: development, decision, adoption, and diffusion, and the role of change agents. Written by the sociologist who first introduced the theory of Diffusion of Innovations in 1962.

A pragmatic guide to facing the difficulties of implementing sustainability and overcoming social, cultural, and psychological barriers to confronting the realities of climate change.


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The classic work on scenario planning, from a central figure in the field.


A guide to working collaboratively with diverse groups of people in businesses and other organizations in developing more sustainable approaches.


A guide to planning and implementing environmental management systems, using ISO 14000 to inform the process.


A thorough guide to implementing a sustainable business plan, with an overview of green business concepts and detailed steps for sustainability planning and implementation.


An analysis of the roles of corporations in exceeding planetary boundaries and the possibilities for transformation, including taxes and subsidies as incentives, regulations on elements such as reserves and capital adequacy ratios, advertising norms and standards, and requiring the reporting of positive and negative externalities in corporate annual reports.


A detailed handbook for using scenario planning in business.


A handbook to help managers make the business case for sustainability, written in the language of business by a former executive at IBM.


An updated version of the original 2002 edition.


*State of the World* reports are edited collections published annually by the authoritative Worldwatch Institute. Each edition explores a different sustainability theme with essays by recognized experts in their respective fields.
Websites

2Degrees. http://www.2degreesnetwork.com/
A global community of individual professionals and businesses sharing information and resources about sustainable business.

Sustainability planning consultants and developers of the International Society of Sustainability Professionals (ISSP). The business is no longer in practice, but links to information booklets and other resources remain available on their website.

A nonprofit organization composed of a network of investors, corporations, and public interest groups working for sustainable business practices and solutions. Founded in 1989 in response to the Exxon Valdez oil spill, co-founders included Denis Hayes, founder of Earth Day, and several investors.

Organization founded by sustainable business consultant Joel Makower and focused on sustainability in business. Newsletters, reports, tools, and a career resource center. Conferences include GreenBiz Forum and VERGE.

Greening Business. http://www.esci.keele.ac.uk/greeningbusiness/
An online teaching resource from Keele University, UK.

Institute of Environmental Management and Assessment (IEMA). http://www.iema.net/
Organization of professional environmental management practitioners. Headquartered in the UK, with members worldwide.

International Society of Sustainability Professionals (ISSP).
http://www.sustainabilityprofessionals.org/
Resources and networking for sustainability practitioners.

Provides training in the Natural Step framework, free toolkits, and other resources in several languages for businesses and communities.

Think tank and consulting firm focused on business leadership in sustainability, cofounded by John Elkington, developer of the triple bottom line concept.

Resources from corporate sustainability consultant Bob Willard. Includes books, worksheets, and slideshows for communicating the business case.

A U.N. initiative that works with companies to implement principles of human rights, labor, environment, and anti-corruption.

www.epa.gov/ems/
Explains the basics of environmental management systems, their costs and benefits, information about implementation, and an introduction to ISO 14001, with links to training and other resources.

U.S. Environmental Protection Agency (EPA): Green Purchasing Guides.
http://www.epa.gov/epp/pubs/greenguide.htm
Links to green purchasing guides through the EPA’s Environmentally Preferable Purchasing program.

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A CEO-led coalition of international companies focused on business and sustainable development. Originated at the 1992 U.N. Earth Summit held in Rio de Janeiro, Brazil.
Facts, data, and other information about global research.
17. Education: Preparing a New Generation to Live Well in a Changing World

Further Reading

Articles, Chapters, and Papers


An initiative from the U.S. Green Building Council whose vision is that by 2040 all students are able to integrate environment, economy, and equity and are able to apply systems thinking to problem-solving and decision-making. Identifies key actions, each illustrated by case studies, and includes an implementation timeline.


A quiz that tests place-based knowledge, often used in design and environmental studies programs as a way to stimulate bioregional thinking.


Describes how one child’s question—“But what can we do?”—resulted in a watershed education program based on learning by doing, which then grew into a network of educators, scientists, and community members with experiential restoration projects across a four-county region.


A guide to planning and implementing a campus-wide strategy of sustainable landscapes and green buildings using LEED certification as a framework, with guidance on participation, communication, and campus as curriculum. Developed through the USGBC’s Center for Green Schools.


Discussion of how social, political, and economic conditions keep us moving in the wrong direction; our efforts to make changes are too small and too disconnected, while the issues we face are systemic and must be solved at a systems scale.
A summary of the framework for educating for environmental and sustainability literacy in higher education.

An essay on how universities of the world are responsible for the knowledge which has resulted in environmental degradation, and how they must transform to become part of the solution.


Panel discussion among five faculty who have taught Introduction to Sustainability courses, from the 2012 Association for the Advancement of Sustainability in Higher Education conference.

A strategy document that explores the integration of sustainable building principles into the higher education curriculum for all students. Identifies core concepts, provides a flow chart of action steps, and offers case studies.

An overview of the principles of place-based learning and learning by doing practice at the Center for Ecoliteracy and described in Stone and Barlow’s books Ecological Literacy and Smart by Nature.

A survey of commonalities in learning outcomes for education for sustainable development: systems thinking, diversity of perspectives, critical thinking, attitudes and values, and skills for change agents.

The role of community colleges in developing knowledge and skills necessary for the transition to a post-carbon world.
Books

A series of case studies from U.S. colleges and universities.

Strategies for infusing sustainability into operations in higher education.

A guide to designing and building natural play areas and school grounds that function as outdoor classrooms, with color illustrations and numerous examples.

This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.

The meaning of place in education, place-based learning, and the design of places for learning, written in the language of educators.

A detailed survey of the theory and concepts of biophilia, from the field’s primary developer.

The original classic explication of the Biophilia Hypothesis, with chapters by its leading scholars.

A groundbreaking guide to the field of biophilic design, with essays by leading scholars of sustainability and design. Thoroughly covers the theory and science of biophilia and the practice of biophilic design.

An early resource for implementing sustainability on college and university campuses.

An influential book that popularized the concept of natural play environments for lay audiences. Details the benefits of childhood interaction with nature and immersion in natural settings.

An exploration of the restorative power of the natural world and its benefits for cognition, health, economies, and communities, written for lay audiences.

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A survey of the history of higher education, an examination of how it can evolve, and its role in facilitating the transition to sustainability.

David Orr is a significant figure in education for sustainability. A professor at Oberlin College, he is the founder and executive director of the visionary Oberlin Project, a prolific author, sought-after speaker, and winner of numerous honors. Dr. Orr is a tireless, passionate advocate for ecological literacy in education whose writing is articulate and literate.

An examination of the structure and pedagogy of the UK college, some of whose visiting professors are leading figures in the world of sustainability.


A detailed look at planning and implementing climate action plans and sustainability initiatives in higher education.


A re-issue of Snow’s influential 1959 lecture on the division between the humanities and the sciences which argued that a rigid division between disciplines was a major obstacle to solving global problems.

The practice and pedagogy of place-based learning.

A collection of essays by experts in sustainability and other fields exploring the skills that will be needed in order to survive and thrive through the challenges of the coming century. Covers a range of sustainability topics including systems thinking, ecological literacy, and transition skills.

A discussion of education that points the way toward learning by doing, illustrated by numerous successful examples. Presents strategies for greening the campus, infusing
sustainability into the curriculum, conducting environmental audits, learning through food, and transforming schools into models of sustainable community.


A robust approach to education built on systems thinking, that is, becoming ecologically literate. Edited by the director and senior editor at the Center for Ecoliteracy in Berkeley, California.


A report on a comprehensive study of U.S. interdisciplinary programs and degrees.


The theoretical and conceptual framework of the role of learning gardens in sustainability education. Includes an emphasis on the importance of soil.


*State of the World* reports are edited collections published annually by the authoritative Worldwatch Institute. Each edition explores a different sustainability theme with essays by recognized experts in their respective fields.

**Websites**

Adam Joseph Lewis Center for Environmental Studies, Oberlin College, Ohio. [http://www.oberlin.edu/ajlc](http://www.oberlin.edu/ajlc)

An early exemplar of environmental design, designed by a team of students and designers and led by Cradle-to-Cradle architect William McDonough, a zero energy building that treats its own wastewater.

American College and University Presidents’ Climate Commitment. [http://www.presidentsclimatecommitment.org/](http://www.presidentsclimatecommitment.org/)

An agreement signed by several hundred U.S. college and university presidents, agreeing that their institutions will measure and report their greenhouse gas emissions, develop and implement action plans for becoming climate neutral, and make climate neutrality part of their curriculum.


An association of colleges and universities in the U.S. and Canada offering research, workshops, conferences, newsletters, an online resource center, and the Sustainability Tracking, Assessment & Rating System (STARS), a sustainability reporting tool used by institutions of higher education.


A program that works to protect wildlife and habitat on campuses through educational events, resources, and campus wildlife habitat certification.


A nonprofit organization that works to advance education for sustainable living through initiatives in school food, habitat, and curriculum, including the initiative “Smart by Nature: Schooling for Sustainability.”

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Center for Place-Based Learning and Community Engagement. [http://www.promiseofplace.org/](http://www.promiseofplace.org/)
A public-private partnership centered in New England that works to advance place-based learning through research, technical assistance, and advocacy.

A peer-reviewed collection of online science Earth system science activities for teaching with data, including data sets, analysis tools, and case studies, written for high school and college educators.

Links to resources for ecological schoolyards.

Global Learning and Observations to Benefit the Environment (GLOBE).
[https://www.globe.gov/](https://www.globe.gov/)
A worldwide hands-on, primary and secondary school-based science and education program which allows students, teachers, and scientists to collaborate on research, in partnership with NASA, NOAA, and the NSF Earth System Science Projects.

Green Schools Initiative. [http://www.greenschools.net/](http://www.greenschools.net/)
A nonprofit organization that works primarily through volunteer effort to reduce the environmental footprints of schools.

A magazine for K-12 educators.

Access the book, additional chapters, and additional information related to learning and thriving in the world of the coming century.

Mary E. Silveira Elementary School, San Rafael, California: school-wide jobs.
A school where students can choose to participate in the work of operating and caring for the school, its programs, facilities, and grounds.

See “Campus Ecology.”

A program that promotes the importance of the natural environment in childhood learning, through research, education, design, and outreach.

A nonprofit organization that promotes sustainability in higher education learning and practice.

Students and Teachers Restoring a Watershed (STRAW).
[http://www.bay.org/watershed_education.htm](http://www.bay.org/watershed_education.htm)
A watershed-education network of educators, scientists, and community members with experiential restoration projects for children across a four-county region.

[http://www.warren-wilson.edu/work/](http://www.warren-wilson.edu/work/)
A program in which every student of the college is assigned to work crews engaged in the operation of the college in return for a credit toward tuition costs.

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18. Working as Agents for Change

Further Reading

Articles, Chapters, and Papers


An examination of the marginalization or even evictions of indigenous peoples as a result of conservation activities, and various initiatives and policies that work to protect and respect indigenous peoples and their practices.


Discussions of constructive and realistic approaches to being agents of change, by a senior fellow of the Worldwatch Institute.


An exploration of the science of scale-free networks, a recurring feature of complex systems throughout the biosphere and thus an important concept in systems thinking.


A discussion of sustainable development, what it means, and whether it is possible.


A revealing look at how Elkington came to coin the now-famous term, ‘triple bottom line.’


A report on the discussions of a program for encouraging public participation in the debates at Rio+20.


A look at constructive responses and community resilience in the face of disasters, increasingly relevant in planning for climate displacements, resource depletion, and other dislocations in a destabilized era.


An essay on making processes visible and letting them speak for themselves as a way of communicating.


A scholarly examination of greenwashing with visual imagery.


An encouraging overview of ways that communities can lead the transition to a post-carbon world, from the leading voice of the Transition movement.


An innovative look at how to foster an intimate connection to place and to the biosphere, from an independent scholar who was one of the early voices of deep ecology.


An article for nonscientists from a cognitive linguistics scholar who studies how the language and metaphors we use can reframe environmental and social issues.


A discussion of the fundamentally political nature of sustainability challenges and strategies for governance.

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A discussion of the proportionally small impact of individual behavioral choices and the necessity of moving beyond personal behavior to broad, societal restructuring.

A discussion of the belief that environmental degradation is the product of individual shortcomings that can be countered simply by different individual choices in consumption, with a scholarly analysis of the fundamental necessity for collective political action.


An essay on preparing students for the inevitable turbulence in the transition to a post-carbon future.

A discussion of the characteristics of effective flexible governance.

A discussion of the application of resilience theory in ecosystems to social systems.

An examination of why pessimistic environmental narratives as well as those that offer only causal connections are not sufficient to bring about social change. Proposes frameworks for narratives with a positive focus that result in action.


A discussion of the essentially political nature of the sustainability challenges in the “long emergency” that lies ahead, and an analysis of the characteristics of governance that will be needed.


Sanjayan, M.A. “Seaworthy Semantics.” Nature Conservancy, Summer 2010: 8. The story of how using the words “fish banks” instead of “marine resources” helped Indonesian fishers understand the merits of the idea.


Books


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An overview of the field of Big History, an academic discipline which examines history over long time scales and through multiple disciplines, incorporating cosmology, geology, biology, and human history into a single narrative.


A rigorous examination of the role of communication in influencing perception and behavior.


Provides methods for transforming one’s own cognitive patterns and then for fostering change in other people, teams, and organizations.


Methods for creating narratives for impactful presentations.


An optimistic collection of examples from around the world of how individuals, organizations, and communities are putting sustainability principles into practice.


A thorough introductory overview of the principles, theories, and approaches of environmental governance, illustrated with a broad range of examples from around the world. Governance plays a central role in fostering collective action and maximizing participation by diverse stakeholders in the steering of society, and the environment within which it is embedded, toward a more sustainable future.


Clear explanations of collaborative community participation processes, with case studies.


A collection of case studies in North America, examining green building, livable communities, and social justice,


A detailed and informative look at why an impending global crisis is now unavoidable and at why a global transformation to a sustainable economy is plausible.


A detailed and quantitative handbook for understanding carbon impacts of choices in heating, energy use, travel, and food. Useful for individuals and for sustainability practitioners.

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A scholarly survey of indigenous spiritual traditions and the challenges facing modern indigenous communities. One of a series of volumes on Religions of the World and Ecology, from the Harvard Center for the Study of World Religions.

Theory and practice of interpretation for museums, parks, and exhibits, based upon research in cognitive psychology, neurology, communication, and pedagogy.

A survey of the emergent worldwide movement for social and environmental change at a range of scales.

This thoughtful collection of papers by recognized experts is one of the clearest and most comprehensive books on sustainability issues, potential solutions, and interconnectedness. Topics include sustainability concepts, climate, water, biodiversity, food, population, culture, energy, economics, cities, transportation, waste, health, education, and resilience.


Descriptions of the work of successful Transition Towns from around the world, with details for communities about how to organize and implement a local Transition initiative. Examples of approaches to providing food and energy, building local economies, relearning skills, and building community illustrate how the transition to a post-carbon world can be pleasant and joyful.

A handbook for organizing and implementing a local Transition initiative, building and expanding on the 2008 *Transition Handbook*.

Building on concepts from the Transition movement, this book discusses how communities can expand actions for positive change into mainstream life: how to get organized, what to choose to do, and how to reach across cultural divides, illustrated by successful examples from around the world.

A thorough handbook of techniques for designing meetings and leading group processes, with examples and guidance on handling facilitation challenges.

Collection of important essays by the twentieth century ecologist and writer, influential in the field of environmental ethics. The essay “Thinking Like a Mountain” describes how his killing of a wolf changed his worldview. “The Land Ethic,” his best-known essay, explores
the idea of ethics as a process of ecological evolution and extends the concept of the intrinsic rights of nature to the land itself.


A revised edition of the classic handbook on the work of social marketing: fostering behavioral change toward sustainability.


A survey of community-based social marketing methods, illustrated with case studies.


An essay on the failings of the growth economy and proposals for moving beyond growth.


A scholarly textbook of ecolinguistics, for linguists.


An optimistic, can-do book for the popular press that nevertheless offers useful examples from young writers who have been successful at finding ways to make a difference.


A rigorous and data-driven assessment from one of the three co-authors of the seminal 1972 study *Limits to Growth*. Forty years after the publication of *Limits to Growth*, the author reviews and synthesizes research data from over 30 experts in a range of specialties, from which he develops plausible scenarios for changes in population, consumption, social structure, food, energy, and climate for the next 40 years.


A classic handbook for planning and leading participatory community design.


A discussion of globalization and social justice issues, with proposed solutions through peace, equity, inclusion, and reclaiming the commons.


A thorough guide to collaborating, researching, and writing public policy within a democratic political process.


Encouraging for lay readers concerned about potential future turbulence in the post-carbon years, this book provides insights into spontaneous altruism, self-organization, and constructive collective human behavior that arise under stressful conditions.


Guidance on ways to live more sustainably for individuals who want to make changes at a personal scale.


An examination of how culture and language in particular affect human relationships with animals and the natural world, by a scholar of ecological linguistics.


A collection of essays by experts in sustainability and other fields exploring the skills that will be needed in order to survive and thrive through the challenges of the coming century. Covers a range of sustainability topics including systems thinking, ecological literacy, and transition skills.


Discussion of the studies of young children and great apes that indicate an innate ability to cooperate, with implications for collective learning.


Handbook commissioned by UNEP. Describes how to craft a story, bring it to life, and use it to translate theory into practice.


Technical examination of a framework for collective governance at local and global scales.


*State of the World* reports are edited collections published annually by the authoritative Worldwatch Institute. Each edition explores a different sustainability theme with essays by recognized experts in their respective fields.
Websites

   A nonprofit organization providing legal expertise in support of local self-government and the rights of nature.

   Description of a series of interactive rituals developed by Joanna Macy and John Seed.

   A collaboration of global organizations with a focus on agriculture, community, resilience, and green infrastructure, organized around the principles of the Earth Charter and Agenda 21.


   An international network and online forum that promotes scholarly discourse and public awareness focused on transition to a sustainable future. Launched in 1995 with support from United Nations agencies and the Stockholm Environment Institute.

   A consortium of worldwide cities, towns, and urban regions. Tools and resources for community resilience and climate action planning.

International Association for Public Participation (IAP2). http://www.iap2.org/
   An association of practitioners that promotes public participation. Provides training programs, manuals, tools, journals, research, and reports.

   The Great Turning initiative deals with the transformation from an industrial growth society to a more sustainable civilization. Dr. Macy conducts workshops for personal and social change.

Mr. Green. http://sierraclub.typepad.com/mrgreen/
   Sponsored by the Sierra Club. Bob Schildgen, former managing editor of Sierra magazine, provides answers to questions submitted by individuals wanting to make more sustainable choices.


   An organization of 30 leading experts in a range of social and scientific fields working to lead a transition to a resilient, equitable, and sustainable post-carbon world. The website is a rich source of articles, reports, blogs, videos, and other resources.

   Most of the chapters from The Post Carbon Reader are available for download from the website of the Post Carbon Institute.

   A project of the Post Carbon Institute. A clearinghouse of information on resilience and a network of other groups oriented around building community resilience.

   Peer-reviewed interdisciplinary journal focused on solutions, founded by leading sustainability thinkers Robert Costanza, David Orr, Paul Hawken, and John Todd; the editorial board is a who’s-who of other leading thinkers. Primarily distributed online, with open access; print subscriptions also available.

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Sustainable Communities Online.  http://www.sustainable.org/
  A website for sharing information about community initiatives.

The Future We Want.  http://www.futurewewant.org
  Initiative launched by the United Nations in connection with the 2012 Conference on
  Sustainable Development (known as Rio+20).  Online sharing community to help people
  envision what a sustainable future could be like, using the power of stories and visualization.

  Information about a wide array of initiatives and activities of Transition Towns and other
  Transition groups from around the world.  Examples include community food networks,
  exchanges, and energy descent plans.

  The website of one the first and most successful Transition Towns in the global Transition
  Network.

  http://www.grida.no/publications/vg/
  A useful series of electronic publications in the Vital Graphics series designed to
  communicate scientific findings in an accessible format.  Communicate concepts clearly
  using both language and numerous high quality graphics.

  Facts, data, and other information about global research on environmental governance.

  A site for sharing information about design, products, and daily life.