



Sustainability 101

Sustainability: Its Purposes, Challenges and Requirements

Essential Question: How do we create a society and economy that is aligned with the ecological systems of Planet Earth?

The Big Idea: Think about your day so far today. Let's assume you woke up, took a shower, got dressed, made a cup of coffee, ate breakfast, checked your email on your smartphone, and got in the car to head to work or school. Have you ever thought about the "behind the scenes" of all these routine activities? Where did the water come from for your shower? What kind of fuel heated the water? Who grew your coffee and what are their working conditions like? How about the milk for your cereal—what are the laws that regulate its production? Your smartphone seems completely removed from nature, but where did all of those components inside the phone come from? What happens to the gasoline after it is burned to power your car to work?

Investigating these types of questions is the entry way into understanding sustainability. As we will see, seemingly mundane activities are embedded in webs of relationships with the Earth, materials, energy, plants and animals, and people all over the world. Sustainability is a way of thinking that allows us to get under the surface of things and see connections in enlightening and sometimes surprising ways.

Key Topics:

- What is sustainability?
- The triple bottom line
- Why is sustainability important?
- Myths and misconceptions about sustainability
- Sustainability as an adaptive practice: context and scale
- The participatory sustainability movement

Human's Ecological Footprint

Essential Question: How has human impact on ecosystems changed over time through the early stages of civilization development to today's industrialized and growing societies?

The Big Idea: Many civilizations of the past were unaware of threats to their existence until it was too late. For the first time in human history we have a remarkably clear picture of the sobering challenges we face: climate change, species extinction, deforestation, resource depletion, and widespread economic inequality. By 2050, Earth will be host to between 9 and 10 billion humans. With a population of this size and with growing per capita resource use, humanity has a large and increasing impact on the ecological systems on which it depends. This unit explores the concept of ecological footprint: a measure of human resource use and pollution, compared with the Earth's capacity to regenerate, called biocapacity. When we use ecological footprints to compare different modes of living, it can point the way towards a sustainable society.

Key Topics:

- The ecological footprint concept
- Emergence of modern humans and the development of agriculture
- Impacts of population growth on global ecosystems
- The Industrial Revolution
- Variations in ecological footprint
- Climate change and carbon footprints
- Other global challenges

Primary Sustainability Issues: Energy, Food, Water, and Pollution

Essential Question: What are the primary ways in which impact measurements are useful tools and what are the long-term effects of human ecological footprints?

The Big Idea: Several sustainability issues stand out for their vital importance to humanity: energy, food, water, and pollution. All sustainability initiatives intersect directly or indirectly with these areas. A great deal of the day-to-day work of sustainability is focusing on making these focus areas work better for people and fit into the ecological systems of the planet. Transforming them is presenting enormous challenges, but people around the world are dedicated to improving energy, food, water, and industrial systems, and creating a more sustainable society.

Key Topics:

- The central role of energy
- Sustainable agriculture
- Freshwater resources
- Industrial pollution and toxins

The Global Ecosystem

Essential Question: How are the Earth's systems connected and why is it important to understand the concept of interdependency?

The Big Idea: Creating a sustainable society and economy means understanding how human civilization is embedded within, and dependent upon, the natural environment. The science of ecology teaches us to look at connections—between parts of the Earth as well as between the Earth and human civilization. Ecology and sustainability are integrating frameworks that tie together ideas, such as the environment, energy use, and economics, that are often considered in isolation. In this unit, we will investigate natural systems, how they support human activities, and how sustainability teaches us to see parts in terms of their connection to whole systems.

Key Topics:

- Our planet in context
- The Earth as a system: biogeochemical cycles
- The importance of ecosystems
- Sustainability as an integrating concept: STEM application

The Importance of Biodiversity

Essential Question: Why is biodiversity an important feature of healthy, vibrant ecosystems?

The Big Idea: Just like cities full of people, businesses, and transportation networks, ecosystems depend on life-supporting cycles of energy and nutrients. Similarly, cities and ecosystems both depend on diversity: a wide range of services, occupations, and infrastructure in cities; and a range of species, biological “jobs,” and ecological services in ecosystems. This unit explores the biocentric viewpoint of sustainability, which values biodiversity as a primary measure of ecosystem health. Currently, human activity is decreasing global biodiversity by driving the extinction of many species. An understanding of biodiversity, threats to biodiversity, and tools for protecting biodiversity is essential to creating sustainability that is successfully aligned with natural systems.

Key Topics:

- Where does life exist? defining the Earth’s biosphere
- Biodiversity as nature’s risk management tool
- The benefits of biodiversity to humans
- The biodiversity crisis: tropical forests and oceans
- Biodiversity threats and protection strategies

Sustainable Development: The Social Challenges

Essential Question: How does society and governance contribute to sustainability and what are the essential elements of quality of life for people?

The Big Idea: Moving from the environmental perspective, the second pillar of sustainability is social equity: sharing the benefits of economic growth within and between nations and providing opportunities for all people to live productive lives. This goal is equivalent to **sustainable development**, which aims to meet humanity’s present needs while not jeopardizing the ability of future generations to meet their needs. Severe global inequities in income, education, and access to healthcare and resources are primary challenges that we must overcome in order to create a sustainable world. Additionally, inequality needs to be understood in the context of overall global population and economic growth. Finally, the challenge of sustainable development is not solely the role of governments, but rather the responsibility of all global citizens.

Key Topics:

- What is sustainable development?
- Global inequities in all dimensions of sustainability
- Population growth, energy use, and sustainable development
- Health and sustainability
- Sustainability, society, and social change

The Economics of Sustainability: Part I

Essential Question: How are traditional economic systems limited to encouraging sustainability on global, regional and local scale?

The Big Idea: Understanding economics is integral to understanding sustainability. The prefix *eco*, derived from the ancient Greek word for “house,” is the base of the words “economics” and “ecology.” Both disciplines study the behavior of systems and relationships between parts of systems. However, the current global economic system operates in ways that discount ecological relationships or health, and it is marked by several unsustainable trends. By prioritizing monetary returns on investments over all other measures of well-being, our system makes economic growth obligatory even when it is unsustainable. Although economic growth provides benefits to society, unsustainable growth is linked to inequality, natural resource depletion, and pollution. Current market incentives are reinforcing these trends, and there is little pressure from the global economic system to decrease economic inequality, make economic growth more sustainable, or rein in resource depletion and pollution. However, progressive approaches such as the economic valuation of nature offer hope that the global economic system can become truly sustainable.

Key Topics:

- Dominant global economic trends: economic growth
- Market failures and externalities
- Tragedy of the commons and the free rider problem
- Ecological economics
- Placing a value on nature
- Creating a sustainable economic system

The Economics of Sustainability: Part II

Essential Question: What are the roles of governments in addressing sustainability market failures?

The Big Idea: The global economic system in its current configuration is driving unsustainable growth, resource depletion, pollution, and inequality. Because the costs of pollution and ecosystem degradation are paid by society at large, many economists and environmentalists insist that government must take action to promote sustainability. Although the history of public activity to conserve natural resources, prevent pollution, and promote equality stretches back centuries, most comprehensive governmental actions in these realms have occurred during the past fifty years. Governments have successfully addressed some environmental concerns such as acid rain and ozone depletion, yet they have been much less successful at promoting the comprehensive sustainability agenda that will be required to meet the challenges of climate change and global economic inequality. This unit takes a look at the various roles of government, especially regulations – and considers their challenges, effectiveness, and how our evolving understanding of important sustainability concepts is driving substantial changes to traditional economic systems.

Key Topics:

- The role of government in sustainability
- Policy successes and challenges
- Pollution markets: cap and trade
- Political constraints on government action: climate change
- Decentralized authority

- The problems of enforcement
- Case study: Chesapeake Bay Watershed

New Technology and Innovative Sustainability Approaches

Essential Question: What new technologies are being developed to address sustainability issues and why is important that consumers embrace demand for them?

The Big Idea: Technological innovation is a vital part of sustainability. While no single technology is a “silver bullet” that will transform the way humans live on the planet, a range of innovations in design, energy, transportation, water use, and buildings are making significant improvements. It will take the positive actions of all people, creatively using appropriate technology over an extended period, to achieve sustainable societies. Many sustainable technological solutions are available now, but resistance to change short-sighted approaches to problem-solving often stand in the way. Looking at technology from within an integrated sustainability framework allows innovations to have long-lasting impact.

Key Topics:

- Nature as a role model – biomimicry
- The future of energy
- Sustainable transportation
- Innovations in water Systems
- Green building
- Green jobs and the green economy

Toward a Sustainable Future

Essential Question: What important cultural and fundamental shifts must continue happening in businesses, governments, media, and societies in order to fully promote and implement sustainability?

The Big Idea: The primary goal of sustainability is to transform our economy from a system that is based on waste and destruction to a system that aligns with the ecological balance of our planet. This is no small task, as it means overturning entrenched business and political practices that value short term profit and growth over sustainability. Despite this enormous challenge, there are some encouraging developments underway which point to an emerging sustainable society and economy. These developments include:

Key Topics:

- Sustainable design and sustainable cities
- Consumer choice and demand for sustainability
- Business sustainability initiatives and corporate social responsibility
- Organizations and new social media promoting sustainability around the world
- An emerging sustainability mindset