Chapter Objectives

This chapter will help students:

- Characterize the influences of culture and worldview on the choices people make
- Outline the nature and historical expansion of ethics in Western cultures
- Compare the major approaches in environmental ethics
- Explain how our economies exist within the environment and rely on ecosystem services
- Describe principles of classical and neoclassical economic theory and summarize their implications for the environment
- Compare the concepts of economic growth, well-being, and sustainability
- Explain aspects of environmental economics and ecological economics
- Describe how individuals and businesses can help move our economic system in a sustainable direction

Lecture Outline

I. Central Case: The Mirarr Clan Confronts the Jabiluka Uranium Mine

   A. The remote Kakadu region of Australia’s Northern Territory is home to several groups of Australian Aborigines, and also features Kakadu National Park, a World Heritage Site with irreplaceable natural and cultural resources.

      1. The region’s land contains large amounts of uranium, and uranium mining is a key contributor to the Australian economy.
2. Many of Australia’s uranium deposits occur on Aboriginal lands, giving rise to conflicts between mining corporations and the Aboriginal people.

B. The Mirarr clan has been fighting the development of the Jabiluka mine because of threats to their culture, to human health, and to the environment.

C. In 2004, the mine’s owner and its international parent company agreed to give the Mirarr veto power over development at Jabiluka. Under the signed agreement, Jabiluka will not be developed unless the Mirarr agree.

D. Since then, the price of uranium has risen, so the corporation and nearby aboriginal groups are again interested in developing the site.

E. The story of mining and the Mirarr exemplify how our values, beliefs, and traditions interact with economic interests to influence the choices we make about living in our environment.

II. Culture, Worldview, and the Environment

A. Ethics and economics involve values.
   1. To address any environmental problem, we must understand not only how natural systems work, but also how values shape human behavior.
   2. Ethics and economics give us tools we need to pursue the “triple bottom line” of environmental, economic, and social sustainability.

B. Culture and worldview influence our perception of the environment.
   1. Our decisions about how we use the environment to meet our needs depend in part on assessments of costs and benefits, and in part on our culture and our worldview.
   2. **Culture** can be defined as the ensemble of knowledge, beliefs, values, and learned ways of life shared by a group of people.
   3. A **worldview** reflects a person’s beliefs about the meaning, operation, and essence of the world.
   4. People with different worldviews can study the same situation and draw dramatically different conclusions.

C. Many factors shape our worldviews.
   1. The traditional culture and worldview of the Mirarr clan have played a large role in its response to the proposed Jabiluka mine.
   2. Aborigines believe their spirit ancestors left important signs and lessons in the landscape.
   3. A community may also share a particular view of its environment if its members have lived through similar experiences.
4. A person’s political ideology can also shape his or her attitudes toward the environment.

5. Economic factors can sway how people perceive their environment and how they make decisions.

6. Acquiring scientific understanding is only one part of the search for sustainable solutions to environmental problems. We need ethics and economics as well, to help us understand how and why we value those things we value.

III. Environmental Ethics

A. The field of ethics involves the study of good and bad, of right and wrong.

1. People of different cultures or with different worldviews may differ in their values; therefore some ethicists are relativists, believing that ethics do and should vary with social context.

2. Some ethicists are universalists; they maintain that there are objective notions of right and wrong that are standard across all cultures and contexts.

B. Ethical standards help us judge right and wrong.

1. Ethical standards are the criteria that help differentiate right from wrong.

   a. The critical imperative is one classical ethical standard, which equates to the “golden rule.”

   b. Another is the principle of utility, which holds that something is right when it produces the greatest practical benefits for the most people.

C. We value things in two ways.

1. One way is to value something for the pragmatic benefits it brings us if we put it to use; this is termed instrumental value.

2. The other way is to value something for its intrinsic worth, to feel that something has a right to exist and is valuable for its own sake. This notion is termed intrinsic value, or inherent value.

D. Environmental ethics pertains to people and the environment.

1. The application of ethical standards to relationships between human and nonhuman entities is known as environmental ethics.

E. We have expanded our ethical consideration over time.

1. Throughout the history of Western cultures (European and European-derived societies), people have granted intrinsic value and extended ethical consideration to more and more people and things.
2. Some people have suggested that all of nature—living and nonliving things alike—should be ethically recognized.

3. Many traditional non-Western cultures have long granted nonhuman entities intrinsic value and ethical standing.

4. **Anthropocentrism** is a human-centered view of our relationship with the environment. It denies or ignores the notion that nonhuman things have intrinsic value, and it measures the costs and benefits of actions solely according to their impact on people.

5. **Biocentrism** ascribes intrinsic value to certain living things or to the biotic realm in general. In this perspective, nonhuman life has ethical standing, so a biocentrist evaluates actions in terms of their overall impact on living things, human and nonhuman.

6. The perspective of **ecocentrism** judges actions in terms of their benefit or harm to the integrity of whole ecological systems, which consist of living and nonliving elements and the relationships among them.

F. Environmental ethics has ancient roots.

1. People have contemplated our relationship with nature for thousands of years.

2. Some ethicists and theologians have pointed to the religious traditions of Christianity, Judaism, and Islam as a source of anthropocentric hostility toward the environment.

3. Others interpret sacred texts of these religions to encourage benevolent human stewardship over nature.

G. The industrial revolution inspired environmental philosophers.

1. **John Ruskin**, a British art critic, poet, and writer, criticized industrialized cities as “little more than laboratories for the distillation into heaven of venomous smokes and smells.”

2. Transcendentalism was a philosophical movement started during the 1840s in the United States by **Ralph Waldo Emerson**, **Henry David Thoreau**, and **Walt Whitman**.

3. Transcendentalists viewed nature as a direct manifestation of the divine.

H. Conservation and preservation arose with the 20th century.

1. **John Muir** was an advocate for the preservation of untouched wilderness.

2. **Gifford Pinchot** is associated with the conservation ethic stating that humans should put natural resources to use, but should manage them wisely.

I. Aldo Leopold’s land ethic arose from the conservation and preservation ethics.
1. **Aldo Leopold** came to see that healthy ecological systems depend on the protection of all their interacting parts.

2. He argued that humans should view themselves and “the land” as members of the same community, and that people are obliged to treat the land in an ethical manner.

J. Ecofeminism critiques male attitudes toward nature and women.

1. Ecological feminism, or **ecofeminism**, argues that the patriarchal structure of society is a root cause of both social and environmental problems.

K. Environmental justice seeks equal treatment for all races and classes.

1. **Environmental justice** involves the fair and equitable treatment of all people with respect to environmental policy and practice, regardless of their income, race, or ethnicity.

2. The environmental justice movement has been fueled by the perception that poor people and minorities tend to be exposed to a greater share of pollution, hazards, and environmental degradation than are richer people and whites.

3. A protest in the early 1980s by African Americans in North Carolina against a toxic waste dump in their community is widely seen as the beginning of the environmental justice movement.

4. Uranium mining in Australia and in North America has been a source of environmental justice concerns.

5. Cases of lung cancer began to appear among Navajo miners in the early 1960s, but scientific studies of the effects of radiation on miners at the time excluded Native American workers.

6. Today, despite much progress toward racial equality, significant inequities remain.

7. One success story is in California’s San Joaquin Valley, where the poor, mostly Latino, farm workers who help harvest much of the U.S. food supply also suffer from some of the nation’s worst air pollution.

L. Environmental justice is an international issue.

1. Just as wealthy people often impose their pollution on poorer people, wealthy nations do the same to poorer nations.

2. One common source of environmental injustice among nations concerns the dumping of hazardous waste.

   a. In nations with lax environmental and health regulations, workers and residents are often uninformed of or unprotected against the dangers from this waste.
IV. Economics: Approaches and Environmental Implications

A. Is there a trade-off between the economy and the environment?
   1. Often, when development results in long-term environmental degradation, private parties benefit economically while the broader public is harmed.
   2. Economic advancement and environmental protection go hand-in-hand.

B. Economics studies the allocation of resources.
   1. **Economics** is the study of how people decide to use potentially scarce resources to provide goods and services in the face of demand for them.

C. Several types of economies exist.
   1. An **economy** is a social system that converts resources into **goods**, which are material commodities manufactured for and bought by individuals and businesses, and **services**, which are work done for others as a form of business.
   2. The oldest type of economy is the **subsistence economy** in which people meet most or all of their daily needs directly from nature and their own production.
   3. In the **capitalist market economy**, interactions among buyers and sellers determine which goods and services are produced, how many are produced, and how these are made and distributed.
   4. In a **centrally planned economy**, a nation’s government determines in a top-down manner how to allocate resources.
   5. In reality, however, virtually all national economies in today’s world are hybrid systems, often termed **mixed economies**.

D. The economy exists within the environment.
   1. This mainstream view essentially holds that environmental resources (the inputs into the economy) are free and limitless and that wastes (outputs) can be endlessly exported and absorbed by the environment, at no cost.
   2. In contrast, modern economists belonging to the fast-growing fields of environmental economics and ecological economics explicitly recognize that human economies are subsets of the environment and depend crucially on it for natural resources and ecosystem services.

E. Economies rely on ecosystem goods and services.
   1. Economic activity uses resources from the environment.
   2. Environmental systems also naturally function in a manner that supports economies.
   3. Earth’s ecological systems purify air and water, form soil, cycle nutrients, regulate climate, pollinate plants, and recycle the waste generated by our economic activity. Such essential services are called **ecosystem services**.
4. While our environment enables economic activity by providing ecosystem goods and services, economic activity can also affect the environment.

F. Adam Smith proposed an “invisible hand.”
   1. Economics shares a common intellectual heritage with ethics.
   2. Known today as a founder of classical economics, Smith felt that when people are free to pursue their own economic self-interest in a competitive marketplace, the marketplace will behave as if guided by “an invisible hand” that leads their actions to benefit society as a whole.

G. Neoclassical economics incorporates psychology.
   1. Neoclassical economics examines the psychological factors underlying consumer choices.
   2. The conflict between buyers and sellers results in a compromise price being reached and the “right” quantity of commodities being bought and sold.
   3. This is often phrased in terms of supply, the amount of a product offered for sale at a given price, and demand, the amount of a product people will buy at a given price if free to do so.

H. Cost-benefit analysis is a widespread tool.
   1. In cost-benefit analysis, the estimated costs for a proposed action are totaled and compared to the sum of benefits estimated to result from the action; the decision on the action then depends on whether benefits exceed costs.
   2. Not all costs and benefits are easily quantified, or even identified or defined.
   3. Monetary benefits are more easily quantified than environmental costs, and so they tend to be overrepresented in traditional cost-benefit analyses.

I. Aspects of neoclassical economics have profound implications for the environment.
   1. There are four fundamental assumptions of neoclassical economics that have implications for the environment.
      a. Resources are infinite or substitutable.
      b. Costs and benefits are internal.
         i. Costs or benefits of a transaction that affect people other than the buyer or seller are known as externalities.
         ii. By ignoring the external cost, which is the cost borne by someone not involved in the transaction, economies create a false idea of the true and complete costs of particular choices, and unjustly subject
people to the consequences of activities in which they did not participate

c. Future effects should be discounted.
   i. An event in the future should count less than one in the present; in economic terminology, future effects are “discounted.”
   ii. Many environmental problems unfold slowly. Impacts of resource depletion and pollution buildup to future generations are not calculated.
   iii. Discounting essentially shunts the costs of dealing with such problems on to future generations

d. Growth is considered good.
   i. **Economic growth** can be defined as an increase in an economy’s production and consumption of goods and services.
   ii. However, many observers today worry that growth is no longer the best path to happiness, as consumption and material affluence often fail to bring people contentment; this is called **affluenza**.

J. We live in a growth-oriented economy.
   1. The world economy is seven times bigger today than it was 50 years ago.
   2. The dramatic rise in per-person consumption of goods and services has numerous consequences.

K. Can growth go on forever?
   1. Today’s mainstream economic theory assumes that growth can continue forever. This view rests on the assumption that resources are infinite or substitutable.
   2. Economic growth stems from two sources.
      a. An increase in inputs to the economy (e.g., greater inputs of labor and natural resources).
      b. Improvements in the efficiency of production due to better technologies and approaches (i.e., ideas and equipment that enable us to produce more goods with fewer inputs). This second approach—whereby we produce more with less—is often termed “economic development.”
   3. Cornucopians believe technology will help us continue economic growth indefinitely.
   4. Cassandras believe that the Earth’s resources are finite.

L. Environmental economists address shortcomings in mainstream economics.
1. **Environmental economics** maintain that economic growth may be unsustainable if we do not reduce population growth and make resource use far more efficient.

M. Ecological economists propose a steady-state economy.

1. **Ecological economists** argue that if population growth and resource consumption are not reined in, depleted natural systems could plunge our economies into ruin.

2. Many of these economists advocate economies that neither grow nor shrink, but are stable. Such **steady-state economies** are intended to mirror natural ecological systems.
   a. In the 19th century, British economist **John Stuart Mill** hypothesized that as resources become harder to find and extract, economic growth will slow and eventually stabilize.
   b. Modern proponents of a global steady-state economy, such as American economist **Herman Daly**, are not optimistic that a steady state will evolve on its own from a capitalist market system.

N. We can measure economic progress differently.

1. For decades, the economic robustness of a nation has been calculated using the **Gross Domestic Product (GDP)**, the total monetary value of final goods and services produced annually.

2. Several alternative models have been produced to account for nonmarket values and externalities; one is the **Genuine Progress Indicator (GPI)**, which includes all positive contributions to the economy, then subtracts all negative social, environmental, and economic factors.

3. Other “green accounting” indicators include Net Economic Welfare (NEW), the Index of Sustainable Economic Welfare (ISEW), and The United Nations’ Human Development Index. These indices value leisure time, personal transactions, wealth distribution, volunteerism, a nation’s standard of living, life expectancy, and education as accurate measures of quality of life.

O. We can give ecosystem goods and services monetary values.

1. Our society often mistreats the very systems that keep it alive and healthy, in large part because the market assigns these entities no quantitative monetary value or, at best, assigns values that underestimate their true worth.

2. Ecosystem services are said to have **nonmarket values**, values not usually included in the price of a good or service.

3. One technique of assigning nonmarket value is **contingent valuation**, which involves using surveys to determine how much people would be willing to pay to protect a resource or to restore it.
4. Whereas contingent valuation measures people’s *expressed preferences*, other methods aim to measure people’s *revealed preferences*—preferences as revealed by data on actual behavior.

5. An alternative approach is to calculate the overall economic value of all services that an ecosystem provides.

P. Markets can fail.

1. **Market failure** occurs when markets do not reflect the full costs and benefits of actions.

2. Traditionally, market failure has been countered by government intervention.

Q. Ecolabeling helps address market failure.

1. **Ecolabeling** serves to inform consumers which brands use environmentally benign processes.

2. **Socially responsible investing** involves investing in only those companies that meet certain criteria for environmental and social standards of sustainability.

R. Corporations are responding to sustainability concerns.

1. As more consumers and investors express preferences for sustainable products and services, more industries, businesses, and corporations are finding that they can make money by “greening” their operations.

2. Some companies have cultivated an eco-conscious image from the start, while some newer businesses are trying to go even further than these pioneers.

3. Today, corporate sustainability is going mainstream, and some of the world’s largest corporations have joined in.

4. Many corporate greening efforts are more rhetoric than reality, and corporate **greenwashing** may mislead consumers into thinking the companies are acting more sustainably than they are.

V. **Conclusion**

A. Corporate sustainability through alternative ways of measuring growth, ecolabeling, and valuation of ecosystem services are some recent developments that have brought economic approaches to bear on environmental protection and resource conservation.

B. Sustainability is key to the ethical treatment of future generations of humans, as well as of the nonhuman environment; this is environmental justice.

C. If economic welfare can be enhanced in the absence of growth, we can envision economies and environmental quality benefiting from one another.
Key Terms

affluenza
anthropocentrism
biocentrism
capitalist market economy
centrally planned economy
classical economics
conservation
contingent valuation
cost-benefit analysis
culture
Daly, Herman
demand
ecocentrism
ecofeminism
ecolabeling
ecological economics
economic growth
economics
economy
ecosystem services
Emerson, Ralph Waldo
environmental economics
environmental ethics
environmental justice
ethical standards
ethics
external cost
externalities
Genuine Progress Indicator (GPI)
goods
greenwashing
Gross Domestic Product (GDP)
instrumental value
intrinsic value
Leopold, Aldo
market failure
Mill, John Stuart
mixed economy
Muir, John
neoclassical economics
nonmarket values
Pinchot, Gifford
preservation
relativists
Ruskin, John
services
Smith, Adam
steady-state economies
subsistence economy
supply
Thoreau, Henry David
universalists
Whitman, Walt
worldview

Teaching Tips

1. Assign outside readings from books that are mentioned in the chapter and discuss the authors’ views on nature and society. What has changed since these authors wrote these particular texts? What is the same? What points do the authors make that the students agree or disagree with and why? Key texts are

Walden by Henry David Thoreau,

Sand County Almanac by Aldo Leopold, and

The Rights of Nature by Roderick Nash.

2. Have students go to the Resources for the Future group’s website (www.rff.org) and choose one of the topics listed under the Focus Areas section. Students can work in small groups or independently to present a short report to the class or to write a brief paper on the selected topic.
3. Assign an ethical perspective to each student or group of students (anthropocentrism, biocentrism, ecocentrism, ecofeminism) and ask them to defend that worldview in a class discussion. They should do research on that perspective before the next class. If you have a large class, ask students to be involved in an online discussion. Choose an issue for discussion, either local, national, or international, and have each student or group explain the worldview of their assigned perspective.

4. Present a local situation to your students that is similar to the Jabiluka uranium mine issue. Are there public movements in your area against a development (e.g., logging, mining, road building) because of its environmental impact? How do the students feel about it?

5. Getting to Know Your Students, and the Utility of Groups

a. Place your students in groups of three to six to have discussions and projects for the semester. It is a good idea to have each student in a group have a different strength pertinent to the class. One effective grouping method is to have students fill out a 3 × 5 card indicating their familiarity and comfort level with 1. biology, 2. math, 3. Internet searches, 4. PowerPoint, and 5. public speaking. It should take only 10–20 minutes to sort the cards in groups of students with different strengths: one student for biology, one for math, one for Internet use, and so on. When students enter the room for the next class, have them find their card in the group to which they’ve been assigned.

b. Take used file folders and remove the tab that sticks out. This makes it easy to stand the folders up “tent” style. Have a set of these blank folders available for each group, and have each student use markers to write his or her name on BOTH sides so that everyone in the room can see it. Give the group a colored folder in which to keep these “name tents” and other group-related items. The colored folders can be the responsibility of a group member or, ideally, left in the classroom in a cardboard box if you have the space. Have the students use their name tents for at least the first three weeks of class, to assist everyone in learning names. Research shows that students who feel more “connected” to classmates have better perseverance in specific classes and in college in general. Helping students to feel like part of a group can assist with this goal.

c. If you have a digital camera, take a photo of each group, with each student holding their name tent. Put six or eight groups per page into Photoshop or PowerPoint and print out the sheets. You now have a way to learn the names of your students quickly. Keep the pages with you as you grade papers or lead class discussions.

d. Have individuals list observable behaviors that show a person acting responsibly and respectfully toward the environment. Ask each student to create a second list of core values that might motivate such behavior. Give examples such as honesty, respect, etc. Create a master list for the class. Hold that list until the last day of class and repeat the exercise. The list of behaviors should expand substantially. Additional core values may emerge as well.
Additional Resources

Websites

1. *Ethics Update*, University of San Diego (http://ethics.sandiego.edu/Applied/Environment)

   This website provides links to environmental ethics information, publications, and organizations.


   The ISEE provides information that “facilitates understanding between economists and ecologists, and the integration of their thinking into a transdiscipline aimed at developing a sustainable world.”


   This online exhibit features the life of John Muir, renowned naturalist and founder of the Sierra Club.


   This online resource provides links to a large number of other environmental justice websites, documents, and government agencies.

5. *Ethics and the Environment*, University of Georgia (www.phil.uga.edu/eande)

   This Web-based journal provides an interdisciplinary forum for theoretical and practical articles, discussions, reviews, comments, and book reviews in the broad area encompassed by environmental ethics.


   In 1982, Leopold’s children, Starker, Luna, Nina, Carl, and Estella, all respected conservationists themselves, established the Aldo Leopold Foundation in response to the growing interest in their father’s legacy. For more than 20 years, the Aldo Leopold Foundation has promoted the care of natural resources and fostered an ethical relationship between people and land.

Audiovisual Materials

This program shows corporate leaders who are planning for a sustainable future by incorporating social responsibility and environmental protection into all processes and decisions.


   Scientists, academic experts, and others study the environmental impact humans have had on the planet and present their perspectives on ecological stewardship for the 21st century.


   Bill Moyers and Nisha Pillai interview a panel of environmental visionaries about the global environment at the Johannesburg Earth Summit.


   Businesspeople and environmentalists explore the business behind doing business the Earth-friendly way.

Weighing the Issues: Facts to Consider

**Mining in Mecca?**

**Facts to consider:** Any plan for mining such religious sites in these regions would probably be met with fierce opposition despite any claims of minimal environmental impact. These situations may have many similarities, including the disturbance of lands considered by the inhabitants to be sacred. In each example, the people involved have strong cultural values drawn from the stories surrounding the sites. The pollution resulting from mining could contaminate local habitats, even in the air and water. Some differences might include the distinct socioeconomic status of the inhabitants of the regions in question. The Mirarr clan numbers 52 people in all, while the populations in Jerusalem and Mecca are obviously much higher. Because these populations are large, they would have more economic resources and political power. The mine would also have greater social consequences in a more heavily populated region.

**Preservation and Conservation**

**Facts to consider:** Preservationists would argue against any resource exploitation. Answers will vary, but should focus on the inherent value of the land itself, and should seek to determine whether or not the value of the land would be destroyed by the development. Another likely answer would address which option would play a larger role in overall human happiness: scarring the land to exploit natural resources or keeping wild lands intact. Conservationists would be more likely to support the mine to some degree. Again, student answers will vary, but may include a focus on the land use that constitutes the greatest good.
for the greatest number of people. Conservationists would seek to manage the resources and make them available to the largest number of people for the longest time possible. The development ethic is in direct opposition to preservationism and can work for or against conservationism because its main focus is to “master nature” and promote economic development of all resources for human use, regardless of cost or consequences. Students will have to give a personal rationale for whichever ethic they choose.

**Environmental Justice**

**Facts to consider:** Answers will vary. In 1994, President Clinton issued an executive order requiring federal agencies to make sure that their environmental actions do not discriminate on the basis of income. This executive order set a precedent by expanding these directives to actions of state and local governments. People may disagree about whether such restrictions should also apply to private entities, but other procedures can be followed that will reduce this inequality, even without such changes. For instance, public agencies can provide more vigorous enforcement of existing antipollution laws, including the levying of fines and other punishments on violators. Also, both public and private studies could be required, not only to predict the environmental consequences of proposed projects, but also to assess the effect of existing facilities. Making results public would help to control the negative effects of environmental actions on communities. Other answers may suggest additional ways to reduce this inequality, such as regulations, fines, compensation for loss due to adverse effects of environmental actions, and public education about the pros and cons of any proposed environmental action.

**Cornucopian or Cassandra?**

**Facts to consider:** Answers will vary depending on the backgrounds of your students. Students who are business, economics, computer, and technology majors will gravitate toward the Cornucopian view that technology can sustain a growing human population. Those students that are science or mathematics majors will gravitate toward the Cassandra’s view that no human technological advancement can indefinitely support endless human growth. Also, consider the students’ lifestyles and personal perspectives—if they are heavily reliant on technology to drive their lifestyles, they most likely will be associated with the Cornucopian view. If they are living a more sustainable lifestyle, they can associate with the merits of a Cassandran lifestyle. Students will invariably overlap different areas of their beliefs with the textbook definitions. But, the view of the students, as stated by the first question, will drive the informed response of the last.

**The Science behind the Stories:**

**Thinking Like a Scientist**

**Ethics in Economics: Discounting and Global Climate Change**

**Problem:** How much will it cost our society if we do nothing about global climate change? We need to respond to the growing problem of climate change. But, the costs
that this problem may impose on society need to be addressed. To do this, economics, ethics, and discounting all need to be factored into the solution.

Solution: After researching primary sources on the scientific aspects of the topic, a price tag was placed on the economic consequences of these climate changes. It was concluded that climate change could decrease the GDP by year 2200. But, by investing now, with just a fraction of the GDP, our society could stabilize atmospheric gasses and prevent most of future economic losses. But, an assumption was made—that we will be not only wealthier in the future, but better able to absorb economic costs. And, the idea that the future will be discounted was questioned—can this be guaranteed? The discount rate in this article was deemed, by some, as being too low—forcing people today to pay too much for possible future impacts. In the end, it was determined that the market should not be used to guide ethical decisions. And, the report’s main message—that it is cheaper to deal with climate change now versus later—was robust to a fair amount of fluctuation in the discount rate, up to at least a rate of 1.5%. Stern concludes with the simple solution that the quicker we get going, the better off we’ll be.

Putting a Price on Nature in Australia’s Kakadu Region

Problem: Should mining be allowed on public land alongside a national park, or should the land instead be preserved as part of the park? This problem is a classic example of how economics and the environment collide. Specifically, this problem addresses how to apply monetary figures to the nonmarket values inherent in natural features and ecosystem services. The conflict exists in saving land rich in cultural heritage versus exploiting land rich in mineral resources. The question is how much the land is “worth” economically if preserved undeveloped.

Solution: To answer this question, research was needed to determine the importance Australian citizens placed on preserving the land. The research team selected the method of contingent valuation, which surveys people to determine how much they are willing to pay to protect or restore a resource. Over 2,000 citizens were surveyed, using use and non-use values to gauge overall value of the land. Potential environmental mining impacts were disclosed. From this interview, a monetary value of the land was equated to a dollar value. Both of these numbers exceeded that of the planned mineral extraction. Thus, the researchers concluded that preserving the land as undeveloped was worth more than opening it to mining. But, was this the best approach to provide value to the land? In the end, it was determined that contingent valuation is one economist tool to ascribe monetary figures to nonmarket values that are difficult to quantify—but undeniably important.

Answers to End-of-Chapter Questions

Testing Your Comprehension

1. Ethics encompasses the study of good and bad, right and wrong, and of sets of moral principles or values. Classical ethical standards include virtue (the just and equal
treatment of individuals), the *categorical imperative* (to treat others as you’d want to be treated), and *utility* (to produce the greatest practical benefit for the largest number of people). Environmental ethics applies ethical standards to environmental problems.

2. Anthropocentrism is a human-centered view of our relationship with the environment. Biocentrism ascribes values based on the effects of actions on all living things. Ecocentrism ascribes values based on consideration of entire systems, for instance an entire ecosystem, including its abiotic components as well as its biotic components. The Mirarr Clan has a decidedly ecocentric environmental perspective.

3. John Muir advocated for the *preservation ethic*, which holds that we should protect the natural environment in its pristine, unaltered state. The *conservation ethic*, championed by Gifford Pinchot, says we should put natural resources to use and manage them wisely.

4. Aldo Leopold’s *land ethic* views humans and the land as members of the same community, and argues that this community should be regarded and treated ethically.

5. Environmental justice involves the fair and equitable treatment of all people with respect to environmental policy and practice, regardless of their income, race, or ethnicity. Answers will vary for one’s city, state, or country, but one common type of environmental injustice is that polluting facilities are often located in low-income and minority neighborhoods.

6. The environment contributes *goods*, such as fresh water and fossil fuels, as well as *services*, such as waste removal and air purification. It sustains our lives and livelihoods and supports our economy. Examples provided will vary.

7. Adam Smith suggested that individuals seeking their own benefit would, as an unintended consequence, bring about benefits to society, as if guided by an “invisible hand.” Neoclassical economists took more quantitative approaches, considered the psychological factors underlying human choices, and focused on supply and demand dynamics.

8. Critics of neoclassical economics point to four of its fundamental assumptions that have potentially negative effects on the environment: 1. that resources are infinite or substitutable; 2. that costs and benefits are internal; 3. that growth is good; and 4. that long-term effects should be discounted. In reality, resources become depleted, costs are often externalized, limitless growth in a limited environment results in increasingly severe competition for resources, and the future becomes important as it draws near.

9. In contrast to the assumptions of neoclassical economics (see #8, above), ecological economics assumes that resources are finite, the future (sustainability) is important, externalized costs are real, and that growth is not an absolute good but may or may not be desirable, depending on the ecological situation. Ecological economics often uses the economy of nature as a model for the human economy. Environmental economics adopts the goals of ecological economics (e.g., sustainability) but tries to achieve them within a neoclassical framework.
10. Contingent valuation is a technique used to quantify the value of ecosystem services by surveying people to determine how much they would be willing to pay to protect or restore a resource. A potential weakness of this approach is that people may inflate the values of what they’d actually be willing to pay. An alternative method that addresses this weakness is to measure people’s revealed preferences by collecting data on their actual behavior. For example, measuring the amount of money and time people spend to travel to and visit a park as a measure of the value they place on the park itself.

Calculating Ecological Footprints

<table>
<thead>
<tr>
<th>Components of GPI</th>
<th>U.S. total in 1950 (trillions of dollars)</th>
<th>Per capita in 1950 (thousand dollars)</th>
<th>U.S. total in 2004 (trillions of dollars)</th>
<th>Per capita in 2004 (thousand dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>1.153</td>
<td>7.6</td>
<td>7.589</td>
<td>25.9</td>
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<tr>
<td>Benefits</td>
<td>1.041</td>
<td>6.8</td>
<td>4.746</td>
<td>16.2</td>
</tr>
<tr>
<td>Environmental Costs</td>
<td>0.407</td>
<td>2.7</td>
<td>3.990</td>
<td>13.6</td>
</tr>
<tr>
<td>Social and Economic Costs</td>
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<td>3.1</td>
<td>3.926</td>
<td>13.4</td>
</tr>
<tr>
<td>GPI</td>
<td>1.311</td>
<td>8.6</td>
<td>4.419</td>
<td>15.1</td>
</tr>
</tbody>
</table>

1. 6.58, 3.37. Answers may vary.
2. 2. 4.559, 9.803, 8.247. Worst = environmental costs. Other answers will vary.
3. Answers will vary. Anthropocentric will be higher.
4. Answers will depend on the student.