

18.5 INTERNATIONAL ENVIRONMENTAL ISSUES

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain biodiversity
- Analyze the partnership of high-income and low-income countries in efforts to address international externalities

Many countries around the world have become more aware of the benefits of environmental protection. Yet even if most nations individually took steps to address their environmental issues, no nation acting alone can solve certain environmental problems which spill over national borders. No nation by itself can reduce emissions of carbon dioxide and other gases by enough to solve the problem of global warming—not without the cooperation of other nations. Another issue is the challenge of preserving **biodiversity**, which includes the full spectrum of animal and plant genetic material. Although a nation can protect biodiversity within its own borders, no nation acting alone can protect biodiversity around the world. Global warming and biodiversity are examples of **international externalities**.

Bringing the nations of the world together to address environmental issues requires a difficult set of negotiations between countries with different income levels and different sets of priorities. If nations such as China, India, Brazil, Mexico, and others are developing their economies by burning vast amounts of fossil fuels or by stripping their forest and wildlife habitats, then the world's high-income countries acting alone will not be able to reduce greenhouse gases. However, low-income countries, with some understandable exasperation, point out that high-income countries do not have much moral standing to lecture them on the necessities of putting environmental protection ahead of economic growth. After all, high-income countries have historically been the primary contributors to greenhouse warming by burning **fossil fuels**—and still are today. It is hard to tell people who are living in a low-income country, where adequate diet, health care, and education are lacking, that they should sacrifice an improved quality of life for a cleaner environment.

Can rich and poor countries come together to address global environmental spillovers? At the initiative of the European Union and the most vulnerable developing nations, the Durban climate conference in December 2011 launched negotiations to develop a new international climate change agreement that covers all countries. The agreement will take the form of an agreed upon outcome with legal force applicable to all parties. According to the EU, the goal is to adopt the plan in

2015 and implement it in 2020. For the agreement to work, the two biggest emitters of greenhouse gases—China and the United States—will have to sign on.

Visit this website to learn more about the European Commission.



If high-income countries want low-income countries to reduce their emissions of greenhouse gases, then the high-income countries may need to pay some of the costs. Perhaps some of these payments will happen through private markets; for example, some tourists from rich countries will pay handsomely to vacation near the natural treasures of low-income countries. Perhaps some of the transfer of resources can happen through making modern pollution-control technology available to poorer countries.

The practical details of what such an international system might look like and how it would operate across international borders are forbiddingly complex. But it seems highly unlikely that some form of world government will impose a detailed system of environmental command-and-control regulation around the world. As a result, a decentralized and market-oriented approach may be the only practical way to address international issues such as global warming and biodiversity.

KEY CONCEPTS AND SUMMARY

Certain global environmental issues, such as global warming and biodiversity, spill over national borders and will need to be addressed with some form of international agreement.

SELF-CHECK QUESTIONS

Consider the case of global environmental problems that spill across international borders as a prisoner's dilemma of the sort studied in Monopolistic Competition and Oligopoly. Say that there are two countries, A and B. Each country can choose whether to protect the environment, at a cost of 10, or not to protect it, at a cost of zero. If one country decides to protect the environment, there is a benefit of 16, but the benefit is divided equally between the two countries. If both countries decide to protect the environment, there is a benefit of 32, which is divided equally between the two countries.

- a. In Table 16, fill in the costs, benefits, and total payoffs to the countries of the following decisions. Explain why, without some international agreement, they are likely to end up with neither country acting to protect the environment.

		Country B	
		Protect	Not Protect
		Protect	
Country A	Protect		
	Not Protect		

Table 16.

REVIEW QUESTIONS

1. What are the economic tradeoffs between low-income and high-income countries in international conferences on global environmental damage?
2. What arguments do low-income countries make in international discussions of global environmental clean-up?

CRITICAL THINKING QUESTIONS

1. Can extreme levels of pollution hurt the economic development of a high-income country? Why or why not?
2. How can high-income countries benefit from covering much of the cost of reducing pollution created by low-income countries?

REFERENCES

European Union. "Durban Conference Delivers Breakthrough for Climate." Press release. December 11, 2012. Accessed December 19, 2013. http://europa.eu/rapid/press-release_MEMO-11-895_en.htm?locale=en.

GLOSSARY

biodiversity the full spectrum of animal and plant genetic material

international externalities externalities that cross national borders and that cannot be resolved by a single nation acting alone

SOLUTIONS

Answers to Self-Check Questions

		Country B	
		Protect	Not Protect
		Protect	Both A and B have a cost of 10 and a benefit of 16; each country has net = 6
Country A	Protect	Both A and B have a cost of 10 and a benefit of 16; each country has net = 6	A has a cost of 10 and a benefit of 8 (net = -2); B has a cost of 0 and a benefit of 8 (net = 8)
	Not Protect	A has a cost of 0 and a benefit of 8 (net = 8); B has a cost of 10 and a benefit of 8 (net = -2)	Both A and B have a zero cost and a zero benefit; each country has net = 0

Table 17.

Country B will reason this way: If A protects the environment, then we will have benefits of 6 if we act to protect the environment, but 8 if we do not, so we will not protect it. If A is not protecting the environment, we will have losses of 2 if we protect, but have zero if we do not protect, so again, we will not protect it. Country A will reason in a similar manner. The result is that both countries choose to not protect, even though they will achieve the largest social benefits—a combined benefit of 12 for the two countries—if they both choose to protect. Environmental treaties can be viewed as a way for countries to try to extricate themselves from this situation.

18.6 THE TRADEOFF BETWEEN ECONOMIC OUTPUT AND ENVIRONMENTAL PROTECTION

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Apply the production possibility frontier to evaluate the tradeoff between economic output and the environment
- Interpret a graphic representation of the tradeoff between economic output and environmental protection

The tradeoff between economic output and the environment can be analyzed with a **production possibility frontier (PPF)** such as the one shown in Figure 1. At one extreme, at a choice like P, a country would be selecting a high level of economic output but very little environmental protection. At the other extreme, at a choice like T, a country would be selecting a high level of environmental protection but little economic output. According to the graph, an increase in environmental protection involves an opportunity cost of less economic output. No matter what their preferences, all societies should wish to avoid choices like M, which are productively inefficient. Efficiency requires that the choice should be on the production possibility frontier.

Economists do not have a great deal to say about the choice between P, Q, R, S and T in Figure 1, all of which lie along the production possibility frontier. Countries with low per capita **gross domestic product (GDP)**, such as China, place a greater emphasis on economic output—which in turn helps to produce nutrition, shelter, health, education, and desirable consumer goods. Countries with higher income levels, where a greater share of people have access to the basic necessities of life, may be willing to place a relatively greater emphasis on environmental protection.

However, economists are united in their belief that an inefficient choice such as M is undesirable. Rather than choosing M, a nation could achieve either greater economic output with the same environmental protection, as at point Q, or greater environmental protection with the same level of output, as at point S. The problem with command-and-control environmental laws is that they sometimes involve a choice like M. Market-oriented environmental tools offer a mechanism either for providing either the same environmental protection at lower cost, or providing a greater degree of environmental protection for the same cost.

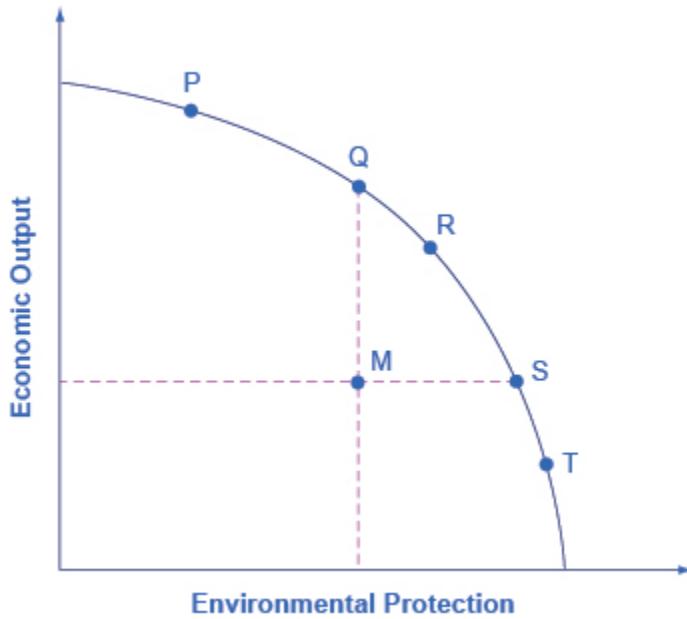


Figure 1. The Tradeoff between Economic Output and Environmental Protection. Each society will have to weigh its own values and decide whether it prefers a choice like P with more economic output and less environmental protection, or a choice like T with more environmental protection and less economic output.

KEYSTONE XL

So how would an economist respond to claims of environmental damage caused by the Keystone XL project? Clearly the environmental cost of oil spills would be considered a negative externality, but how many external costs would arise? And are these costs “too high” when measured against any potential for economic benefit?

As this chapter indicates, in deciding whether construction of the pipeline is a good idea, an economist would want to know not only about the marginal benefits resulting from the additional pipeline construction, but also the potential marginal costs—and especially the marginal external costs of the pipeline. Typically these come in the form of environmental impact statements, which are usually required for these kinds of projects. The most recent impact statement, released in March 2013 by the Nebraska Department of State, considered the possibility of fewer miles of pipeline going over the aquifer system and avoiding completely environmentally fragile areas; it indicated that “most resources” would not be harmed by construction of the pipeline.

As of press time, the Obama Administration has not approved construction of the Keystone XL project. While the economic benefits of additional oil in the United States may be fairly easily quantified, the social costs are not. It seems that, in a period of economic expansion, people want to err on the side of caution and estimate the marginal costs to be greater than the marginal benefits of additional oil generation. Those estimates may change, however, if the price of gasoline continues to rise.

KEY CONCEPTS AND SUMMARY

Depending on their different income levels and political preferences, countries are likely to make different choices about **allocative efficiency**—that is, the choice between economic output and environ-

mental protection along the production possibility frontier. However, all countries should prefer to make a choice that shows **productive efficiency**—that is, the choice is somewhere on the production possibility frontier rather than inside it. Revisit Choice in a World of Scarcity for more on these terms.

SELF-CHECK QUESTIONS

A country called Sherwood is very heavily covered with a forest of 50,000 trees. There are proposals to clear some of Sherwood's forest and grow corn, but obtaining this additional economic output will have an environmental cost from reducing the number of trees. Table 18 shows possible combinations of economic output and environmental protection.

<i>Combos</i>	Corn Bushels (thousands)	Number of Trees (thousands)
P	9	5
Q	2	30
R	7	20
S	2	40
T	6	10

Table 18.

- Sketch a graph of a production possibility frontier with environmental quality on the horizontal axis, measured by the number of trees, and the quantity of economic output, measured in corn, on the vertical axis.
- Which choices display productive efficiency? How can you tell?
- Which choices show allocative efficiency? How can you tell?
- In the choice between T and R, decide which one is better. Why?
- In the choice between T and S, can you say which one is better, and why?
- If you had to guess, which choice would you think is more likely to represent a command-and-control environmental policy and which choice is more likely to represent a market-oriented environmental policy, choice Q or S? Why?

REVIEW QUESTIONS

- In the tradeoff between economic output and environmental protection, what do the combinations on the protection possibility curve represent?
- What does a point inside the production possibility frontier represent?

CRITICAL THINKING QUESTIONS

Technological innovations shift the production possibility curve. Look at graph you sketched for Self-Check Question 1 Which types of technologies should a country promote? Should “clean” technologies be promoted over other technologies? Why or why not?

PROBLEMS

In the Land of Purity, there is only one form of pollution, called “gunk.” Table 19 shows possible combinations of economic output and reduction of gunk, depending on what kinds of environmental regulations are chosen.

<i>Combos</i>	Eco Output	Gunk Cleaned Up
J	800	10%
K	500	30%
L	600	40%
M	400	40%
N	100	90%

Table 19.

- a. Sketch a graph of a production possibility frontier with environmental quality on the horizontal axis, measured by the percentage reduction of gunk, and with the quantity of economic output on the vertical axis.
- b. Which choices display productive efficiency? How can you tell?
- c. Which choices show allocative efficiency? How can you tell?
- d. In the choice between K and L, can you say which one is better and why?
- e. In the choice between K and N, can you say which one is better, and why?
- f. If you had to guess, which choice would you think is more likely to represent a command-and-control environmental policy and which choice is more likely to represent a market-oriented environmental policy, choice L or M? Why?

SOLUTIONS

Answers to Self-Check Questions

- b. Of the choices provided, P, R, and S demonstrate productive efficiency. These are the choices on the production possibility frontier.
- c. Allocative efficiency is determined by the preferences—in this case by the preferences of society as expressed through government and other social institutions. Because you do not have information about these preferences, you really cannot say much about allocative efficiency.
- d. In the choice between T and R, R should clearly be preferred, because it has both more corn and more trees. This answer illustrates why productive efficiency is beneficial. Compared with choices inside the PPF, it means more of one or both goods.
- e. In the choice between T and S, it is not possible to say which choice is better. True, S is on the PPF and T is not—but that only addresses the issue of productive efficiency. If a society has a strong preference for economic output and places a lower value on trees, then allocative efficiency may lead to a choice of T over S. Of course, the reverse could also be true, leading to a choice of S. Without information on society’s preferences to judge allocative efficiency, this question cannot be answered.
- f. Compared with command-and-control policies, market-oriented policies allow either more output with the same environmental protection or more environmental protection with the same level of output—or more

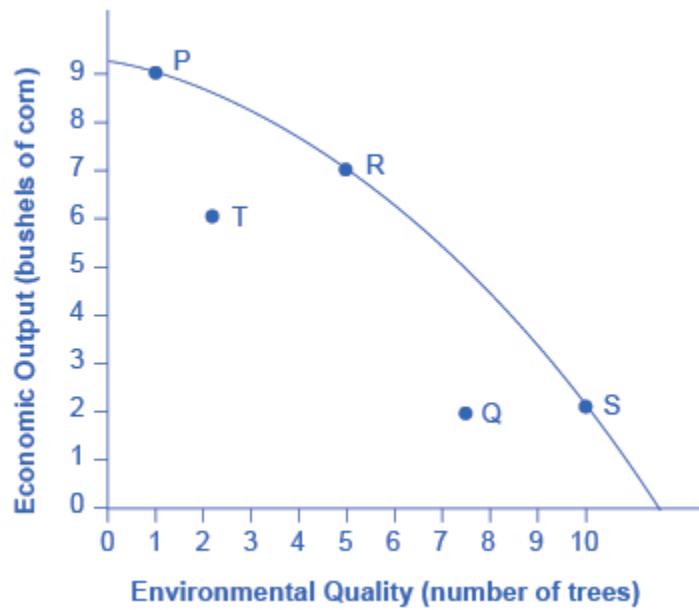


Figure 2.

of both environmental protection and output. Thus, a choice like Q inside the PPF is more likely to represent a command-and-control policy demand than a choice like S on the frontier of the PPF.