Chapter 1: Changing Perspectives on the Environment

1. Does improving environmental quality necessarily mean reducing rates of economic growth?
2. What are some of the differences between standard neoclassical natural resource and environmental economics and ecological economics?
3. What are externalities?
4. What is carrying capacity?
5. What is sustainable development?
6. What is included in the standard circular flow model? How are natural resources included in the model?
7. How does the broader ecological circular flow model extend the standard model? What is the primary input? What is the primary output?
8. What is the source function? What is the sink function? How can these be affected by human activities?
9. How do traditional and ecological economists view the issue of economic valuation differently?
10. What are some of the techniques used by standard natural resource and environmental economists?
11. What is environmental macroeconomics?
12. What are some of the natural cycles considered in environmental macroeconomics?
13. What is throughput?
Chapter 2: Resources, Environment, and Economic Development

1. What was the Malthusian hypothesis and is it relevant for studying modern environmental issues?
2. What is the key to escaping the Malthusian trap?
3. What three factors does ecological economics emphasize in studying economic growth?
4. What is the “Limits to Growth” model? What did it predict?
5. How have the global growth rates of population, agricultural production, and energy use changed over the past 40 years?
6. Will we be able to provide enough food to meet the demands of a growing global population?
7. What will be some of the demands of a growing population on the natural environment?
8. What is the particular problem with cumulative pollutants?
9. What is industrial ecology?
10. What are some of the characteristics of sustainable development?
11. What is the difference between supply augmentation and demand-side management?
12. How might economic history be classified into three distinct periods?
Chapter 3: The Theory of Environmental Externalities

1. What are environmental externalities? List some examples.
2. What do we mean by “internalizing externalities”?
3. How do we illustrate externalities in a market graph?
4. What is a “socially optimal” outcome from an economic perspective?
5. What are complementary goods?
6. What is the difference between a positive and a negative externality?
7. How can subsidies be used to increase economic efficiency?
8. What is the difference between a private optimum and a social optimum?
9. What is welfare analysis? How is it used to measure efficiency?
10. What is consumer surplus? What is producer surplus?
11. How do we measure net social benefits on a market graph?
12. What do we mean by “optimal” pollution? Why shouldn’t pollution levels be zero?
13. What is a Pigouvian tax? How does it relate to the issue of property rights?
14. What is the Coase theorem? What does it say about the relationship between property rights and efficiency?
15. What are transactions costs? How do transactions costs relate to efficiency?
16. Does the assignment of property rights affect equity?
17. What is the objective of free market environmentalism?
18. What is the free rider effect?
19. What is the holdout effect?
20. What are some of the limitations of the Coase theorem?
Chapter 4: Common-Property Resources and Public Goods

1. What do we mean by “common” property? What are some examples?
2. What are the three phases of a total product curve for a common property resource?
3. How do we calculate total revenue, average revenue, and marginal revenue?
4. What is the relationship between the marginal revenue curve and the average revenue curve?
5. How do we determine the open access equilibrium?
6. How do we determine the economic optimum level of production with a common property resource? How will this differ from the open access equilibrium?
7. What is the tragedy of the commons? How might this problem be avoided?
8. How can a license fee be used to improve economic efficiency? How can the price of the license fee be determined?
9. How can transferable permits be used to improve economic efficiency? What is the advantage of using tradable permits instead of a license fee?
10. What are the two major characteristics of public goods?
11. Will free markets tend to produce a sufficient supply of public goods? Why or why not?
12. Why is vertical addition of demand curves preferable to horizontal addition in the case of public goods?
13. What is the free rider effect and why is it relevant to public good issues?
14. What are global commons? What special considerations might be required for managing a global commons?
Chapter 5. Resource Allocation over Time

1. How do we measure the marginal net benefit of producing a resource?
2. Given the formulas for market demand and market supply, solve for the marginal net benefit function.
3. What is the normal shape of the marginal net benefit function?
4. When are total benefits normally maximized in a market?
5. What is a static equilibrium?
6. What is a discount rate? What is a present value?
7. How is discounting used to determine the efficient allocation of a resource over time?
8. How do we determine the efficient allocation of a resource over two time periods?
9. What are user costs?
10. What is a resource depletion tax? How can it be used to increase the temporal efficiency of using a resource?
11. Is government intervention always necessary for an efficient allocation of a resource over time?
12. How will different discount rates affect the way a resource is allocated over time?
13. What is Hotelling’s rule?
14. When is it “optimal” to deplete a non-renewable resource as soon as possible?
15. If the current generation does not care about the welfare of the next generation, does this necessarily imply that the current generation will always use all supplies of a non-renewable resource?
16. What are the equity implications of using discount rates to determine the allocation of a resource over time?
Chapter 6: Valuing the Environment

1. What is cost-benefit analysis?
2. What is the difference between direct use value and indirect use value?
3. What are the three types of non-use values?
4. What is contingent valuation?
5. What is the difference between willingness-to-pay and willingness-to-accept? Which one tends to be larger? Why is this a problem?
6. What is hedonic pricing?
7. What is the travel cost method?
8. What are three supply-side approaches to environmental valuation?
9. What is the difference between economic value and ecological value?
10. How do economists value future costs and benefits?
11. Is a high or low discount rate inherently better for environmental protection?
12. What is a social discount rate?
13. What is the opportunity cost of capital? How can it help determine a discount rate?
14. What is generational equity?
15. What is the difference between risk and uncertainty?
16. How do economists calculate an expected value? What is the problem with using expected values in cases where people are risk adverse?
17. What is the precautionary principle?
18. What is a safe minimum standard?
19. What is a benefit/cost ratio? What is the positive net present value criterion?
20. What are some of the limitations of cost-benefit analysis?
21. What is cost-effectiveness analysis? How does it differ from cost-benefit analysis?
22. What is positional analysis?
Chapter 7: Ecological Economics - Some Basic Concepts

1. What is natural capital?
2. What is net investment?
3. What is natural capital depreciation?
4. What are some ways to account for natural capital depreciation?
5. What are satellite accounts?
6. What is the principle of natural capital sustainability?
7. What is throughput?
8. What is the difference between a closed and open system?
9. Why is the issue of scale important in ecological economics?
10. What do we mean by “empty-world” and “full-world” economics?
11. What is the difference between weak and strong sustainability?
12. Why is ecological complexity important to ecological economists?
13. What is the precautionary principle?
Chapter 8: National Income and Environmental Accounting

1. What are some of the criticisms and limitations of traditional national income accounting measures?
2. What is the difference between Net National Product and Adjusted Net National Product?
3. What is the measure of genuine saving developed by the World Bank?
4. What are defensive expenditures? How are they included in traditional national income accounting?
5. What is the Index of Sustainable Economic Welfare?
6. What are satellite accounts?
7. What is critical natural capital?
8. What are the four components of the capital stock of an economy?
9. How do economists calculate future productivity losses?
10. What is “true” income?
11. How is genuine saving (S*) calculated?
12. What capital does strong sustainability seek to maintain?
13. What is the Human Development Index? What factors does it consider?
14. What does the extended national investment measure take into account?
Chapter 9: Modeling Economic and Ecological Systems

1. What is methodological pluralism?
2. How does an energy flow perspective differ from a standard economic approach?
3. What does the economic system require as inputs? What does it create as outputs?
4. What is input-output analysis?
5. What is the difference between a static and a dynamic input-output analysis?
6. What are some of the limitations of input-output analysis?
7. What is industrial ecology?
8. What are cross-boundary flows?
9. Can one model accurately describe all flows in a system?
10. What do we mean when we say that we should take an eclectic approach to studying environmental issues?
Chapter 10: Population and the Environment

1. What was the main prediction of Malthus’ *Essay on the Principle of Population*? Did it come true? Is his essay still relevant today?

2. How quickly did the global population grow during the 20th century? What is the current global population growth rate? How is it changing?

3. What is the neo-Malthusian perspective on environmental issues?

4. How is future population growth going to be distributed across different regions of the world?

5. Why is population momentum an important concept?

6. What is a population age profile?

7. What is the fertility rate? What is replacement level fertility?

8. What does the shape of a population age profile tell us about present and future population growth?

9. What is the demographic transition theory? What happens to birth rates, death rates, and population at each stage?

10. What is relevance of the demographic transition theory for current environmental and economic problems?

11. According to economic theory, what is the relationship between population growth and economic growth?

12. How can rapid population growth undermine economic growth?

13. What ecological principles apply to human population issues?

14. What is IPAT and what is its relevance for considering the future of the environment?

15. What types of population policies might be effective in the future?
Chapter 11: Agriculture, Food, and Environment

1. Has per-capita food production risen or fallen over the past 50 years?
2. Can agricultural land use continue to expand at current rates?
3. Why is per capita grain consumption in the U.S. so high?
4. What are some of the environmental impacts of agriculture?
5. How has global cereal production per capita changed over the past 40 years?
6. How does the elasticity of supply affect food prices?
7. What is the difference between a supply-side and demand-side impact on prices?
8. What is a crop value index? How can it be used to determine how land will be allocated among various crops?
9. What are some of the impacts of an increase in production of crops for export?
10. Are current agricultural production levels sufficient to provide everyone in the world with adequate nutrition?
11. How unequal is current food distribution?
12. What factors will require an increase in agricultural production increase in the future?
13. Where do most world grain exports currently come from?
14. What two factors form the basis of an optimistic future food scenario?
15. How widespread are problems of soil erosion and degradation?
16. What is the importance of the discount rate in soil management decisions?
17. What are some of the ways to reduce soil erosion?
18. What has been the trend in world fertilizer use over the past thirty years?
19. What are some of the environmental impacts of fertilizer use?
20. What is the relationship between fertilizer levels and yields?
21. What have been the trends in pesticide use in the U.S. in the past 40 years?
22. What are the environmental impacts of pesticides?
23. What is information asymmetry and why is it relevant to pesticide use?
24. What are some of the impacts of irrigation?
25. How much of the world’s water is used for irrigation?
26. What are the advantages and disadvantages of genetically-modified foods?
27. Describe a sustainable agricultural system.
28. What is Integrated Pest Management?
29. What policies might encourage sustainable agriculture?
Chapter 12: Resources - Scarcity and Abundance

1. What is the difference between the physical supply and the economic supply of a non-renewable resource?
2. What are the three reasons that economic supplies of resources change over time?
3. What are the different classifications of non-renewable resources?
4. How do we calculate expected resource lifetimes?
5. What is assumed with an exponential reserve index?
6. Why have predictions that non-renewable resources would be depleted failed to occur?
7. How do we measure resource rent?
8. What does Hotelling’s rule imply about the change in resource rents over time?
9. What is a choke price?
10. What three factors contributed to the expansion of global non-renewable resource consumption through the 20th century?
11. What are the four stages in consumption and prices of a non-renewable resource over time?
12. Do current price signals suggest that non-renewable resources are close to depletion?
13. How does the distribution of a non-renewable resource in the earth’s crust affect reserves?
14. Will we likely ever “run out” of a non-renewable resource?
15. How would internalized costs affect the turning point of a non-renewable resource?
16. What are some of the environmental impacts of mining?
17. What is a backstop resource?
18. How does a manufacturer determine an optimal recycling rate?
19. How does the inclusion of environmental costs affect the optimal recycling rate?
20. What policies can be used to achieve the optimal level of recycling?
21. What are the trends in metals recycling rates in the U.S. over the past 40 years?
22. What are royalty payments?
23. What is meant by “technological lock-in”? What can be done to avoid the problem?
24. What is meant by “mining the waste stream?”
Chapter 13: Energy - The Great Transition

1. What are the first and second laws of thermodynamics?
2. What is entropy?
3. What is throughput?
4. How is the price of energy linked to the price of non-renewable resources?
5. Can energy be recycled?
6. What is the difference between economic and thermodynamic efficiency?
7. How has global energy use grown in the past 50 years?
8. What source provides most of the world’s energy?
9. What is expected to happen with global energy demand in the future?
10. How will most of the future increase in demand be met?
11. What is the Hubbert curve? Has it accurately predicted U.S. oil production?
12. Has global oil production followed a Hubbert curve?
13. When is global oil production expected to peak?
14. What are three possible errors of optimistic predictions of future oil production?
15. Where are most remaining oil reserves located?
16. Is it currently possible to reduce energy demand significantly without reducing living standards?
17. What has happened to photovoltaic energy prices over the past several decades?
18. What are some of the factors that maintain our dependence on fossil fuels?
19. Why might use of solar energy be especially suitable in developing countries?
20. How can low fossil fuel prices be viewed as a market failure?
21. What are the environmental effects of electricity deregulation?
22. What are some policies that could encourage a transition to renewable energy sources?
23. What are some potential benefits of solar hydrogen?
Chapter 14: Renewable Resource Use - Fisheries

1. What does sustainable management of a renewable resource involve?
2. What is the maximum sustainable yield of a renewable resource?
3. What is a logistic curve?
4. What happens if the population of a species falls below the critical level?
5. What is the difference between a stable and unstable equilibrium?
6. What is the economic optimum yield level for a fishery?
7. What is the open-access equilibrium for a fishery?
8. What is the normal relationship between the economic optimum, the open-access equilibrium, and the maximum sustained yield for a fishery?
9. How might the economic optimum yield level for a fishery be obtained?
10. What is rent dissipation?
11. What is the current status of the world’s fisheries?
12. What is bycatch?
13. What has happened to total world fish catch and per capita fish catch in the past 50 years?
14. What is the 1982 Law of the Sea?
15. What policies could be instituted to encourage sustainable fishery management?
16. What are individual transferable quotas?
17. What is ecolabeling and how could it be used to encourage sustainable fishery management?
18. What are the advantages and disadvantages of aquaculture?
1. Why is the interest rate important in determining whether a private owner will clear cut timber or practice sustainable forestry?
2. What is a mean annual increment?
3. Is cutting timber at the maximum mean annual increment economically optimal?
4. How is the economically optimal forestry management determined?
5. Is the economically optimal forestry management ecologically optimal?
6. What is the main cause of tropical deforestation?
7. How does total forested area tend to change with population density?
8. Why are most timber plots managed as monocultures?
9. Is timber management for maximum sustained yield ecologically optimal?
10. How is timber management related to the loss of biodiversity?
11. What are some the reasons why forests tend to be exploited?
12. What is institutional failure? How does it apply to timber management?
13. Why are property rights relevant to forestry policy?
14. What are some of the positive externalities associated with forests?
15. Why is full pricing relevant to forestry policy?
16. How does the availability of credit affect timber management?
17. What is agroforestry?
18. What is the potential for demand-side strategies to reduce the demand for wood products?
19. How has the global demand for wood and paper products changed over time?
20. How is the total world water supply classified?
21. What is the water cycle?
22. What are some examples of countries experiencing current water scarcity and stress?
23. What is the potential for groundwater to be used to increase water supplies?
24. What are some of the advantages and disadvantages of dams?
25. What is the major problem with desalination?
26. What has been the trend in global water demand?
27. What is microirrigation?
28. How can pricing be used to influence the efficient use of water?
29. What are the effects of subsidized water pricing?
30. What is social sustainability?
31. What is ecosystems management?
Chapter 16: Pollution - Analysis and Policy

1. What are the shapes of the marginal cost and marginal benefit curves of pollution control?
2. How do we determine the “optimal” level of pollution?
3. What is the equimarginal principle?
4. What are the advantages and disadvantages of emissions standards?
5. How do economists determine the efficient level of a pollution tax?
6. What are the advantages of a system of transferable pollution permits?
7. How does a firm decide whether it should buy or sell pollution permits?
8. How is the equilibrium price of a pollution permit determined?
9. What are threshold and non-linear impacts of pollution?
10. When might emissions standards be the most appropriate policy to regulate pollution?
11. Why do market-based policies work better if pollutants are uniformly mixed?
12. How were market-based policies included in the 1990 Clean Air Act Amendments?
13. How should non-uniformly mixed pollutants be regulated?
14. What is the difference between point and non-point pollution? Which one is more difficult to control?
15. How can we determine if pollution taxes or tradable permits are the most appropriate policy for regulating pollution?
16. What are the different ways to allocate tradable pollution permits? Which one is generally preferred?
17. What is the problem with “grandfathering” policies?
18. How will industries react to technology change with a pollution tax? How will they react with a system of transferable permits?
19. What is the difference between a flow and a stock pollutant?
20. What is the relationship between the emissions and the accumulation of a stock pollutant?
21. Why might a reduction in emissions levels be insufficient to prevent problems with a stock pollutant?
Chapter 17: Industrial Ecology

1. What are the basic principles of industrial ecology?
2. What is resource recycling?
3. What is the difference between a “straight-line” and circular industrial process?
4. What are feedback loops?
5. What is dematerialization?
6. What is materials substitution?
7. What is waste mining?
8. How can growth in GDP be decoupled from growth in material inputs?
9. How have environmentally-oriented policies been used in practice?
10. What is an agroecological system?
11. What are some ways to make agricultural systems compatible with natural ecosystems?
12. How has the global demand for materials changed over the past few decades?
13. How is material consumption distributed unequally among countries?
14. What are global materials cycles?
15. What is the intensity of materials use?
16. How are gains in material efficiency offset by other factors?
17. What is the relationship between the intensity of materials use and the IPAT equation?
18. What is the concept of “sufficiency”?
19. What has been the trend in energy intensity in the past few decades among industrial countries?
20. What are some policies that could be used to promote industrial ecology?
21. How is the Kalundborg industrial ecosystem structured?
Chapter 18: Global Climate Change

1. What is the greenhouse effect? What causes it?
2. What are future predictions of global temperature increase?
3. What has been the trend in global carbon dioxide emissions since the Industrial Revolution?
4. According the IPCC, has human activity already increased global average temperatures?
5. What are the differences between preventive and adaptive strategies? What are examples of each?
6. What would be some of the impacts of global climate change?
7. What would be the climate change implications of the “business as usual” scenario?
8. What are the results of cost-benefit analyses of global climate change? What are the potential problems with these analyses?
9. Why is the choice of a discount rate so important in a cost-benefit analysis of global climate change?
10. What are the possible impacts of global climate change on GDP?
11. What are the impacts of stabilizing carbon emissions on GDP?
12. Summarize the economists’ statement on climate change endorsed by 2,500 economists?
13. How could carbon taxes be used to reduce the rate of global climate change?
14. What would be the effect of a carbon tax on the price of fossil fuels and alternative energy sources?
15. What is a revenue-neutral tax?
16. What is the relationship between gas prices and gas consumption across countries?
17. How could a system of tradable permits be used to reduce carbon emissions?
18. How would the price of a carbon permit be determined?
19. How would carbon reduction be allocated among various options if a carbon permit system were instituted?
20. How would the Kyoto protocol reduce carbon emissions? Why is the protocol meeting resistance?
21. What is the Clean Development Mechanism in the Kyoto protocol?
22. What are some additional policy tools that could be used to reduce carbon emissions?
23. What is the debate over carbon “sinks”?
24. What has been the trend of U.S. carbon emissions since 1990?
Chapter 19: World Trade and the Environment

1. What was at issue in the 1991 tuna/dolphin trade dispute? Why is this significant for environmental policy?
2. What is the basic principle of comparative advantage in international trade?
3. How can externalities be incorporate into the basic theory of international trade?
4. How can trade reduce environmental quality? How can trade improve environmental quality?
5. What does Article XX of the GATT/WTO provide regarding the ability of countries to restrict international trade?
6. What is the process and production methods (PPM) rule?
7. What is a “race to the bottom” and why can it occur as a result of international trade?
8. What is an Environmental Kuznets Curve (EKC)?
9. Is the EKC hypothesis supported by the available data?
10. What does the World Trade Organization say about trade and environmental quality?
11. What provisions are made for environmental protection in the North American Free Trade Agreement?
12. How does the European Union deal with the issue of trade and environmental quality?
13. What are multilateral environmental agreements?
14. Why do some people recommend the creation of a World Environmental Organization?
15. What other strategies could be used to reduce the environmental damage caused by international trade?
Chapter 20: Institutions for Sustainable Development

1. What is sustainable development?
2. What are the different implications of sustainable development for developed and developing countries?
3. What are the implications of sustainable development for agriculture, energy use, industry, and renewable resource systems?
4. What is structural adjustment?
5. What are the positive and negative environmental impacts of structural adjustment policies?
6. What are some specific proposals to reduce the environmental impacts of structural adjustment policies?
7. What is the World Bank?
8. How has funding for environmental programs by the World Bank changed in recent years?
9. What is the difference between a “brown agenda” and a “green agenda”?
10. What is the Global Environmental Facility?
11. What are some examples of successful projects funded by non-governmental organizations?
12. What is the difference between strong and weak sustainability? What are the implications of each for sustainable development?
13. What is a “steady-state” economy?
14. Why do some people consider the terms “sustainable growth” a contradiction in terms?
15. What are some specific policy proposals for sustainable development?