Econ 354

Exam on "Governing the Commons" by Elinor Ostrom

Greg Dow March 1, 2022

Please answer all of the following questions.

1. Choose <u>one</u> of the case studies from Chapter 3 of EO.

(a) Describe the physical nature of the common pool resource, the nature of the community, the ways in which individual people appropriated the resource, and the institutions used to manage the resource. Why does EO view these institutions as successful?

(b) Consider the repeated game model described in class. Discuss how the model addresses each of the following ideas: discounting, mutual monitoring, self-enforcing agreements, and credible commitment. Then discuss one strength and one weakness of the model as a way of understanding the success of the institutions in part (a).

2. Choose <u>one</u> of the case studies from Chapter 5 of EO.

(a) Describe the physical nature of the common pool resource, the nature of the community, the ways in which individual people appropriated the resource, and the institutions used to manage the resource. Why does EO view these institutions as unsuccessful or fragile?

(b) Why do you think it was difficult for people to create successful institutions in this case? Was it mainly a problem with the nature of the resource, the nature of the community, the strategies people used to create the institutions, or other factors? Explain carefully.

3. There are 250 foragers living in a forest. Each of the foragers can either hunt aardvarks or gather blueberries (no one does both). Each individual forager wants to maximize her calorie intake. A blueberry gatherer gets 2000 calories per day no matter what the other people are doing. An aardvark hunter gets the average product 10,000 - 40n where n is the number of hunters. The marginal product of aardvark hunting is 10,000 - 80n.

(a) Draw a graph with n on the horizontal axis, and AP and MP on the vertical axis. Show the equilibrium number of aardvark hunters n^0 when there are no restrictions on who can go hunting (give a numerical solution). On the same graph, show the number of aardvark hunters n* that would maximize the total calorie intake for all 250 foragers as a group and give a numerical solution. Carefully explain the economic logic behind your answers.

(b) Suppose the 250 foragers have a meeting to decide which individuals will be allowed to hunt aardvarks. Would it be a Pareto improvement for the foragers to switch from n^0 to n*? Why would this new policy lead to inequality among the foragers? Can you suggest some ways to solve the inequality problem? Carefully explain the economic logic behind your answers.

From: Gregory Dow <gdow@sfu.ca>
Subject: ECON 354 EXAM ON ELINOR OSTROM
Date: March 9, 2021 at 10:25:07 AM PST

1. Assume you are describing EO's book to a friend who has not read it.

(a) Tell your friend (i) what questions EO is trying to answer; (ii) what methods she uses; (iii) what conclusions she reaches; and (iv) why the conclusions are important.

(b) Choose one case study from chapter 3 and one from chapter 4. In each case, describe the common pool resource in detail and identify the most important lessons EO draws from that case. Be sure to explain EO's reasoning.

2. Here are some game theory questions. In all cases, explain your answers carefully.

(a) Suppose two people play a prisoner's dilemma game only once. How do the players rank the various possible outcomes? What outcome is likely to occur and why? How is this game related to EO's book? Why is this game important for the social sciences in general?

(b) Suppose two people play a prisoner's dilemma game infinitely many times. Describe some strategies that could potentially be used to achieve cooperation. What determines whether cooperation is possible? When cooperation is possible, are other outcomes also possible? How is this game related to EO's book?

3. Suppose a local community has a common pool resource. In all cases, explain your answers carefully.

(a) Currently there is no restriction on who can use the resource. (i) Would this situation be Pareto efficient? (ii) What would be necessary in order to maximize the total income of the community? (iii) if total income is maximized, would that be Pareto efficient? (iv) If total income is maximized, is there any way to distribute the benefits from the CPR equally among the individual members of the community?

(b) Assume the community has clear rules about who can use the resource. Discuss why it is also important to have rules about (i) appropriation; (ii) monitoring; and (iii) penalties. Then choose one example from chapter 5 to show why bad things can happen if the community ignores one or more of these issues.

From: Gregory Dow <gdow@sfu.ca>
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Date: November 2, 2020 at 2:25:47 PM PST
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1. Let's start with some general concepts.

(a) When people refer to "the tragedy of the commons", what are they talking about? Why is this idea relevant to EO's book? Assuming there is a commons, does EO believe there is always, sometimes, or never a tragedy? Explain using a few brief examples.

(b) Some people say the best way to deal with common pool resources is by government regulation. Other people say the best way is by private ownership. Describe the main arguments in favor of each point of view. How do you think EO would respond to the arguments in each case? Explain.

2. In answering this question, use ideas both from Ostrom's book and Dow's lecture notes.

(a) Describe an infinitely repeated prisoner's dilemma game. What are the most important insights about common pool resources obtained from this model? What are the most important limitations of the model? Explain.

(b) Describe rent dissipation. What are the most important insights about CPRs obtained from this model? What are the most important limitations of the model? Explain.

3. A local community has a common pool resource and they want to create an institution to manage it. Because you have taken Econ 354, they have hired you as a consultant.

(a) Using one detailed example from the book, explain to the community what a successful institution might look like. Using a second detailed example, explain to the community how an institution could fail. Be clear about your criteria for success and failure, and carefully explain the reasons for success or failure in each case.

(b) After meeting with community members, you go back to your hotel room and think about the probability that the community will be able to create a successful institution. What factors would you consider? Why? Explain your reasoning carefully.

Econ 354

Exam on "Governing the Commons" by Elinor Ostrom

Greg Dow March 2, 2020

Please answer all of the following questions.

1. Ostrom defines a common pool resource as a resource system that is large enough to make it costly (but not impossible) to exclude potential users.

(a) Choose one of the case studies from Chapter 3. Describe the resource system and the institutions that were used to manage it. According to EO, what factors made these institutions successful? Explain carefully.

(b) Choose one of the case studies from Chapter 5. Describe the resource system and the institutions used to manage it. According to EO, what factors made these institutions unsuccessful? Explain carefully.

2. Here are two general questions about Ostrom's book.

(a) Using the payoffs $w > x > y > z$, show a two-person prisoner's dilemma game with the strategies 'cooperate' and 'defect'. Now suppose you are trying to explain to your friend how this game is related to EO's book. First discuss how the one-shot game is related to ideas from the book. Then discuss how the infinitely repeated game is related to ideas from the book. You don't need a lot of math, but you can use a little bit if that helps to clarify your answers.

(b) EO is interested in the conditions under which people will succeed in creating good CPR institutions, and the strategies they could use for that purpose. For the California ground water basins in Chapter 4, where people created good institutions, describe the strategies they used and why these strategies were successful. One case of this kind is enough; you don't need to discuss all three cases. Then consider the problem of global climate change. In what ways are the two situations similar? In what ways are they different? In general, can we learn anything from EO's book that might be useful in dealing with the problem of climate change? Explain.

[See over for question 3]

3. Note: this question is closely related to the model of rent dissipation discussed in class. However, there are some differences. For example, in this question each person wants to minimize their commuting time instead of maximizing their income. Also the graph here will not have any average product or marginal product curves. But you should be able to see some connections with the model from the lecture.

A total of 1000 people leave the same office tower every day at 5:00 PM. They all live in the same condo tower, which is located in a different part of the city. Each person drives a car and wants to minimize the time it takes to get home. There are two options: go the long way or use the bridge. Anyone who goes the long way takes 60 minutes to get home no matter what anyone else does. Each person using the bridge takes n/10 minutes to get home, where n is the total number of people using the bridge (more traffic congestion on the bridge causes longer delays). Think about the bridge as a common pool resource.

(a) Draw a graph showing the number of people using the bridge (n) on the horizontal axis and the number of minutes it takes a person to get home using each route on the vertical axis. Assume we have an equilibrium where no one can get home any faster by switching to a different route. Use your graph to solve for the equilibrium number of people n^0 who use the bridge, and explain your reasoning. Show that n^0 is stable in the sense that if $n < n^0$ then n will tend to rise, and if $n > n^0$ then n will tend to fall.

(b) Now suppose the government randomly chooses n* people who will be permitted to use the bridge, and no one else can use it. Assume $0 < n^* < n^0$. Use your graph to show the total amount of time this policy would save for commuters as a group, and explain your reasoning. Is this policy a Pareto improvement compared to the equilibrium in part (a)? Why or why not? Do you think commuters would see this policy as fair? Why or why not? If the government implemented such a policy, how do you think it should choose n*? Finally, how is this related to the model of rent dissipation we discussed in class?

Econ 354

Exam on "Governing the Commons" by E. Ostrom

Greg Dow February 29, 2016

Please answer all of the following questions.

1. For each part of this question, try to make your answers as specific as possible.

(a) In chapter 3, Ostrom gives several examples of communities that managed their common pool resources successfully. Describe the CPR for <u>one</u> of these cases. Then describe <u>five</u> of Ostrom's design principles, and explain how the institutions used by the community to manage the CPR were consistent with each of these five principles.

(b) In chapter 5, Ostrom gives several examples of communities that <u>failed</u> to manage their CPRs successfully. Describe the CPR for <u>one</u> of these cases. Then discuss the reasons (there may be more than one) for the failure to develop good institutions.

2. In class we spent a lot of time talking about game theory.

(a) Carefully define the following concepts: (i) dominant strategy equilibrium; (ii) Pareto improvement; (iii) Pareto efficiency; (iv) prisoner's dilemma game. Then describe <u>two</u> situations that <u>do not</u> involve CPRs where the prisoner's dilemma model can be used to understand social, political, or economic behavior in the real world. Explain.

(b) Consider a two-person prisoner's dilemma game where if one player cooperates and the other defects, the cooperator gets 2 and the defector gets 10; if both cooperate, both get 6; and if both defect, both get 3. Assume the game is played infinitely many times. What is the <u>minimum</u> value of the discount factor δ that is necessary in order to have cooperation in every period? How could cooperation be achieved? Carefully justify your answers.

3. Suppose there is a lake where people can catch fish. People can also work at McDonalds.

(a) Use a graph and words to explain why the outcome is <u>not</u> likely to be Pareto efficient if there are no rules about who can go fishing. Define your notation, label all of the axes and curves on your graph, state your assumptions, and justify your conclusion.

(b) Suppose one person owns the entire lake and pays employees a wage to go fishing. How would the owner of the lake decide how many employees to hire? Would you expect the outcome to be Pareto efficient? Why or why not?

(c) Some people in the community might say that giving the lake to a single owner is unfair. What arguments could they make? Is there any way to solve this CPR problem in a fair way? Carefully justify your answers.

Econ 354

Exam on "Governing the Commons" by E. Ostrom

Greg Dow February 26, 2015

Please answer all of the following questions.

1. Ostrom's book is about common pool resources (CPRs).

(a) Think about the roads in the Vancouver area as a CPR. How does this CPR differ from the resources discussed by Ostrom? In what ways is there a 'tragedy of the commons' problem? In what ways is there a 'free rider' problem? How are the institutions used to govern this CPR different from the institutions described in Ostrom's book? Explain.

(b) Private ownership can be used in two ways: (i) the commons can be divided into separate territories with one owner per territory; or (ii) ownership of the entire commons could be given to a single person. For each approach explain how it might help to prevent overuse of the CPR, and discuss whether problems of equity and/or efficiency could arise.

2. In class we spent a lot of time discussing the prisoner's dilemma (PD) game.

(a) Draw a payoff matrix for the PD game using $w > x > y > z$. Carefully explain why this game has a dominant strategy equilibrium. Now assume that a regulator will impose a cost equal to F on anyone who defects, but not on anyone who cooperates (the regulator has perfect information). Draw a new payoff matrix for this game and carefully explain what value of F would be needed in order to have a dominant strategy equilibrium with cooperation. What can go wrong if the regulator sometimes makes mistakes? Explain.

(b) Consider the infinitely repeated PD game. Explain why a discount factor close enough to one is necessary for cooperation but not sufficient. Then explain how this model includes the concepts of discounting, self-enforcing agreements, mutual monitoring, and credible commitments. Finally, describe the limitations of this model according to Ostrom.

3. Here are two more questions.

(a) Define "rent dissipation" in words. Then use a graph to illustrate situations where (i) rent dissipation does not occur at all; and (ii) there is maximum rent dissipation. Explain your answers. Then describe two case studies from the book: one where rent dissipation was prevented, and one where it was a major

problem. Compare the CPR institutions for the two cases and discuss why the institutions either solved this problem or failed to solve it.

(b) In class we discussed how Ostrom's book might apply to the problem of climate change. Use Ostrom's ideas to explain why it might be hard to solve this problem. Then explain how the strategies of hierarchical organization and incrementalism could be used to help solve it.

Econ 354

Exam on "Governing the Commons" by E. Ostrom

Greg Dow October 20, 2014

Please answer all of the following questions.

1. Ostrom's book is about common pool resources (CPRs).

(a) Define a CPR. Why does a CPR create economic problems? What was Ostrom trying to learn about CPRs? How did she decide which cases to include in her book? Explain.

(b) Person A says "government regulation is a good way to solve CPR problems". What are the arguments in favor of this idea? What problems might arise in using this approach? Person B says "private ownership is a good way to solve CPR problems". What are the arguments in favor of this idea? What problems might arise in using this approach?

2. In class we spent a lot of time discussing the prisoner's dilemma (PD) game.

(a) Your friend has never heard of this idea. Carefully explain to her what a PD game is. Do <u>not</u> draw a payoff matrix; use <u>only</u> words. Be sure to define any technical terms you use. Then explain to your friend (i) how the PD game could be useful in understanding a CPR problem; and (ii) how it could be useful in understanding one other social science topic.

(b) Consider the infinitely repeated PD game. Write down the present value expressions for players A and B and indicate the meaning of your algebraic symbols. Explain how you would interpret these present values when the discount factor (δ) is a probability. Then explain why the following things are true: (i) if δ is close enough to zero, cooperation in every period is impossible; (ii) if δ is close enough to one, cooperation in every period is possible but it is not certain to occur. Use algebra where needed to clarify your answers.

3. Consider a large lake where many people go fishing. You have been hired as a consultant to help the local community develop an institution to govern their fishing activities.

(a) Describe four design principles that it would be useful for the community to know about. Explain why each principle is important, and how it could be applied to the specific issue of fishing in the lake.

(b) You are hired by many communities and always give the same advice. However, some communities are able to create good institutions relatively easily, while others fail to do so. Describe four factors that could account for such differences. Explain your answers.

Econ 354

Exam on "Governing the Commons" by E. Ostrom

Greg Dow February 24, 2014

Answer all three of the following questions.

1. Here are some questions about concepts we discussed in class. Where appropriate, use algebra or graphs.

(a) Consider a common pool resource where it is difficult to get accurate information about the behavior of individual resource users. Define type I and type II errors. Then explain why such errors could be important if the CPR is managed by (i) government regulation; (ii) dividing the CPR into two or more privately owned territories; (iii) having the users of the CPR play a repeated prisoner's dilemma game.

(b) Define the concept of rent in the context of a lake where people can go fishing. Explain what happens to rent when there is free access to the lake (anyone can go fishing), what would be necessary in order to maximize the rent from the lake, and why maximizing the rent is a good idea from the standpoint of Pareto efficiency.

2. Consider a prisoner's dilemma game with the usual payoffs $w > x > y > z$. Assume the game is repeated infinitely many times.

(a) Use algebra to describe the key conclusion from this model and give a detailed economic interpretation. Now suppose that y <u>decreases</u> while all of the other payoffs stay constant. Does this make it <u>more</u> likely or <u>less</u> likely that there is an equilibrium in which both of the players cooperate in every period? Again, give a detailed economic interpretation.

(b) In what ways does this model reflect important ideas from Ostrom's book? In what ways is this model unsatisfactory from Ostrom's perspective? Provide a detailed discussion.

3. Some CPRs are well managed while others are not.

(a) Choose a case study from chapter 3 in which a CPR was <u>well</u> managed. Describe the physical nature of the resource, the set of people using the resource, and the institutions involved. Were Ostrom's design principles followed in this case? Justify your answer.

(b) Choose a case study from chapter 5 in which a CPR was poorly managed. Describe the physical nature of the resource, the set of people using the resource, and the institutions involved. Were Ostrom's design principles followed in this case? Justify your answer.

Econ 354

Exam on "Governing the Commons" by E. Ostrom

Greg Dow October 18, 2013

Answer all three of the following questions.

1. Your friend notices that you have been reading "Governing the Commons" and wants to know what the book is about. She is waiting for a bus so your answers have to be short.

(a) Start by explaining the title. What does Ostrom mean by a commons? What are the types of commons she spends the most time discussing? Why does she think a commons needs to be governed? What are the main goal(s) of her book?

(b) Consider chapters 3, 4, 5, and 6 (the last four chapters of the book). For each of these, explain what the chapter does and how it contributes to the overall goal(s) of the book.

2. In answering this question, use only words and sentences. Do not draw a payoff matrix or use any algebra. I am looking for clear and complete verbal explanations.

(a) Describe a prisoner's dilemma game. Make your description general enough that it could be applied to a game with many players, where each player has many strategies. If you use any technical terms, be sure to define what they mean. Then explain what is meant by "the tragedy of the commons" and "the free rider problem in supplying public goods". How are these two ideas similar? How are they different? How are they related to the prisoner's dilemma game?

(b) Consider a prisoner's dilemma game as in part (a). What would happen if this game were played exactly twice? Explain your reasoning carefully, along with any assumptions you need to make. Now suppose instead that the game will be played many times and no one knows when it will end. Explain how a Pareto efficient outcome might be achieved, and give an economic interpretation of the conditions that would be needed for this to occur.

3. Consider a large lake where many people go fishing.

(a) Describe how government regulation and private ownership could be used to avoid the problem of overfishing. What are the advantages and disadvantages of each approach? Explain your reasoning.

(b) Ostrom would probably not recommend either of the approaches in part (a). What kind of institution would she recommend instead? What characteristics would it have? Why does Ostrom believe these characteristics would be desirable?

Econ 354

Exam on "Governing the Commons" by E. Ostrom

Greg Dow March 1, 2013

Answer all three of the following questions (note that question 3 is on the back).

1. Consider a pasture with two shepherds A and B. Each person can bring a low or high number of sheep to the pasture. The payoff matrix is

		B: low	B: high
A	low	8, 8	2, 11 - F
A	high	11 - F, 2	7 - F, 7 - F

where F is a fine that must be paid to the government by someone who chooses 'high'.

(a) Assume this game will only be played once, there is no communication, there is no trust, and there are no contracts. How high does the fine F need to be in order for (low, low) to be a dominant strategy equilibrium? Give a detailed explanation.

(b) Now assume F = 0 so that no one ever pays a fine but the game is played infinitely many times. How high does the discount factor δ need to be in order for (low, low) to occur in every period? Give a detailed explanation.

2. The total number of fish that are caught in a lake is q(n) where n is the number of people who go fishing. The average product q(n)/n first rises and then falls. All fish are sold at a fixed world market price p. Anyone who doesn't go fishing can obtain a fixed income w by working at McDonald's. There are a total of N people in the community.

(a) (i) The local government wants to maximize total income for all N people by giving out n fishing licenses. How should it choose n? Explain using a graph.

(ii) Assume the local government chooses n as in part (i). What is the maximum an individual would be willing to pay for a license? Explain using the same graph.

(iii) If everyone who goes fishing pays the amount in part (ii), what is the total amount the local government collects by selling licenses? Explain using the same graph.

(b) Instead of selling fishing licenses, now the local government wants to sell the entire lake to a private owner. The owner will decide how many employees to hire to catch fish. If the owner wants to maximize profit, how many employees should s/he hire? What is the maximum amount a private owner would pay to buy the lake? Explain using a graph.

3. Ostrom discusses two kinds of free rider (FR) problems that typically arise for common pool resources (CPRs).

(a) The first FR problem involves the amount of the resource that an individual is allowed to use. Explain why a FR problem normally exists when there is a CPR. Then describe the main features that a 'good' institution should have in order to solve this FR problem, and use an example to show how a 'good' institution operates in the real world.

(b) A second FR problem involves contributions of time, effort, money, and other resources by individuals who are trying to create a 'good' institution. Explain why a FR problem normally exists when people are trying to create an institution to manage a CPR. Then describe conditions under which people are likely to solve this FR problem, and use an example to show how such an institution was created in the real world.

Econ 354

Exam on Governing the Commons by E. Ostrom

Greg Dow February 24, 2011

Answer ALL THREE of the following questions.

1. Ostrom wants to find institutional solutions for common pool resource problems.

(a) Choose one of the case studies from chapter 3. Describe the nature of the CPR and the institutions that were used to manage the CPR. Were Ostrom's principles for good institutional design satisfied in this case? Why or why not?

(b) Choose one of the case studies from chapter 5. Describe the nature of the CPR and the institutions that were used to manage the CPR. Were Ostrom's principles for good institutional design satisfied in this case? Why or why not?

2. Consider a two-person prisoner's dilemma game.

(a) Let $w > x > y > z$ be the payoffs for the game. Let δ be the discount factor, where $0 < \delta < 1$. Assume the game is played infinitely many times. What condition must hold in order to have cooperation from both players in every period? Why is cooperation impossible if this condition is not satisfied? Explain.

(b) Which features of Ostrom's theoretical framework are included in the model from (a)? Which features of her framework are not included in this model? Explain.

3. For professors in the economics department, the office photocopier is a common pool resource. There is a temptation for individual professors to overuse it, which results in long waiting times and frequent machine breakdowns.

(a) Suppose anyone can use the economics department photocopier for free (students, faculty from other departments, etc.). Alternatively, people can go to a private copying service and pay a price of five cents per page. What is likely to happen in equilibrium? Would the resulting equilibrium be Pareto efficient? Hint: think about the model of rent dissipation for a fishery.

(b) Suppose that only economics professors can use the photocopier. If you wanted to predict whether or not the economics professors will create a good institution for managing the photocopier, what information would you need? Why?

Econ 354

Exam on Governing the Commons by E. Ostrom

Greg Dow October 25, 2010

Answer ALL THREE of the following questions.

1. Ostrom's book examines the problems associated with common pool resources.

(a) Define a common pool resource. Then consider (i) a bridge over the Fraser River; (ii) a computer server for a web site; and (iii) the SFU library. In each case, is the resource definitely a CPR, definitely not a CPR, or uncertain? Explain.

(b) Players A and B each decide whether to cooperate or defect when they use a CPR. Draw a payoff table using letters (not numbers), and say what inequalities must hold among the payoffs if the game is a prisoner's dilemma. Explain why each of the inequalities is important, and what impact it has on the outcome of the game.

2. There are various strategies for avoiding a 'tragedy of the commons'.

(a) One approach is government regulation and another is private ownership. Explain why each of these two approaches might help to solve the problem, and why each is likely to involve predictable costs, difficulties, or inefficiencies.

(b) Choose one of the 'success stories' from chapter 3 or 4. Describe the nature of the resource and why there was a temptation to overuse it. How did the appropriators prevent overuse? How did they avoid the kinds of problems you discussed in part (a) for government regulation and private ownership? Explain carefully.

3. Emissions of carbon dioxide contribute to global climate change. The two largest emitters (the US and China) account for 40% of world emissions. The top ten countries account for 66% of total emissions, and the top 20 countries account for 79%. Rich countries generally have high emissions per person, middle-income countries have intermediate emissions per person, and poor countries tend to have low emissions per person. The costs of reducing carbon emissions depend on the technology and natural resources of each country, and the future damage that will result from climate change also varies considerably among different countries.

(a) What conditions are usually needed in order to evolve good institutional solutions for a CPR problem? Explain why each condition is important and give examples (do not discuss climate change in this part of the question).

(b) Based on your answer in (a), are you optimistic or pessimistic about the chances that the world will develop good institutions to solve the climate change problem? Can you think of any strategies that would make a solution more likely? Explain.

Econ 354

Exam on Governing the Commons by E. Ostrom

Greg Dow October 18, 2007

Answer ALL THREE of the following questions.

1. According to the October 2007 *Scientific American*, Quito (the capital of Ecuador) gets drinking water from a river that begins in the Andes Mountains. Unfortunately, the water that reaches the city is often unsafe because of waste from farm animals grazing upstream along the river. Several agencies (the US Agency for International Development, the Nature Conservancy, the Quito water supplier, and others) have contributed money to deal with this problem. Some of the money has been used to hire guards to monitor the river and to educate farmers about new grazing practices.

(a) Describe the characteristics of a "common pool resource" according to Ostrom. Does the Quito water supply fit her definition of a CPR? Why or why not? If you are uncertain, say what information you would need and explain why it is important.

(b) Ostrom talks about the issue of "institutional supply" and discusses the conditions under which good institutions are likely to evolve to solve a CPR problem. Based on the short description above, would you be optimistic or pessimistic that good institutions will evolve to handle the water supply problem in Quito? If you are uncertain, say what information you would need and explain why it is important.

2. Ostrom frequently mentions the following concepts: (a) discounting future payoffs; (b) self-enforcing agreements; (c) mutual monitoring; and (d) credible commitment.

(a) Describe the repeated prisoners' dilemma game (played infinitely many times) and explain how each of these four concepts is included or represented in the model.

(b) Give one example of a "success story" from Ostrom's book (either chapter 3 or 4) and discuss whether the repeated prisoners' dilemma helps you to understand why it was a success. Then give one example of a "failure or fragility" (from chapter 5) and discuss whether the repeated prisoners' dilemma game helps you to understand why it was <u>not</u> a success.

3. A major problem with common pool resources is the possibility of rent dissipation.

(a) Define the economic concept of rent for a natural resource like a fishery. Then use a graph to explain why (i) allowing free entry into a CPR can lead to zero rent; and (ii) why excluding some users of the resource can lead to a Pareto improvement. If the goal is to maximize total community income, how should the optimal number of users be determined? Explain.

(b) NOTE: in answering this question, use <u>different</u> examples from the ones you used in answering question 2(b). Give an example of a successful CPR and discuss who was allowed to appropriate the resource. Then give an example of a CPR where it was difficult to prevent new appropriators from using the resource. For each case, say what impact these entry conditions had on the value of the resource over time.

Econ 387

Exam on Governing the Commons by E. Ostrom

Greg Dow October 22, 2003

Answer two of the following three questions. Do not answer all three.

1. Choose one of the 'success stories' from chapter 3.

(a) Briefly describe the CPR, the users of the resource, and the institutional framework governing the CPR. What do you think are the most important factors in explaining how the community was able to avoid the tragedy of the commons? Why?

(b) Why do you think the community chose not to solve the CPR problem through pure private ownership, either by dividing the resource and giving everyone a separate piece of it, or by having a single person own the entire resource? If you think the answer mainly involves efficiency issues, explain. If you think the answer mainly involves equity issues, why couldn't the community handle this by requiring that owners pay compensation to non-owners?

2. Choose one of the 'institutional supply' cases from chapter 4.

(a) Briefly describe the CPR, the users of the resource, and the institutional framework that was eventually created to manage the resource. Before these institutions were created, would the prisoners' dilemma game have been a reasonable model of the situation? Explain.

(b) How did the members of the community solve the first-order free rider problem (avoiding overuse of the resource)? How did they solve the second-order problem (creating the institutions necessary to solve the first problem)? What factors made success likely? Were there any negative factors that had to be overcome? Explain.

3. Choose one of the 'failure' or 'fragility' cases from chapter 5.

(a) Briefly describe the CPR, the users of the resource, and the institutional framework governing the CPR. Why does Ostrom view this case as a failure, or as a 'fragile' success? What negative factors in the environment made it unlikely that satisfactory institutions would evolve? Explain.

(b) Using a graph, explain the concept of rent dissipation. Define what rent is (for a CPR), why open access tends to drive rent to zero, and why this result is not Pareto efficient. Then say whether rent dissipation was an important problem for the case from part (a), how people tried to solve this problem, and whether they succeeded.

Econ 387

Exam on Governing the Commons by E. Ostrom

Greg Dow October 24, 2001

Answer two of the following three questions. Do not answer all three.

1. Consider a VERY simple model of global warming. There is a rich country (A) and a poor country (B). Each country decides whether to reduce emissions of carbon dioxide or continue its current emissions. In addition country A might offer some non-negative compensation ($x \geq 0$) to country B in the form of development aid. All payoffs are measured in dollars and are indicated in the following table:

		B (poor)	
		reduce	continue
	reduce	2-x, 2+x	-1-x, 7+x
A (rich)	continue	9-x, -1+x	0-x, 0+x

(a) Given a fixed value of x, does A have a dominant strategy? Does B? What result occurs in equilibrium? Is this result Pareto efficient? Justify your answer.

(b) Assume $x = 0$. Draw a graph with A's payoff on the horizontal axis and B's payoff on the vertical axis, and show the four distinct points that are reached for each pair of strategies. What additional points become possible if x can be positive? Why?

(c) Now suppose A and B can sign a treaty which commits them to a pair of strategies and to a value of x. Starting from (continue, continue) with $x = 0$, if x must remain at zero what treaty will they sign? If x can now be set at any positive value which is acceptable to both countries, what treaties might they sign? Justify your answers.

2. A fundamental point in Ostrom's book is the importance of defining boundaries that say who is entitled to use a common pool resource and who is not.

(a) Using an economic model, explain what is likely to happen when everyone is free to use a common pool resource, and why the resulting equilibrium is not efficient.

(b) Describe one example from the book where boundaries were successfully defined and enforced, and one example where they were not. Comment on whether it was possible in each case to avoid rent dissipation, and explain your reasoning.

3. Ostrom lists a number of conditions which make it more or less likely that a group of people will develop institutions to solve a common pool resource problem.

(a) List five of these conditions and explain why each is important.

(b) Choose one of the successes from the Ostrom book and one of the failures. In each case describe the resource involved, the users of the resource, and how people tried to avoid overuse of the resource. Do the conditions in (a) help to explain why one group succeeded and the other failed? Be as specific as possible.

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Exam on Governing the Commons by E. Ostrom

Greg Dow October 21, 1999

Answer two of the following three questions. Do not answer all three.

1. The prisoners' dilemma game plays a central role in Ostrom's book.

(a) Define what is meant by a prisoners' dilemma game and explain why it is important for Ostrom. What are the major insights we get from (i) the one-shot version of the game; and (ii) the infinitely repeated version?

(b) Ostrom believes there are a number of ways in which the prisoners' dilemma idea oversimplifies the real-world problems created by common pool resources. Sketch out the main limitations or weaknesses of this model as a device for thinking about CPRs, and illustrate your argument with two case studies taken from the book.

2. Two major themes in Ostrom's book are (i) the characteristics that successful CPR institutions typically have; and (ii) the circumstances under which institutions of this kind are likely to be created.

(a) What are the main 'design principles' that successful CPR institutions often have? For each principle that you mention, explain why it is important or necessary, and give an example from the book where this principle was adopted or implemented.

(b) Describe the main conditions under which successful CPR institutions are likely to arise, and explain why each of these conditions is important or helpful. Illustrate your reasoning with some examples from the book.

3. The lobster fishery in Maine has the following characteristics. There are 2200 full-time lobster fishermen and another 7000 part-timers. Each harvests lobsters from between 300 and 600 traps placed in the ocean. Lobster fishing is highly territorial. One must not only have a license but also be accepted by the small group of men fishing out of a particular harbor. People from other harbors who trespass in a local territory are typically punished by having their traps destroyed. The most important seasons for lobster fishing are April to June, when adult lobsters migrate toward shore, and August to November, when young lobsters grow to sufficient size. The market on which lobsters are sold is reasonably competitive, although prices change frequently and fisherman usually have long-term relationships with specific buyers.

(a) Based on this brief description, do you think there is likely to be a serious 'tragedy of the commons' problem in the lobster fishery? Why or why not?

(b) What other information would you want to have in order to make a more confident prediction about whether the lobster resource is likely to be depleted over time? Say what you would like to know, and why you need to know it.

Econ 387

Exam on Governing the Commons by Elinor Ostrom

Greg Dow October 22, 1998

Answer two of the following three questions. Do not answer all three.

1. Salmon lay their eggs in fresh water streams, often very far inland. When young salmon hatch, they swim downriver to the ocean, spend a few years there, and then return to fresh water. After swimming back upstream, they lay their eggs and die.

   The migration route of the salmon takes them long distances along the Pacific coast of North America. For example salmon that hatch in British Columbia may migrate past Alaska (north of BC) or Washington state (south of BC) and salmon that hatch in these states sometimes swim through BC waters. Many different groups fish for salmon when they swim past, including small-scale fishers in coastal communities, large-scale commercial trawlers, native groups, tourists who fish for sport, and so on. These various groups tend to use very different fishing technologies.

   Recently there has been concern in Canada that salmon populations are declining, and there is fear that some kinds of salmon may disappear entirely. However, there is uncertainty about the seriousness of the problem, partly because there are natural fluctuations in salmon populations. There is also controversy about the best way to reduce the salmon harvest: each group wants all the others to take fewer fish.

   Does Ostrom's book give you any insight into the nature of this problem? Based on your reading, would you be optimistic or pessimistic about the likelihood of a successful solution? What strategies might prove helpful in solving the problem?

2. Economists and other people interested in common pool resources frequently refer to the 'tragedy of the commons'.

(a) Use game theory to explain this concept. What is the source of the problem? Why is there a tragedy? Briefly describe two real examples where this idea is relevant.

(b) Carefully outline how the tragedy of the commons can be prevented when the game among appropriators is played more than once. Does repetition of the game always make it possible to avoid a tragedy, or only sometimes? Explain.

3. There are two standard methods which can be used to prevent overuse of a common pool resource: government regulation, and private ownership. Ostrom believes that both of these approaches lead to important difficulties in practice.

(a) Briefly say why government regulation might help to solve the problem of overuse, and identify some potential disadvantages of this approach.

(b) Briefly say why private ownership might help to solve the problem of overuse, and identify some potential disadvantages of this approach.