Teaching Plan

Title	Tragedy of commons
Instructional Objectives	➢ To introduce the concept of property right. ➢ To illustrate how different decisions made by people under the system of private property right and common property right. ➢ To illustrate the over-harvesting/over-exploitation tendencies of a common-property resource. ➢ To introduce some solutions for the tragedy of commons.
Keywords and Concepts Illustrated	➢ Property rights ➢ Private property right ➢ Common property right ➢ The tragedy of commons
Needed Time	➢ A double-lesson period (80 minutes)

Sessions	Details	Time Spent
Activity/ Announcement	1. T: Who owns the open sea and its resources? "Nobody" or "all of us". The ocean and its resources can be accessed by all comers. In economics, we usually say that the property right of the open sea and its resources is not well defined. 2. T: What is property right? Property right is an enforced right to select uses of an economic/scarce good (resources in ocean are economic/scarce goods in the sense that more of them is preferred to less of them and the marginal utility of the last unit consumed is positive). Property rights can be classified into two types. They are private property right and common property right. 3. T: If someone has full private property right over a good, that means he/she has a) the right to exclude others for the use of this good, b) the right to derive income from this good and c) the right to sell the use right of this good to other people for other things. For example, a house owner has a full private property right over his/her house. 4. T: If no one has a right to exclude others from using a good and all are free to compete for its use, this good is called a common property. In other words, the exclusive right and the right to transfer of a common property are absent. Also, no net income (rent) can be derived from using a common property. We say that people have a common property right over such property. For example, the open sea and its resources. 5. T: Now, let's play a game. Divide yourselves into eight groups of five. 6. T: Each group of five jointly represents a fisherman. So there are eight fishermen in this country. These fishermen jointly own a pond which nurtures some fish this year itself without being taken care of by the fishermen. 7. T: Now, elect one representative of your group to catch the fish. All the representatives should stand on the edge of the	15 mins 5 mins

		flip chart papers. (Classroom setting can be seen in Diagram 1. Use the blank side of the connected flip chart papers this time. Take 80 soybeans from a pocket and drop them randomly on the flip chart papers. No need to tell students how many soybeans there are). Imagine that the soybeans are fish. Since the fish can swim anywhere they like, they are located randomly in the pond. You have two periods to catch fish, each period will last for 30 seconds. However, not one single fish will be added back to the pond after the first period. When I say, "Go", you will have the first 30 seconds to catch the fish, but you can't enter into the pond. I'll buy your fish in these two periods. In the first period, I'll pay you one candy for six fish. In the second period, I'll pay you two candies for six fish. Since the fish are not storable, you cannot catch fish in the first period and store them for sales in the second period. Only those fish you catch in the second period can be sold in the second period. No communication can be made among all fishermen. You can only make your own decision on how many fish you want to catch in both rounds of fishing. 8. Say "Go" and keep time for 30 seconds. *(They usually catch all fish at the first round because students do not trust others for not over-harvesting the limited "resource" in the first round. Thus, they do not have to play the second half-minute round usually.)* 9. Teacher records down the number of fish each group gets and sells. If there are any fish left on the flip chart papers, continue with period 2 for 30 seconds and record the number of fish each group gets and sells too. Remember to collect all soybeans back for the use in the second round of the game. 10. T: Now, we play the game again. Everything is the same as before, but communication among groups is allowed this time. You can talk to each other and try to influence each other's desired number of fish caught in both rounds. 11. Take 80 beans and drop them randomly on the connected papers. Say "Go" and keep time for 30 seconds. Record down the number of fish each group gets and sells. If there are any fish left on the flip chart, continue with period 2 for 30 seconds and record the number of fish each group gets and sells too. Remember to collect all soybeans back for the use in the third round of the game. *(Note that, communication may not solve the tragedy of commons. Students may still attempt to catch large number of fish in order to free ride off the conservation efforts of others. Moreover, since the agreements students reach don't bind, they may not believe in others' promises to restrain their number of fish caught. A student who has no faith in others' promises to restrict their number of fish caught would not necessarily feel bounded by his/her promise to restrict*	5 mins

	his/her own.) 12. T: This time the pond is divided into eight areas. Each fisherman can only catch fish in his/her own area of the pond. There are still two periods for fishing and selling fish. The prices of fish are the same as before. (Turn the connected flip chart papers over. This time, use the side with eight equally divided squares. Please refer to Diagram 1. Then take 80 soybeans from pocket and drop them on the paper. The location of fish can be broadly even, but need not be equal. 13. Assign an area of the flip chart papers to each group. Say "Go" and keep time for 30 seconds. Record down the number of fish each group gets and sells. If there are any fish left on the flip chart paper, continue with period 2 for 30 seconds and record the number of fish each group gets and sells too. 14. Discussions. 1 When the game was played at the first and second round, the pond was jointly owned. What type of property right was implemented? Why? 2 Why do you think fishermen behaved as they did at the first round? (Explain the tragedy of commons here.) T: When a type of good or resource is with open access to the commons for capturing, each person has an incentive to capture as many and quickly as he/she can. A global experience has shown over-exploitation often occurs when access to the fish stocks in ocean is open to all. It is because fish stocks have traditionally been available to fishermen on a first-comes, first-served basis. Fishermen have incentive to capture as many fish as possible even if doing so is not an efficient way to allocate resources and not an optimal way to maximize all fishermen's total income. Most importantly, over-fishing undermines the ability of fish stock to maintain its abundance. In other words, over-fishing hinders fish reproduction. It is because fishermen capture too many fish within a short period of time. Not enough fish are left for producing offspring. Hence, there are not enough fish supplied for the next period of time. The tendency of over-exploitation of a common property is called "tragedy of commons". Can you suggest the other examples of "tragedy of commons"? For example, over-grazing and over-drilling, etc. 3 Did you behave differently when communication was allowed in the game played in second round? What did you communicate? Did you agree on some joint action(s)? Why or why not? What would be the "best" joint action? Did you do exactly what you had agreed to do in the game? Can communication or cooperation always solve the problem of "tragedy of commons"?	5 mins 30 mins

	4 When the game was played in the third round, what type of property right was implemented? Why do you say that? Did you behave differently when the private property right over the pond had been well defined? 5 Besides defining well the property right, what other solutions can you suggest for overcoming the problems brought about by tragedy of commons? (a) Legal limits – seasonal restriction of fishing in ocean or close fishing season in Hong Kong (b) taxes (c) subsidies, etc. 6 Can you think of a sensible reason why you can get more candies for the same amount of fish you picked up in the second period of time? (Ans: price of fish in the second period of time is higher than the one in the first period of time. It may be due to the excess supply of fish in the first period and a shortage in the second period of time.) 15. Remember giving candies to each group according to the record of the amount of soybeans it picked up.	
Tools	➢ Soybeans — 80 – 100 pieces ➢ Candies — the amount is up to teacher ➢ 2 Flip chart papers — connect them into one and draw eight evenly divided squares on one side	
Definitions	➢ Property rights — property rights are socially enforced rights to select the use of an economic good. It can be seen as rules or criteria of competition which must exist to solve conflict. (Leung, 1989) ➢ Private property right — a person has a private property right over a good means that he/she has a) the right to exclude others for the use of it, b) the right to extract exclusive income from its use; and c) the right to transfer or sell the property to anyone as he/she sees fit. (Kwok and Chan, 1994) ➢ Common property right — if people have a common property right over a good means that no one can has the right to exclude others from using the good, and all are free to compete for its use. In other words, the exclusive right to use and the right to transfer are absent. Moreover, no net income can be derived from using this good. (Kwok and Chan, 1994) ➢ The tragedy of commons — refers to the tendency of over-exploitation of a common property that causes problems such as inefficient allocation and use of recourses, and over-production of certain goods.	
Variations of this experiments	➢ The payment for soybeans picked up can be adjusted based on the affordability of teacher or class budget. You can even use seeds of some plants instead of candies as the	

	payment.	
References	➢ Hazlett, Denise. A Common Property Experiment with a Renewable Resource. *Economic Inquiry*, 35,October 1997, pp. 858-861 ➢ http://www.fte.org/teachers/lessons/efl/fri/eflfri2.htm ➢ Leung, M. P., 1989, *Hong Kong Advanced Level Examination Microeconomics*: Hung Fung Book Co.Ltd. ➢ Kwok, W. K. and Chan, C. M., 1994, *A-Level Microeconomics*: Golden Crown Publication. ➢ Indicello, S, Weber, M. and Wieland, R., 1999, *Fish, Markets, and Fishermen: The Economics of Overfishing*: Island Press.	

Appendix Materials for Teacher

Table 1 Record of Fish Caught

Diagram1 Classroom setting