

Econ 496, Natural Resource Economics
Winter 2012
Assignment 1

The due date for this assignment is **Wednesday January 25** (in class or by dropping it to my mailbox by 9 p.m.). Assignments must be stapled and clearly written. Late assignments will be penalized (the longer the delay, the larger the penalty). No assignment will be accepted after **January 30**.

1. Environment Canada is considering some projects to be undertaken in the near future. The first project concerns the preservation of the white-headed woodpecker in Okanagan Valley, BC. The costs and benefits of this project are represented in Table 1 (all the numbers are in million of dollars). The second project concerns the preservation of the natural environment in Côte-Nord, QC. The associated costs and benefits of this project are represented in Table 2. Currently, the discount rate is 5%.
 - (a) Find the net present value and the benefit cost ratio of the two projects.
 - (b) Assuming the Environment Canada can only undertake one project, which one should that be? Justify your answer.
 - (c) Assuming that Environment Canada has a strict budget of \$40 (the projects can be undertaken in any multiple, *e.g.* 90% of the project comes at 90% of the cost and yields 90% of the benefit). How should Environment Canada allocate the funding between the two projects?

2. The Ministère du Développement durable, de l'Environnement et des Parcs is considering conducting a massive eradication effort for the invasive weed yellow star thistle. The initial cost of the effort will be \$7 million now, \$5 at the end of the first period, and \$2 million at the end of the second. No benefits are expected to accrue until the end of the third period. Benefits from removing the weed (increased wildlife grazing, improved land access, increased soil moisture, water conservation, and the preservation of biodiversity) are estimated to be \$2.8 million dollars a year, although annual maintenance and control costs will be \$0.3 million. These costs and benefits are expected to continue for 10 years following the two years of initial investment.
 - (a) If the discount rate is equal to 5%, what is the benefit cost ratio and what is the net present value of the eradication effort?
 - (b) If the discount rate is 10%, what is the benefit cost ratio and what is the net present value of the eradication effort?

3. The demand and supply for copper are given by $Q_D = 120 - 5P$ and $Q_S = 10P - 15$.
 - (a) What is the marginal willingness to pay for the 40th unit of copper? What is the total willingness to pay for all 40 units?
 - (b) What is the marginal willingness to accept for the 70th unit of copper? What is the total willingness to accept for all 40 units?

- (c) Assuming that the demand also expresses the social marginal benefit and the supply expresses the social marginal cost, what is the optimal quantity of copper to be sold in the market? What are the associated consumer and producer surpluses? Is this solution efficient? Justify your answer.

Year	Cost	Benefit
0	\$15	\$0
1	-	\$1
2	-	\$2
3	-	\$2
4	-	\$3
5	-	\$3
6	-	\$4
7	-	\$4
8	-	\$3
9	-	\$2

Table 1: Project 1

Year	Cost	Benefit
0	\$60	\$0
1	-	\$10
2	-	\$15
3	-	\$20
4	-	\$20
5	-	\$15

Table 2: Project 2