

AAE / Econ / Env. St. 343
Environmental Economics

Homework #3
Suggested Answers

Please download the following outside article posted on the course website:
Mitchell, J.G. 2001. "Oil field or sanctuary?" *National Geographic*, 200 (2): 46-55.

Short answers please.

1. What are the opportunity costs of drilling for oil in the Alaska National Wildlife Refuge (ANWR)? What are the opportunity costs of preserving ANWR as wilderness?

The opportunity costs of drilling may include loss of wildlife habitat and diversity, loss of wilderness aesthetics, and reduction of subsistence for the Gwich'in tribes. Opportunity costs of preserving ANWR may include loss of jobs in oil, foregoing a state/national decrease in oil prices, and a continued reliance on imported oil, and foregoing oil-lease revenue dividends for all Alaskans.

In class, we discussed the range of benefits provided by the environment (see, also, section 3.2 of your textbook). Different terms to describe these benefits are *indirect benefits, direct benefits, use values, non-use values, existence values, option values, bequest values, market goods, and non-market goods.*

2. Consider the scenario in which ANWR is developed for oil drilling. Which indirect benefits would be increased? Which direct benefits would likely be reduced? Explain your answers.

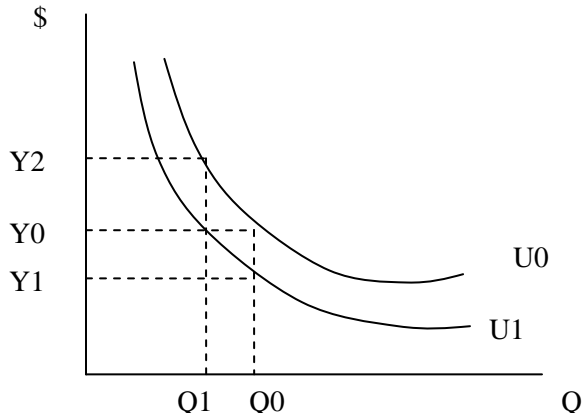
The indirect benefits that would be increased from oil drilling include increased consumer and producer surplus from oil production. The direct benefits that would be reduced include recreation and wildlife habitat.

3. For the direct benefits that are diminished, categorize these benefits using the remaining terms listed above (that is, terms other than indirect and direct benefits), noting that *more than one* term may apply. Justify your answers.

The indirect benefits are market goods, since oil is traded in a market with an observed price. The direct benefits are non-market because they're not traded in a market with an observable price. The direct benefits associated with recreation have a use value, because people derive recreation benefits by directly interacting with goods. The direct benefits associated with wildlife habitat could have use value (e.g. hunting), or non-use existence values because people may derive benefits from the existence of wildlife, independent of any direct use.

Suppose a contingent valuation method (CVM) survey is sent to a large sample of U.S. households to quantify the economic benefits of protecting ANWR as wilderness.

4. Using utility curves, graphically depict Willingness-to-Pay (WTP) and Willingness-to-Accept (WTAC) measures of economic value derived from this survey.



Protecting ANWR as wilderness prevents a decrease in environmental quality. WTP to prevent a decrease in Q from Q_0 to Q_1 is equal to $Y_0 - Y_1$. WTAC a decrease in Q from Q_0 to Q_1 is equal to $Y_2 - Y_0$.

5. Discuss the property rights to preserving ANWR as wilderness that are implied by the WTP and WTAC measures from question #4.

With WTP, since the respondent must pay to prevent the decrease in Q , then they have the property right to the new level of Q and their WTP is measured off of utility curve U_1 . With WTAC, since the respondent must be paid to accept the decrease in Q , then they have the property right to the current level of Q and their WTAC is measured off of utility curve U_0 .

Now suppose three versions of the survey are mailed out; each to one-third of the households in the sample. The first version asks willingness to pay to protect ANWR as wilderness. The second version asks willingness to pay to protect forestland in Montana as wilderness. The third version asks willingness to pay to protect *both* ANWR and the Montana forestland as wilderness. Suppose that the results obtained with each version of the survey are the same. For example, the average willingness to pay is the same for each survey version.

6. In class, we discussed a number of challenges that arise with designing CVM surveys. What potential problem with CVM do the results described above illustrate? Explain your answer.

Residents appear to be insensitive to the amount of the environmental good being bid for, since they're WTP the same amount for different combinations of ANWR and Montana forestland. These results likely illustrate the embedding problem, where people are stating their WTP for wilderness protection in general, rather than the specific

wilderness areas in Alaska and Montana. While hypothetical bias is another possible explanation, it wouldn't explain why the results obtained from each survey are the same.