

Homework Assignment

(The attached PDF file has better formatting.)

Suppose many people want to catch fish in a well-stocked lake.

- As the number of fishermen increases, the cost of hiring boats and equipment rises; that is, the *marginal cost* of fishing *rises* with the *number of fishermen*.
- As the number of fishermen increases, the number of fish caught by each person decreases; the *marginal value* of fishing *decreases* with the number of fishermen.

The table below shows the marginal cost and value of fishing:

| <i>Fishermen</i> | <i>Marginal Cost of Fishing (Per Person)</i> | <i>Total Value of Fish Caught</i> | <i>Value per Fisherman</i> | <i>Social Marginal Benefit</i> |
|------------------|--|-----------------------------------|----------------------------|--------------------------------|
| 0 | – | \$0 | – | – |
| 1 | \$5 | \$20 | | |
| 2 | \$6 | \$36 | | |
| 3 | \$7 | \$48 | | |
| 4 | \$8 | \$56 | | |
| 5 | \$9 | \$60 | | |
| 6 | \$10 | \$60 | | |
| 7 | \$11 | \$56 | | |
| 8 | \$12 | \$48 | | |

- Complete the last two columns of this table. The “value per fisherman” is the *average value per fisherman*, assuming all fishermen have equal ability to catch fish. For example, the value per fisherman for two fishermen is $\$36 / 2 = \18 .
- The social marginal benefit is the *additional social value* of the *last fisherman*. For example, the *social marginal benefit* of the second fisherman is $\$36 - \$20 = \$16$.
- If the lake is common property, how many fishermen will use it? (Choose the row where the marginal cost to the fisherman in the second column equals the average value of fishing to the fisherman in the fourth column.)
- How much *social gain* is created by fishing in the lake? (For the row determined above, use the value of the fish caught minus the product of the number of fishermen and the marginal cost of each fisherman.) You should get an answer of \$0, since all gains from common property are dissipated.

Question: The marginal cost includes the value of the fisherman’s time. This example says that the net present value of fishing is zero. That is true for all work; if we include the value of one’s time, the net present value of any occupation should be zero (in a competitive labor market). What is different about common property?

Answer: The cost includes the value of the fisherman’s time but not the opportunity cost of the lake. The lake is a valuable asset. If there were only one fisherman, he would pay $\$20 - \$5 = \$15$ to use the lake. The lake

produces a daily income of \$15, which might be worth \$50,000 (depending on the opportunity cost of capital, the growth rate of the daily income, and the lifetime of the daily income).

If there were only two fishermen, they would pay $\$36 - 2 \times \$6 = \$24$ to use the lake. The lake produces a daily income of \$24, which might be worth \$80,000, depending on the opportunity cost of capital, the growth rate of the daily income, and the lifetime of the daily income. These variables depends on the daily depletion of fish from the lake.

Our concern is not the value of fishing as an occupation. If fishing is competitive, fishermen earn a normal wage for their efforts. Our concern is the value of the lake itself. Although the lake is clearly a valuable asset, all its value is dissipated by overuse.