

Pollution game by Shapley and Shubik 1969, 4 point home assignment

Sent solutions to yulia.pavlova@luke.fi or bring to the next lecture

Consider 5 villages around a lake. Each village takes its drinking water from the lake, and discharges its sewage into the lake. Each faces the choice to treat the sewage before discharging it or not. The costs of treating the sewage before discharging is 50.000 per year. On the other hand the yearly costs for cleaning the water it takes from the lake to make it drinkable is 20.000 times the number villages that *do not treat* their sewage before discharging it.

- fill in the table that shows *annual total cost* to a village as a function whether it treats or does not treat the sewage (hint slide 28.lecture1) and of the number of other villages that treat their sewage.

| | | Number of others villages that <i>Treat</i> | | | | |
|--------|-----------|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 |
| Farmer | Treat | | | | | |
| | Not Treat | | | | | |

- show that the game belongs to Prisoner's dilemma types of coordination games
- what is the smallest size of coalition of villages which could benefit by having its members choose *Treat*? (Assume that the farmers not in the coalition would continue to pursue their individual self interest by choosing *Not Treat*)
- if such a coalition is formed, would it better to be in coalition or fee-rider?