

An enterprise calling itself "U-Toob" rents out inner tubes near the origin of a spring-fed river, for the use of recreationists who like to float down the river. U-Toob runs a shuttle bus that picks up tubers and tubes at a point downstream and returns them to the start point. Recently, U-Toob's business has been impacted by a privately owned fish hatchery that has begun drawing well water from the same aquifer feeding the spring and therefore the river. The hatchery sells fish to the state wildlife agency which uses them to restock fished waters throughout the state. Effluent from the hatchery flows to the river with only 5% consumptive use, but this return flow occurs downstream of the river segment employed by U-Toob. The owner of U-Toob has noticed that the hatchery operation has reduced average springflow to the detriment of tubing thrills, with the consequence of substantially reduced tube rentals. Moving the U-Toob operation downstream is not feasible as downstream topology yields a slow (and boring) tubing experience.

- a. Ignoring all other values for this water, assign ownership of the aquifer's water to any agent whomsoever. Include the concept of transferability in your ownership "doctrine" and describe how monitoring, enforcement, and exchange activities will be conducted. Clearly describe who owns what in as much detail as is practical.
- b. Using the three-axis, two-agent graphical model or equivalent mathematical relations accounting for marginal costs and marginal benefits, give an example of a privately optimal trade agreement that could be reached between these two firms. Indicate both the pretrade conditions (such as water use, agent profits, and water value) as initially established in part (a) as well as the conditions resulting from privately efficient trade. What elements change due to trade and what are those changes?
- c. Now assign initial ownership in a different way and reperform the analysis of part (b) to again give results of a privately optimal agreement between all parties. What distinctions are apparent in comparing results here to those of part (b)?