

2B: Optimizing Groundwater Management

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The papers of this session were all concerned in one way or another with common pool resource externalities in the context of groundwater. Three of the papers apply hydrological-cum-economic modelling to aquifer or surface stream depletion problems in the American west. These are interesting and important contributions but perhaps not of direct relevance to groundwater depletion in developing countries.

The fourth paper, by Knapp and Franklin, makes a broader point. They try to operationalize the notion of “sustainability” in the context of groundwater. What does sustainable extraction of groundwater actually mean? One definition is that the water-table not fall over time (or across generations), but this is, in general, inconsistent with efficient extraction of the resource.

In addition, according to K&F, the focus on the resource stock alone is too narrow. They introduce a financial asset. Their weaker notion of sustainability is that utility—or, more simply, consumption—be non-decreasing across generations. In this case, sustainable extraction is quite consistent with falling water-tables; farmers who pump out more groundwater (or do so earlier) have more revenues to invest in the financial asset (and bequeath to their children). The resource stock can decline even as intergenerational equity is maintained. Indeed, this can happen whether there is a common pool resource externality or whether the aquifer is managed in such a way to avoid “over-extraction”—it really does not matter too much (according to their calculations).

Bottom line (and lessons for developing countries):

- (1) Focusing on physical depletion of groundwater is not necessarily a valid guide to welfare.
- (2) Property rights matter! Insofar as groundwater is governed by the rule of capture, it is the farmer who drills the well (and his future generations) that benefit from the resource rents. The sustainability analysis entirely avoids the distributional issue.
- (3) And here is a closely related point that I have not seen addressed in the literature: Especially in south Asia, farmers expend considerable resources drilling for groundwater, which is, essentially, a form of rent-seeking. So, there are likely too many borewells chasing too little groundwater. Moreover, some fraction of those wells that are dug eventually will fail as the water table falls, which is a pure deadweight loss. Now, the models of stock externalities used in this session allow pumping costs to depend on depth to water table for existing well-owners, but do not account for the resource cost of rent-seeking. How these costs affect the sustainability calculus is an important avenue for future research.