

## The Hidden Costs of Groundwater Overdraft

<http://waterinthewest.stanford.edu/groundwater/overdraft>

Groundwater overdraft occurs when groundwater use exceeds the amount of recharge into an aquifer, which leads to a decline in groundwater level. This condition is occurring in an increasing number of groundwater basins throughout California, and is impacting the state in many ways.

Because groundwater is a primary water source for many people, as well as a crucial supplement to diminished surface water in dry times for many others, groundwater basins in overdraft create great uncertainty and vulnerability. An increasing number of people are seeing their wells dry up, leading to conflicts between neighbors.

There are many direct and indirect impacts of groundwater overdraft that affect not only groundwater users, but most other Californians in ways that may not be as obvious:

- **Land subsidence** can have serious consequences for infrastructure such as canals, levees, roads, bridges, building foundations, and pipelines. Groundwater-related land subsidence is an ongoing problem in many places throughout the state. Some areas in California's Central Valley are dropping more than one foot a year.
- **Energy** demand and costs go up as groundwater elevations decline. These declines make it financially difficult for groundwater pumpers, place increased pressure on the state's electrical grid, and increase greenhouse gas emissions.
- **Water quality** degradation has been linked to groundwater overdraft, as it increases the concentration of pollutants in an aquifer. Seawater can be drawn into overpumped coastal aquifers, contaminating the basin and reducing freshwater supplies.
- **Ecosystems** that depend on groundwater are numerous. Many rivers, streams, wetlands, springs, lakes, and terrestrial vegetation – and the wildlife they support – rely on groundwater. Groundwater overdraft can place increased pressure on these ecosystems.
- **Economic costs** result from the many direct and indirect impacts of overdraft. Direct costs may stem from using more energy, drilling a deeper well or a new well, treating contaminated groundwater, or finding alternative water supplies. Many other costs of groundwater overdraft are externalities that are harder to quantify, including health problems linked to drinking contaminated groundwater or reductions in ecosystem services as rivers and springs dry up.

While some of the impacts of groundwater overdraft are permanent, aquifers have a great ability to recover with recharge or replenishment. Adequate groundwater management is critical to ensure that groundwater aquifer conditions improve or remain healthy over time. Overdraft and its effects

are of particular concern to California now, both because the current drought is accelerating the rate of overdraft in many basins, and because the California legislature has passed a series of bills requiring local governments and water management agencies to develop sustainable groundwater management plans to get chronic and unreasonable overdraft under control.

Read more at <http://waterinthewest.stanford.edu/groundwater>