

## ***Aquifer Depletion and Potential Impacts on Long-term Irrigated Agricultural Productivity***

Groundwater is the Earth's [most extracted raw material](#).

- Approximately 70% of groundwater withdrawals are used for irrigated agriculture.
- Consequences of the long-term depletion of groundwater resources include the direct impacts of depleting the resource and global impacts of groundwater being released to the atmosphere and oceans once it is brought above ground.

Groundwater [use has grown significantly](#) across the United States over the last century, especially to supply irrigated agriculture.

- Technology began to be deployed extensively across the United States in the 1950s, which coincided with rural electrification across the nation that facilitated use of submersible pumps.
- A second factor increasing groundwater use has been long-term regional droughts, especially in regions with large agricultural sectors.
- Additional factors include over-allocation of surface water and local availability of groundwater as a “point-of-use” resource not requiring expensive distribution infrastructure.

Several [large aquifer systems](#) in the United States are experiencing substantial problems from the depletion of groundwater.

- The U.S. aquifer system with the greatest long-term groundwater storage depletion is the Ogallala aquifer in the Great Plains region of the United States.
- Two large aquifer systems in the Pacific Northwest region of the United States, the Columbia Plateau aquifer and the Snake River Plain aquifer, have had a net accretion of groundwater levels as compared to predevelopment conditions.

Although a large [direct consequence](#) of depleting groundwater resources is the loss of water supply, many other consequences of depletion also must be considered:

- Reduced flow to surface water systems and ecosystems
- Loss of productivity of groundwater wells
- Subsidence of land and ground failures
- Degradation of groundwater quality



There is a [growing recognition](#) of the consequences of groundwater depletion. This has led to several approaches to mitigate or reverse groundwater depletion.

- The most direct approach to decreasing the depletion of groundwater is to simply extract less groundwater from aquifers.
- Another direct approach to arresting groundwater depletion is to enhance groundwater replenishment using alternative water sources.
- Another method to decrease groundwater depletion is through changes to crop selection and agricultural practices.
- Since each state has primacy over its water resources, a wide range of policy and institutional approaches has developed to address groundwater depletion across the United States.

Use of a groundwater resource requires that the groundwater table [must be drawn down](#) to some degree before it can be used in a beneficial manner.

- Lowering of an aquifer's groundwater table in small amounts is unavoidable and not in and of itself a negative condition.
- The potential consequences of groundwater depletion need to be fully assessed to determine the trade-offs that exist between the undesired impacts of groundwater depletion and whether these impacts outweigh the benefits associated with groundwater use.

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## CAST COMMUNICATES CREDIBLE SCIENCE

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The primary work of CAST is the publication of papers highly regarded as a source of science-based information written and reviewed by volunteer scientists and subject experts from many disciplines. CAST is funded through membership dues, unrestricted financial gifts, and grants.

## Upcoming CAST Events (February–April)

### ENABLING OPEN SOURCE DATA ROLLOUT

On March 11, CAST will host three events to promote their new commentary, *Enabling Open-source Data Networks in Public Agricultural Research*. Two events will take place on Capitol Hill, and a third will be hosted at the Association of Public and Land-grant Universities. Dr. Sylvie Brouder, a professor in the Department of Agronomy at Purdue University, will present highlights from the publication.

### NUTRIENT LOSS ROLLOUT

CAST plans to release Issue Paper 64, *Reducing the Impacts of Agricultural Nutrients on Surface Water Quality across a Changing Landscape*, during the week of the Spring Board of Directors Meeting on April 15.

### BORLAUG CAST COMMUNICATION AWARD ANNOUNCEMENT

The 10th Borlaug CAST Communication Award nominee will be announced April 16 at the CAST Spring Board of Directors Meeting. The announcement will take place at the USDA Whitten Building. Dr. Marty Matlock, the BCCA 2018 winner, will deliver the keynote address prior to the announcement of this year's winner. The event will take place at 3:00 p.m.

