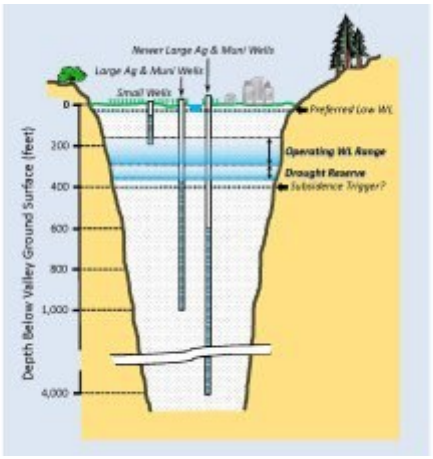
Dan Wendell, Nature Conservancy (2014)

"*We've known since the 1940s that there are only two sources of sustainable water supply out of wells*," began Dan Wendell. "*One is induced recharge from overflowing recharge areas which are pretty rare, and the other is capture of groundwater that would have otherwise discharged to streams and lakes. This is something we know. In other words, the capture of water that goes to streams or lakes is going to result in decreased streamflow. Therefore, groundwater pumping is only truly sustainable to the degree that we accept the associated impacts to these surface water systems.*"



"*Groundwater pumping is really just another way of diverting surface water,*" he said. "*Groundwater systems are storage and conveyance systems, not new sources of water supply. However, California's law and regulations do not recognize these physical relationships, and instead allow for relatively unconstrained groundwater pumping while exercising a permit system for surface water. The results have been unsatisfactory for most all perspectives, having led to widespread lowering of water tables that has dried up shallow wells, loss of perennial flow in streams that is needed for salmon migration and riparian habitat, land subsidence and the impairment of existing surface water rights*."

To manage groundwater in a sustainable fashion, every significant and unadjudicated basin in the state needs to have clearly defined limits on groundwater pumping and water level fluctuations, and the stabilization of water levels, he said. "*This approach needs to recognize the tradeoffs between groundwater pumping and surface water impacts and be arrived at in an open collaborative and stakeholder driven process that accounts for the economic benefits of land cultivation, but also the economic and cultural benefits of instream flows for an important species of fish, the maintenance of important riparian habitat, at least in select streams, and existing surface water rights,*" he said.

"*A key measure of success in basins where groundwater levels are still near the surface will be maintenance of perennial flow in key streams and safeguard of established surface water rights*," he said. "*In basins where groundwater is already strongly decoupled from surface water systems, such as many areas in the southern San Joaquin Valley, the simple stabilization of water levels and the avoidance of additional impacts such as land subsidence may be the best that we can hope for in the foreseeable future. Key measures of success in these cases would be groundwater level changes that average out to zero over a period of time, say 10 years*."

"*Many people automatically assume that overdrafted groundwater basins, especially where land subsidence and well failures are present, have the most complex and pressing problems and therefore require the most intention and money, but we don't agree*," said Mr. Wendell. "*If we want to avoid problems in areas that are reasonably healthy today, it is imperative that we consider the overall value of the hydrologic system, both to man and to nature. Time is of the essence in these cases, since the environmental and surface water rights impacts occur very early in groundwater development, when modest water level declines of only 20 to 40 feet can result in significant depletion of streamflow and even perhaps loss of perennial flow and the impact of surface water rights*."

"*The Sacramento Valley still has water levels that are fairly shallow*," he said. "*There are numerous perennial streams and healthy ecosystems, and the basin is largely within a reasonable definition of sustainable groundwater yield. However, since the 1940s, groundwater discharge to streams in this area has decreased by about 600,000 acre-feet per year due to groundwater pumping, and it's going to decrease an additional 600,000 acre-feet in coming years under 2009 status quo conditions due to the time it takes effects of groundwater pumping to reach streams. It takes years to decades, our work is showing*."

"*This represents a loss of 1.2 million acre-feet of stream flow*," Mr. Wendell said. "*This is real water. This is streamflow that would have otherwise ended up in the Delta. And our current estimates are that 400,000 acre-feet of this 1.2 MAF per year is lost export capacity. This represents a very real decrease in the yield of the Central Valley Project and the State Water Project, especially for purveyors south of the Delta. At a time when we're trying to increase water supplies, we are actually moving in opposite direction from the perspective of these particular areas*."

"*Successful groundwater management will require the use of robust models, most of which exist today in key basins, informed decision making, adaptive, flexible and inclusive management approaches that are implemented locally wherever possible, active recharge projects, and some mechanism to ensure that limits on groundwater pumping and water level fluctuations in groundwater basins are arrived at in an reasonable fashion and are properly implemented and maintained*," he said. "*And some form of bad cop to make sure these things really happen, because these actions are commonly perceived as going against local self interests. In other words, we're at the tragedy of the commons*."

https://mavensnotebook.com/2014/04/28/groundwater-management-workshop-part-1-sustainable-groundwater-management-panel/