There is increasing pressure on our water resources, which prompts us to manage our water more precisely. With an increasing demand for food production, variable rate irrigation (VRI) is a technology that may improve irrigation water productivity (yield produced per unit of water diverted for irrigation). While VRI is not likely to reduce the consumptive use of water (i.e. evapotranspiration), VRI may reduce pumping for irrigation, resulting in energy savings and reduced deep percolation of water below the root zone. Reduced leaching of nitrates from the soil would improve water quality in aquifers. VRI has many potential applications, and the specific benefits of each application should be quantified in order to inform producers who are considering whether to invest in VRI technology. Research is also needed to develop a decision support system that would automate the management of VRI. Ongoing research is incorporating data from unmanned aircraft, satellites, and soil water sensors for near-real-time VRI management.