ABSTRACT

Surface water and groundwater management are often tightly linked, even when linkage is not intended or expected. This link is especially common in semi-arid regions, such as California. This paper summarizes a modeling study on the effects of ending long-term overdraft in California’s Central Valley, the state’s largest aquifer system. The study focuses on economic and operational aspects, such as surface water pumping and diversions, groundwater recharge, water scarcity, and the associated operating and water scarcity costs. This analysis uses CALVIN, a hydro-economic optimization model for California’s water resource system that suggests operational changes to minimize net system costs for a given set of conditions, such as ending long-term overdraft. Based on model results, ending overdraft might induce some major statewide operational changes, including large increases to Delta exports, more intensive conjunctive-use operations with increasing artificial and in-lieu recharge, and greater water scarcity for Central Valley agriculture. The statewide costs of ending roughly 1.2 maf yr\(^{-1}\) of groundwater overdraft are at least $50 million per year from additional direct water shortage and additional operating costs. At its worst, the costs of ending Central Valley overdraft could be much higher, perhaps comparable to the recent economic effects of drought. Driven by recent state legislation to improve groundwater sustainability, ending groundwater overdraft has important implications statewide for water use and management, particularly in the Sacramento–San Joaquin Delta. Ending Central Valley overdraft will amplify economic pressure to increase Delta water exports rather than reduce them, tying together two of California’s largest water management problems.

KEY WORDS

groundwater overdraft, Sacramento–San Joaquin Delta, California’s Central Valley, economic costs, CALVIN.

INTRODUCTION

California is a semi-arid state, with difficult water-resource challenges arising from large agricultural, urban, and environmental water demands; a dry and variable climate; and a seasonal and geographical separation between water supplies and water...