Q & A follow up

Provided by Dr. Josue Medellin-Azuara, Associate Professor, School of Engineering at the University of California, Merced

[In response to data presented by Dr. Medellin-Azuara] Interesting decrease in water 48% but groundwater increased 72%, what are the reasons behind this difference?

JMA: That is a great highlight. We estimated surface water shortages of nearly half of the normal surface water deliveries, from announcements of the major water projects in the state, and surveys to irrigation districts. However, those areas that had access to groundwater were able to pump groundwater in more than in a normal year. That resulted in a net shortage of roughly, 2.7 MAF/year or 10 percent of all applied water.

Notice groundwater deliveries to agriculture in a normal year are around 40% of the total water deliveries, but in dry year that amount constitutes up to 60%. Total applied water in agriculture in the Central Valley is roughly 27 MAF/yr.

When it comes to Agriculture is there a plan to upgrade or change the management of water use, encouraging beneficial grazing techniques (carbon sequestration), or permaculture practices (hold back water)?

JMA: There are various experiments and modeling of turning agricultural lands into wetlands in the Sacramento San Joaquin Delta, and also some vernal pools in the Central Valley (in fact my campus has a reserve) yet it is not a widely adopted practice to my knowledge.

Has California deployed many 'Managed Aquifer/Groundwater Recharge' projects, and, if so, do you see them playing an important role in reversing groundwater depletion?

Please comment on the infrastructure that allows California to physically move water around the state. B.C. has no such infrastructure (for the most part).

JMA: Some farms in the central valley have implemented, particularly large farmers, such as Terranova farms for some years now. The approach gained popularity after the recent 2012-2016 drought, and there are ongoing experiments in alfalfa, and almond orchards. There is an ongoing study by the Department of Water Resources, in the Merced River basin (close to my campus), and includes hydrologic, agronomic and economic aspects. Phase I is about to conclude. There is also a research tool called SAGBI, which identifies areas in the Central Valley suitable for recharge. Yet infrastructure might not suffice at this point for bringing water from the diversion location to the spreading site, and there are still many legal/institutional hurdles to sort out. Some estimates indicate that average annual water available for recharge is in the order of 600 thousand acre-foot. Given the average

overdraft (before GW sustainability act, SGMA) is roughly 2.2 MAF/yr storing flood flows (through managed aquifer recharge) will be insufficient to achieve water balance requirements by SGMA and permanent fallow land is still needed.

And one more question, how would you improve the efficiency of works and promotion of best management practices for the farmers to reduce the water demand.

JMA: Most farmers are in higher efficiency irrigation systems (drip irrigation, subsurface, and other pressurized systems). There are good programs in place by the Department of Food and Agriculture to fund not only irrigation improvements but also reduction in carbon footprint through more energy efficient irrigation systems. So total applied water is sometimes reduced successfully but at the expense of reducing recharge from irrigation. Fortunately, the program requires water balances at farm scale demonstrating that there is not increased pressure in aquifers or expansion of irrigated areas resulting from the proposed projects.