Responses to Reviewer #3

Point #1

This paper discussed an important topic with respect to current water management issues. With increases in extreme climate events, the role of reservoir is critical to maintain stable water resource at the watershed level. In addition, irrigation impacts on overall water budget are highly recognized. This paper considered the two issues at the same time. The authors well wrote down the importance and necessity of the paper. I have a few minor comments to clarify some results.

Response: Thank you very much for the valuable comments. We revised this work accordingly and addressed each point of your comments.

Point #2

Line 98. Use the same unit for precipitation and snowfall.

Response: We change the unit for snowfall to millimeter (mm) to make it consistent with that of precipitation.

Point #3

Line 99: Delete a comma (",") after cropland

Response: we removed the duplicated comma.

Point #4

Line 101. Change "(Malek et al., 2016)" to "the study by Malek et al. (2016)"

Response: We revised this sentence accordingly.

Point #5

Line 165. Crop Data Layer to Cropland Data Layer

Response: We revised the name of the dataset

Point #6

Line 172. What thresholds were used to define HRUs?

Response: We used thresholds of 20%, 10%, and 10% for land use, soil types, and slopes in defining HRUs.

We added the following sentence to explain how HRUs were defined:

"When defining hydrologic response units (HRUs), we used thresholds of 20%, 10%, and 10% for land use types, soil classes, and slop groups, respectively.**"**

Point #7

6. Line 173. Please more elaborate MODIS ET and how to apply it to your simulation?

Response: We further introduced how MODIS ET data were derived as follows:

"To evaluate SWAT ET simulations, we compiled the annual Moderate Resolution Imaging Spectroradiometer (MODIS) evapotranspiration (ET) data for the study area. The MODIS ET data were produced using the Penman– Monteith equation and remotely sensed land cover/ Leaf Area Index (LAI) information, with a spatial resolution of 1 km (Mu et al., 2011)."

Since reviewer #1 had concerns about uncertainties in MODIS ET data, we removed comparison of MODIS ET with the R2 and R2S1 scenario in figure 9, and moved the scatter plot of MODIS ET with R2S1 simulation to the supplementary material.

Point #8

Line 199. Please make a table that compares model performance measures of different scenarios

Response: We added the following table to the supplementary material to compare the performances of SWAT under different scenarios:

Table S2. SWAT performances in the five scenarios during the calibration and validation period

Metrics / Scenarios		Calibration		validation	
		Ens	*R*	*Ens*	*R*
R0	Site 67	0.204	0.532	-0.480	0.297
	Site 99	0.377	0.620	-0.093	0.452
	Site 160	0.229	0.479	0.013	0.498
	Site 171	0.216	0.469	0.519	0.590
R1	Site 67	0.249	0.501	0.288	0.538
	Site 99	0.281	0.557	0.276	0.543
	Site 160	0.440	0.671	0.245	0.503
	Site 171	0.427	0.666	0.326	0.578
	Site 67	0.311	0.560	0.312	0.589

R2	Site 99	0.298	0.585	0.322	0.575
	Site 160	0.404	0.648	0.246	0.511
	Site 171	0.360	0.653	0.318	0.575
R2S1	Site 67	0.372	0.631	0.221	0.531
	Site 99	0.423	0.664	0.228	0.506
	Site 160	0.282	0.534	0.213	0.512
	Site 171	0.280	0.536	0.291	0.576
R2S2	Site 67	0.094	0.362	-0.451	0.595
	Site 99	0.074	0.388	-0.874	0.429
	Site 160	0.343	0.613	-0.883	0.252
	Site 171	0.364	0.618	-0.148	0.368

Ens and *R* are Nash–Sutcliffe efficiency coefficient and correlation coefficient, respectively

Point #9

Line 213. Do you explain why R0 ET is greater than R1 and R2 from Oct. to Mar.?

Response: ET under the R1 and R2 scenarios was higher during the growing seasons than the baseline scenario (R0) because of the higher reservoir surface areas in R1 and R2 scenarios. To match the streamflow observations, the R1 and R2 scenarios simulated lower soil water during Oct to Mar in the next year than that of the R0 scenario. As a result, ET was higher during this period in R0 scenario than the other two scenarios.

However, since soil water under the three scenarios were not evaluated against field observations, seasonal ET variability from the left plot of figure 5 was not sufficiently justified. The key information we want to show here is the difference of annual ET among R0, R1, and R2. As a result, we move the monthly ET comparison in Figure 5 to the supplementary material.

Point #10

Line 216. in R1 -> for R1

Response: We changed the wording accordingly.

Point #11

Line 228 (Figure 8). Do you know why ET from R2S2 was higher before April and lower from

May to October relative to ET from R2S1?

Response: Thank you for the comments. Due to the insufficient water supply for irrigation by groundwater, the R2S2 scenario (surface water for irrigation) added less water to soil than the R2S1 scenario, and resulting lower ET during May-Oct than simulations using surface water as sources for irrigation. During January – April, the R2S1 scenario had lower ET than R2S2 because of the more litter on soil surface due to better crop growth in the previous year. We

acknowledge that seasonal patterns of ET among these scenarios should be further investigated in the future.

"We observed different seasonal patterns of ET under the five scenarios. How management activities affected water and energy exchanges between soil and the atmosphere should also be investigated in the future.**"**

Point #12

Line 234 (Figure 9). Like other results, compare monthly values since ET has high monthly variability.

Response: We removed the MODIS ET in figure 9 since one reviewer had concerns about quality of this product.

Actually, average monthly ET between the R2 and R2S1 scenarios were compared in figure 8. We further compared monthly ET during 2000-2010 as follows:

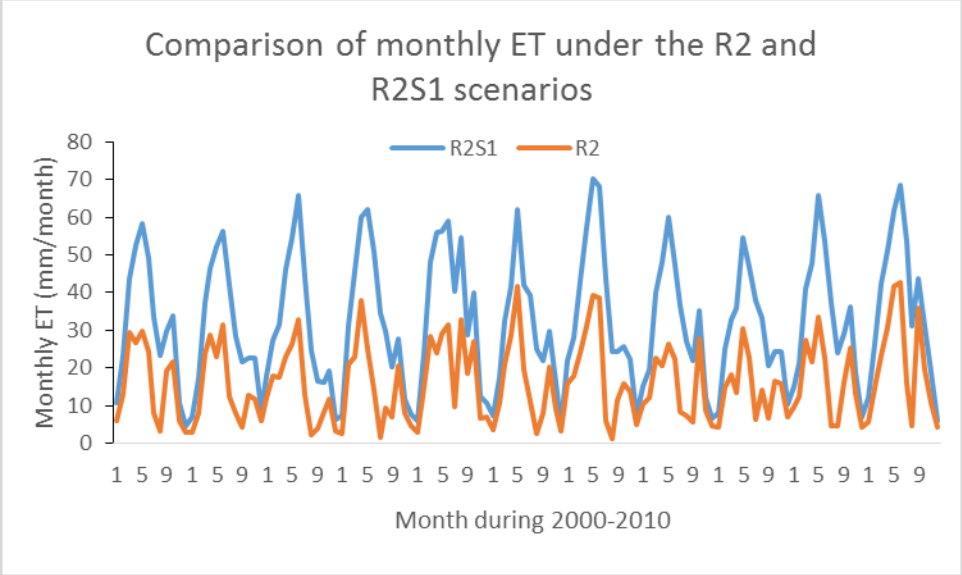

Figure S2. Comparison of monthly ET under the R2 and R2S1 scenarios

This figure was added to the supplementary material. We also added following con

"Specifically, when irrigation was included in our simulation, SWAT ET estimates increased by ca. 85% at the annual scale. Monthly scale comparison showed that increases in ET mainly occurred in growing seasons (April to August, Figure S1)."

Point #13

Line 260-261. Do you know any references to support the statement?

Response: Thank you for the valuable suggestion. Here we were highlighting the more significant impacts of irrigation on ET than reservoir operations. To make it more specific and accurate, we revised this sentence as follows:

"These results indicate that irrigation may have more pronounced impacts on ET through stimulating ET than reservoir operations in the study area."

Point #14

Line 323. Change "ground water" to "groundwater" for consistency.

Response: We changed the wording throughout the manuscript.