General comments:

The article deals with assessing blue-green water resources which can be further used to address issues on water shortage in arid and semi arid regions and the essential to improve water policy in highly managed and complex watersheds where human intervention leads to a complex pattern of surface-ground water interaction. This is an active area of research in different research centres around the world. The current article, however, seems to be a hasty effort which unfortunately leads to a shallow analysis of the subject matter. A major fault of the study is the lack of adequate hydrological and management data and a superficial calibration-validation of such complex river system. Calibration based on two discharge stations from upstream which represent small proportion of the entire region, may lead to enormous conclusion with respect to blue-green water flow and propagate it to the entire basin where high human intervention and complex management condition dominates natural hydrological processes. Over all, it is hard to see the value added this study to the other similar studies in literature. The current text is more likely a local interest and the approach used is not novel enough to apply in arid and semi-arid regions. I would recommend a major revision of the text taking above points into consideration and the following specific corrections:

Specific comments:

- What is missing in the Introduction is a clear and explicit formulation of objectives that can be concluded upon in the Conclusion section. Use short and understandable sentences for that and further use objectives to structure the results and discussions.

- Page 3315, Line 2: It has been recorded in the literature that the Heihe River Basin has an area of 116000 Km2. Please check this.

- Page 3315, Line 3: In Figure (page 3331) the Latitude and Longitude of the study area is missing and being not familiar with Chinese river systems, it is hard to understand direction of the river. Please add grid divisions in the map and a DEM in the background. In addition, please show the Qilian mountain (the origin of the river) and the lake Juyanhai (where it terminates) explicitly in Figure 1. Please also show the subbasins which are delineated and studied in this work.

- Page 3315, the first paragraph: can you provide more detail on the hydrological matters of the area? For instance 200-500 mm precipitation in upstream does not reflect its seasonal variation and that if it is mainly in the form snow or rain? This is important to

understand process with respect to surface-ground water interaction. Please give some information about water supply-demand situation in the three sections of the basin.

- Page 3315, the first paragraph: please mention to the temperature variation in the three different sections of the study area.

- Page 3315, Line 23: Please mention to the source of water used for irrigation (whether it is from river or ground water). This is very important when discussing on the model results and calibration matter.

- Page 3316, Line 19: I do not see any water "quality" assessment in "wide range of scales" in the paper by Faramarzi et al., but by Gassman 2009, who gives a review on the application of the SWAT model in a broad range of studies and scales. Please avoid using Monireh et al., but refer to Gassman et al., 2009 or 2007.

- Page 3317, Line 4: why most of the studies have focused to simulate upstream segments and not entire or downstream watershed? Please explain this.

- Page 3317, line 5-7: "The SWAT model is …2009)) is a general statement about SWAT model. Please move it to the beginning of the paragraph on page 3316, Line 16 and rewrite the paragraph to avoid replication of the statements.

- Page 3317, Line 7, please replace "Monire et al., 2009"with "Faramarzi et al., 2009".

- Page 3328, Line 27: Please rewrite the reference as follow:

  Faramarzi, M., Abbaspour, KC., Schulin, R., and Yang, H.: Modelling blue and green water resources availability in Iran, Hyrol. Process., 23, 486-501, 2009.

- Page 3317, Line 9: Please replace "..monthly time step.." with "..daily time step..".

- Page 3317, Line 9: the phrase ".. only hydrologic component of the model was used" is misleading. What components exist in SWAT model? What do you mean by "only"? As far as I know different components in the model are interacted and one cannot separate the use of specific component in the model. Please rewrite this part.

- Page 3317, Line 12, Please remove "In SWAT model,".

- Page 3317, Line 15: please avoid using “glacier”. Glacier is not simulated using SWAT model, yet, but snow cover and melt during study period. Glacier is essentially a reservoir that gains precipitation in both liquid and solid form, stores a large share of this precipitation, and then releases it with little loss at a later date. The hydrologic characteristics of this reservoir, however, are complex, because its physical attributes change during a year. In late spring the glacier is covered by a thick snowpack at the melting temperature. Meltwater and liquid precipitation must travel through the snowpack by slow percolation until reaching well-defined meltwater channels in the solid ice below. Yet in the summer the process changes.... For this reasons SWAT cannot predict snowmelt from glacier, yet.

- Page 3317, Line 20: Please refer to “Neitsch et al., 2004” instead of “Arnold and Fohrer 2005”.

- Page 3317, Line 24: As mentioned in the above paragraph (Line 12) a dominant landuse-soil-slop was used to characterize every subbasin. This means that the subbasins are not divided further into different HRUs based on different combinations of landuse-soil-slope maps. This is in contradiction with the statement “..303 HRU and 34 sub-basins..”.

- Page 3318, Line 24, Can you provide a management map of the study area?

- Page 3330, footnote of the Table 1: avoid using “..an absolute increase..” which is quite misleading.

- Page 3330, Table 1, column 1 (left side), Line8: replace “R_SOL_AWC(1)” with “r_SOL_AWC(1)”.

- Page 3319, Line 18: Please replace “...indexes...”with “...indices...”.

- Page 3319, Paragraph 1: The two hydrometric stations selected for calibration in this study, represent hydrological processes of their upstream areas. As also shown in Figure 1, this upstream area accounts for a small proportion of the entire watershed. As well, most of the human intervention exists in the mid-stream (as mentioned in the text). How you can use your calibration results (representing optimized parameters of upstream area), to draw conclusion about the whole basin where human activities are important and hydro-climatological conditions are quite different.

- Page 3320, Line 6: please move “... respectively..” to the end of the sentence.

- Page 3320, Line 16: please replace "..Monireh et al.." with "Faramarzi et al.". Check this in other parts of the text.

- Page 3321, paragraph 1, also Figure 2 in page 3332: Why blue single-signal is used for the comparison? Please show how do you measure uncertainty? Representation of the model output using a single signal does not provide enough information while making decision on large scale and complex watersheds. Large scale watershed models subject to uncertainty due to various reasons. As also mentioned in the text, these are conceptual model, input, and parameter uncertainties. Using SUFI_2, propagation of the uncertainty in a parameter, leads to the 95PPU of the output variables. As parameter uncertainty increases, the output uncertainty also increases. So please avoid using a single simulation result for the comparison but the 95PPU resulting from the optimized parameter intervals using Latin Hypercube Sampling approach provided in SUFI2.

- Page 3321, Paragraph 1: Please give more detail about calibration procedure and challenges faced while optimizing the parameters. As wells, the p-factor and r-factor are missing from the results and one cannot see the performance of the calibration-uncertainty results. In addition, I'm more curious to see how you modeled the glacier inflow to the river in your study area? As already mentioned, SWAT is still not able to simulate hydrological processes of glaciers. How did you overcome this shortcoming? If any pioneering approach was adapted, it would be interesting to discuss. Overall, the calibration section is the most important part of the study and the rest of the analysis are based on this part. However, it has not been addressed efficiently.

- Page 3321, sections 4.1 and 4.2: Model calibration using river discharge alone does not provide confidence on the partitioning of water between soil storage, actual evapotranspiration and aquifer recharge. A multi variable calibration is required to calculate water resources availability based on water yield and green water components.

- Page 3321, section 4.2, last paragraph: In SWAT model soil water balance equation is calculated for each subbasin for which the precipitation data are assigned from the closest climate station to each subbasin. In this study density of the climate stations and subbasins are quite coarse especially for the downstream area (Figure 1). As a result, precipitation and consequently the aggregated water resources components may over or under predict the real condition especially for the large subbasins with one climate stations assigned. A simple comparison of the simulated water resources with those of observed-reported data (if available) would be helpful to provide confidence on the model results.

- Page 3322, Paragraph 1: Mention to the "relative change rate" maps of Figure 3 when discussing on the trend change. You have not mentioned to these maps in the text.

- Page 3322, Line 15-17: The human intervention and management change have not been considered in the hydrologic model of the basin, but (more) natural condition. How you can draw this conclusion that "…climate variability is the main reason for the variation of total water flow in Heihe river basin"?

- Page 3322, Line 16: please replace 2004 with 2000.

- Page 3322, Line 19: replace "decrease" with "decreased".

- Page 3323: Please avoid using separate sections (4.3, 4.4 and 4.5) to discuss on similar subjects. Combine the last two sections with section 4.3.

- Page 3333, Figure 3: If the maps are based on the long-term average annual values, please mention to this in the figure caption. Again, how you deal with the uncertainty? I suppose you used the best estimation of the variables for every year!

- Page 3334, Figure 4: Please mention to the "long term average annual values" in Figure caption if applicable.

- Page 3323, Paragraph 1: Please mention to the "relative change rate" maps of Figure 6, when discussing on the trend change. Similar comment is applicable for Figure 7 in section 4.5.

- Page 3323, section 4.5: Again, any conclusion on Evapotranspiration (green water flow, here) which is not calibrated in the model is misleading!

- Page 3324, Line 20-23: A large actual evapotranspiration calls for a large amount of water availability in the soil (based on high precipitation which infiltrates into the soil and supplies evaporation from the soil or transpiration from the plant) and a high Potential ET (based on high temperature). If the precipitation is significantly low in downstream, how a considerably large amount of actual ET is achieved? A large potential ET could be the case, as it is based on Temperature, but perhaps not Actual ET!