First of all I would like to mention that the article does address the scientific questions within the scope of HESS.

I have remarks on three main topics:

- Description of methods and instruments: The authors should carefully check their manuscript to make sure that all measurements can be clearly connected with the respective analysis and results. In some parts of the article I have the impression that the different described analysis stand a bit isolated from each other, rather than they are supporting each other.
- Thermal methods: What is shown in the manuscript is not a quantitative analysis and therefore does not justify stating that temperature methods are used to quantify groundwater-surface water interaction! However in my opinion with the presented data a very easy quantitative analysis of groundwater-surface water interaction using temperature data could and should be performed.
- Figures: I think most figures need substantial improvement. What and how results are presented is often contradictory, unclear or simply incomparable with other results.

Specific Comments:

Page 13254, Line 2: '…are extremely scarce and the environment is….'

P 13254, L 5: 'Vegetarion plays a crucial role in preventing desertification,…' Or: 'Vegetarion plays a crucial role in protecting against desertification,…'

P 13255, L 27: Add a reference about the NDVI.

P 13256, L 7: 'All stations measured daily….'

P 13257, L 8, 11,12, 19, 21, 22: Please specify the used instruments e+WATER L, MiniDiver, HOBO Pro v2, Flow 32 1K, HOBO RG3 and TDR in a more detailed manner as follows: (MiniDiver, Schlumberger Water Services, Delft, The Netherlands). TDR stand for 'Time-domain reflectometry' I guess but it is not clear. Clarify it!

Indicate for which analysis these instruments and data is used! I think it is for the temperature and head gradient analysis. However this is not clearly described!

P 13257, L 15: ‘At the bush water use research site (Fig. 1), ….’. I cannot find any indication of a ‘bush water use research site’ in Fig.1! See also my other remarks on Fig.1 below.

Can you specify which species of salix bush including its scientific name you were examining?

P 13257, L 23-24: Rephrase the sentence like ‘Measurements were performed between 29 May and 12 July 2011; hourly values were stored for analysis.’

P 13258, L 2: ‘Instruments were installed at the tree water use site to….’. Indicate the ‘tree water use site’ in Fig.1!

P 13258, L 2: Can you specify which species of willows and poplars you were examining (scientific name included)? You just mention them in the abstract, but never in the text anymore!

P 13258, L 6, 16: Please specify the used instruments FLGS-TDP XM1000, miniTrase in more detail like: (MiniDiver, Schlumberger Water Services, Delft, The Netherlands). Additional information about the mini lysimeters would be also interesting.

P 13258, L 12: ‘An experimental site to investigate the crop water use was constructed in May 2011 (Fig.1).’

Specify the species of maize you were examining (scientific name included).

P 13258, L 22-23: ‘…using three baseflow separation methods: fixed interval, sliding interval, and local minimum. Annual averages of daily discharges and baseflow are plotted in Fig. 2.’ When you used different methods, it is not clear what is indicated in Fig.2. Are these results from one of the methods, or is an average of all mehods? This should be clarified in the text and the caption of the figure!

P 13258, L 24: ‘River discharges have decreased since 1970s because of the construction of reservoirs and diversion works….’

P 13259, L 10-16: I have some remarks on the following paragraph: ‘Temperature measurements clearly indicate groundwater discharges to the river (Fig. 4). In winter, groundwater temperature is higher than the river temperature. Upward seepage of groundwater increases water temperature in the riverbed deposits, so that water temperature increases with the increase of depths. In summer, river temperature is much higher than the groundwater temperature; diurnal fluctuation of river temperature did not appear in the riverbed deposits, indicating also the upward seepage of groundwater.’

In principal I agree with your statement. According to your analysis there are indeed indications that there is groundwater exfiltration towards the river; the small temperature variations at 10 and 30 cm depth, or the constant temperatures at depth suggest that. However, opposite to hydraulic head, temperature signals can be misleading, temperature gradients not necessarily indicate the flow direction of water.

You made a substantial effort to measure temperatures, and I am a bit disappointed that you did not do more with it. With little effort you could perform a heat transport analysis and get a quantitative estimates of exfiltration fluxes. Such an estimate would be a much stronger argument for your statement mentioned in the paragraph above.

Since you do not perform any quantitative analysis with the measured temperatures I find it misleading to say that you used 'temperature methods' (as you state in the abstract and introduction) for this article.

Consider adding an analysis with the simple tool described in the 2 publications I listed below. This analysis is fairly simple and can be performed using only an excel spreadsheet and its Solver add-in. Form your time series data only a single temperature profile must be extracted; a good time would to be mid- or end of January 2011. Such an analysis would then justify your statement that you used 'temperature methods' and would deliver a very interesting additional result.

M.A. Arriaga, D.I. Leap, 2006. Using solver to determine vertical groundwater velocities by temperature variations, Purdue University, Indiana, USA. Hydrogeology Journal, 14 (1–2), pp. 253–263.
Anibas, C., Buis, K., Verhoeven, R., Meire, P., Batelaan, O., 2011. A simple thermal mapping method for seasonal spatial patterns of groundwater-surface water interaction. Journal of Hydrology 397 (1-2), 93-104.

P 13260, L 8: '…the Hailiutu River catchment with NDVI data and…' the acronym is sufficient.

P 13260, L 17-19: '*Salix matsudana* and *Populus tomentosa* are the dominant species in groves of trees, and they can access deep groundwater with their deeply extended root network.' I don't understand the connection between this sentence and what is written in the rest of the paragraph.

P 13261, L 5-6: Please indicate in figure 7 the positions of the Bulang River and Hailiutu River!

P 13261, L 12-15: ‘At the bush water use research site, the plot of the cumulative sap flow of a salix bush in relation to the groundwater depth changes in the dry period from 29 May to 12 June clearly shows the increase of groundwater depth caused by the water use of 15 the salix bush for transpiration (Fig. 8).’ This sentence is too long and not very clear. Please rephrase it!

P 13261, L 12ff. According to chapters 2.5 and 2.6 you performed similar measurements at the bush water use research site and the tree water use site. Why you than show different results? For the bush site you present quotients like ‘ΔSWC2c, from 55 cm to 130 cm’ while for the tree site you show absolute values in Fig. 11. This is not consistent and make a direct comparison between the bush site and the tree site impossible. Consider showing your results I in way that they can be directly compared, or explain why your chose this approach. See also my remarks for Fig. 11.

P 13262, L 2-3: ‘In the same period, the estimated groundwater storage depletion from groundwater level hydrograph amounts to 16 mm (Fig. 11), the depleted soil water storage was estimated to be 15.2 mm from measured soil water contents (Fig. 11).’ Can you indicate percentages similar to P 13261, L 19-20?

P 13262, L 12: Please give a brief explanation of the 4 different ‘growing stages’! I understand that what is shown in Fig. 12 are these ‘growing stages’. However why did you choose exactly this times you show? Could you provide some values like an average over the growing stages indicating the differences between Poplar and Willow?

P 13262, L 18ff: Likewise such values like could also be provided for the sap flow of Willows and Salix and Willows and Maize!

P 13262, L 18-22: ‘It is not straight forward to compare the water use of a salix bush with other plants since salix have various numbers of branches. Salix bushes with about 60 active branches are typical in the Hailiutu River catchment. Figure 13 compares sap flow of a salix bush 20 with 60 active branches with the sap flow of a willow tree. It shows that the salix bush with 60 branches use twice the amount of water of the willow tree.’ Consider rearranging the sentences as indicated.

P 13263, L 13ff.: ‘Under natural conditions, net groundwater recharge (gross recharge from precipitation infiltration minus total evaporation) equals the baseflow component of river

discharge. The consumptive use of groundwater for irrigation (gross abstraction minus return flow) reduces groundwater discharge to rivers.' Can you express this relationship with a formula? Give a reference also if possible.

P 13265, L 9-12: '…the vegetation cover is much denser in places where groundwater table…'; 'The NDVI decreases with the increase in the depth…'; ' … it was demonstrated that both trees and bushes use groundwater for transpiration during the long dry period in spring.'

P 13266, L 3-4: '…dry resistant vegetation species native in the Hailiutu catchment.'

General remark on the Figures:

- Consider removing most or all the grid lines you show in Figs. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14. In my opinion these lines are not necessary, removing them makes the figures more clear and accessible!
- Your gridlines usually show an interval of 5, while the interval of the value of the horizontal axes is mostly 3 or 4 days. This should be changed! But again, I think you don't need any grid at all for your graphs!
- You should also consider combining some of your figures like you show in Fig. 7 or 12. This would safe space, condense information and save money! For more details see my other remarks below.
- Consider to show Figs. 15-20 at different positions within the text. Best where the shown species first appear or were you describe the wind barriers for example.

Fig. 1: Please indicate the 'bush water use research site' and 'tree water use site' in the map! The yellow colors of the 'Ecological cross section' and 'Yuliawan discharge gauge' are almost invisible. Please change their colors! The symbols indicating the stations and gauges could be a big bigger.

Fig. 3: Consider changing the vertical scale, the lower half of the graph is empty. Also consider to combine Fig.2 and Fig.3! They have the same horizontal axes, hence they could be presented like Fig. 7, placing Fig.2 above (do not overlay it!) Fig.3.

Fig. 5: Likewise with Fig.2-3, Fig.5 could be combined with Fig. 4. The horizontal axes could be combined. It does not matter that the temperature data stops earlier.

Fig. 7: Please indicate in the figure the positions of the Bulang River and Hailiutu River valleys!

What is NDVI 500 and NDVI 30? Please explained this also in the text (P 13261, L1-10)!

You should also improve the graph. On the horizontal axes, use km or $1*10^3$ m as unit. This removes the big numbers from the axes.

Increase the interval on the vertical axes of Elevation and NDVI. Intervals of 100 m or 0.2 respectively are sufficient.

Fig. 8: Consider changing the style of the vertical axes. Indicate it as $1*10^3$ cm^3 in the axes title than the numbers are reduced from 200.000 to 200. This is more convenient.

Why you show here increasing values at the vertical axes indicating groundwater depth, while in Fig. 10 it's the opposite? This is misleading, since the lines in both Figs. seem to show a similar trend. This phenomena should also me explained in the text!

Fig. 9: Likewise with Fig. 2-3 and Fig. 4-5, Fig. 9 could be combined with Fig. 8.

The vertical axes 'Depletion of storage' shows here negative values, while in Fig. 11 it is positive. This should be explained or changed!

Fig. 10: Likewise with Fig. 8, consider changing the style of the vertical axes. Indicate it as $1*10^3$ cm^3 in the axes title and the numbers on the axes are reduced from 100.000 to 100. However it is not clear for me what I can learn from this graph. Does it have a meaning that the black and red line cross each other? Please explain it in more detail in the text!

Fig. 11: Likewise as already described consider combining Fig. 11 with Fig. 10!

How does it come that the parameters indicated in Fig. 9 and Fig. 11 are different? While you show a quotient in Fig. 9, in Fig. 11 absolute values of storage depletion are indicated. This makes a direct comparison impossible; that however would be more compelling for the reader!

Therefore I you could even combine Figs. 8-11 to just one! I made a small exercise to show you how this could look like:

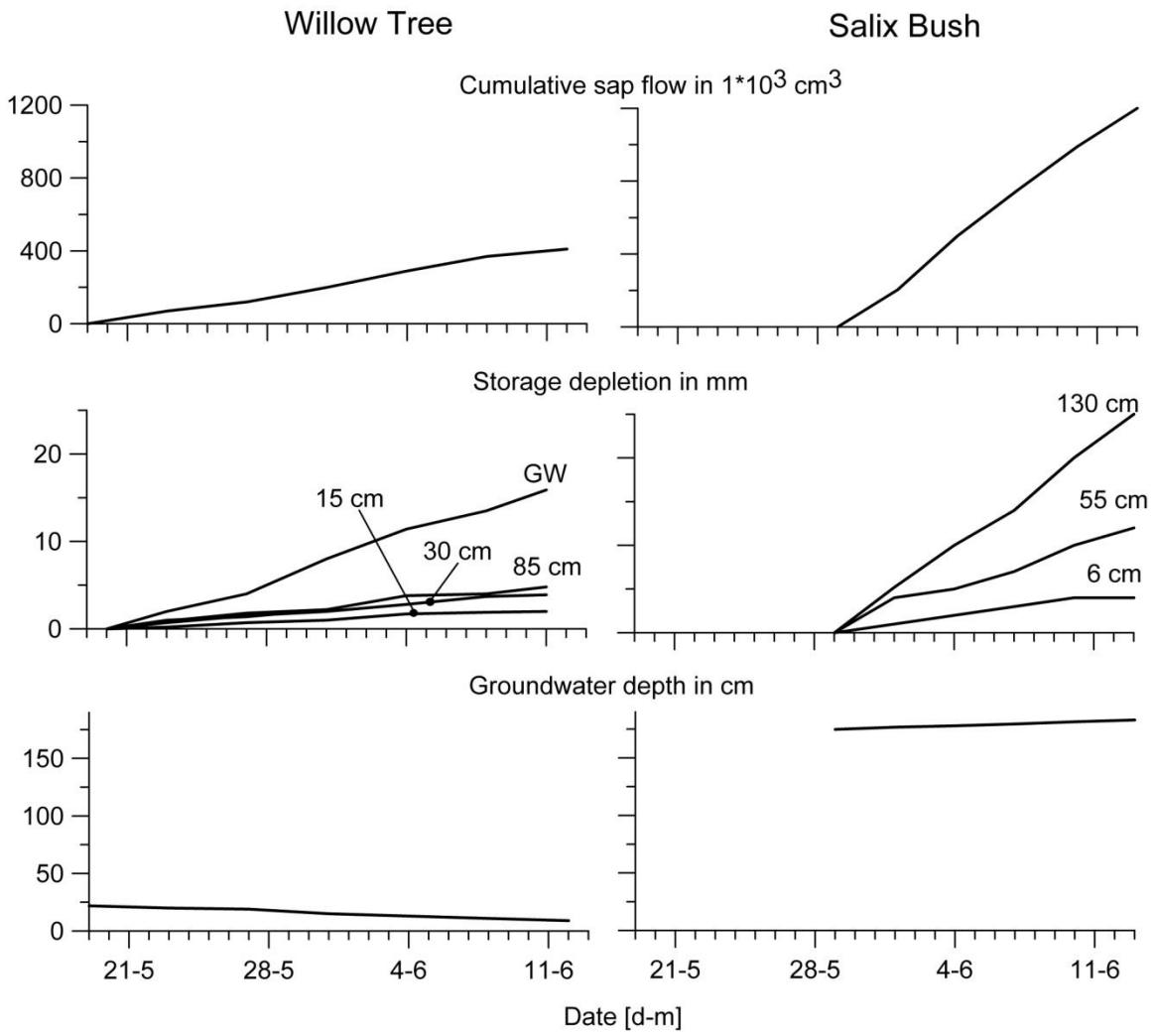

Fig. 8. Comparison of 2 ecohydrological research sites, one with Willow trees and another with Salix bushes, performed in may-June 2011. Despite the shorter examination period, the Salix bushes show a much stronger cumulative sap flow and stronger storage depletion than the Willow trees. The groundwater depth therefore is increasing for the Salix bush research site. The research site for the Willow trees however shows the opposite trend.

Fig. 12: Modify the horizontal axes: The format YYYY-MM-DD HH:MM is not necessary; just use HH and mention in the caption that the time series starts the 2 August 2011 at midnight and stops at 4 August 2011 at midnight.

Fig. 13: Why you show 2 different time series? Is this necessary? Describe this in the text!

Figs. 15-17: Include the scientific name in the caption!

Fig. 19: In comparison to Fig. 18 and 20, where you use the scientific name of the bush species, here you use the popular name ‘Korshinsk Peashrub’. It would be useful to add the scientific name, in this case I think it is *Caragana korshinskii*.