Reviewer 2:

Summary This study examined various factors, including transpiration rates, intrinsic WUE, sapwood to leaf area ratios, and water source use of two tropical trees under two precipitation exclusion treatments. The study found differences in transpiration rates between the wet and dry periods, and that the exclusion treatments reduced transpiration rates in both species. The study also found a difference in soil water use between the two species, with one using more shallow and the other using deeper.

General Comments: This manuscript tackles an interesting question related to how decreases in precipitation influences tropical forests, since more intense wet and dry periods are predicted for the future. The combination of measurements (transpiration, WUE, source water use) were all important in understanding what the mechanisms were for different water use strategies. However, there were several weaknesses with the paper that made it difficult to recommend for publication.

1) The objectives of this study were not particularly exciting. Why was the main objective simply to examine different water use strategies by different tree species? This study utilized two precipitation exclusion treatments, ED and DD, and these different deliveries of moisture provided a unique opportunity to ask more targeted questions and/or hypotheses. This was a missed opportunity. The second objective was to examine if the mechanism responsible for the differences were due to transpiration, morphological adjustment, or WUE. Again, this is not particularly exciting because the answer to this question is yes, all of these likely differ (or not differ) between the two species. The more important question is, if they do differ (or not differ), why? Can you provide some hypotheses on how you might think each species may respond both physiologically as well as morphologically to the different treatments?

R: According to the suggestion, we have rewritten the objectives and provided the hypotheses: "Based on previous root sampling analyses that 47% and 72% of the total root biomass distributed in the surface soil layer (0-20 cm) for *Schima superba* and *Michelia macclurei* (two dominant coexisting tree species in our experimental site), respectively (Hao and Peng, 2009; Li, 1984), and combined with our preliminary survey on tree biometric characters, we hypothesized that 1) *M. macclurei* trees would transpired more water than *S. superba* tress, even under the relatively drier condition; 2) In response to the intensified drought or extension of dry season, the trees will improve their water use efficiency by increasing ratios of sapwood area to leaf area (*M. macclurei*),

or by being promoted to utilize deeper soil water (*S. superba*). Therefore, the main objectives of this study are 1) to investigate the effects of manipulated precipitation conditions on spatial-temporal water use patterns of *S. superba* and *M. macclurei* in this subtropical forest; 2) to understand the potential mechanism for the varied responses of tree transpiration to the changed precipitation patterns by examining the variations in morphological adjustment, such as (A_s: A_l), the intrinsic water use efficiency, and the contributions of water resources to the tree transpiration" (Line 126-141)

2) This manuscript would also benefit a lot by providing a more clear picture of when measurements were made. For example, the statistical analysis section seemed to imply that analyses were made at monthly time intervals, but the method section described making many of the collections at the end of the experiment. It wasn't clear how monthly time scale analyses could be made if there were only one set of collections.

R: The time for the measurements in our study was presented in the section of Materials&Methods. As described in the section, the sap flow monitoring had been carried out continuously through the whole year with the recording interval of 10 minutes, We measured the soil water content (*SWC)* values monthly, but for the WUE_i, Huber values, and the isotope analysis, collections and measurements were only carried out at the end of the experiment. (Line 244, 259, 282).

3) The Results section lacked reporting of the statistical analyses. This needs to be addressed. Without the statistical outputs, it's hard to evaluate if any of the findings were true.

R: According to the suggestion, we recalculate the proportions of water resources use based on the measured isotope data and display the statistical analysis in Figure 4. The corresponding results of statistical analysis are also described in the manuscript: "According to the statistical results, the utilization of rainwater and soil water of *M. macclurei* trees showed no significant treatment-difference, while the DD and ED treatments significantly decreased its utilization of groundwater (Figure 4). However, the changed precipitation pattern posed a significant influence on the water use proportions of *S. superba* from different water resources ($p < 0.05$)....Furthermore, the two dominant tree species shared similar water use proportion under the control condition, and *M. macclurei* used more soil water (0-60cm) than the *S. superba* under DD treatment. Comparatively, *M. macclurei* utilized more rainwater, while *S. superba* was inclined to make use of more groundwater under ED treatment ($p < 0.05$)." (Line 379-392)

4) Despite having two different precipitation exclusion treatments, the results are not discussed at all in the Discussion section.

R: We revised the Discussion section and added some contents according to the suggestion: "In this study, only *S. superba* experienced significant increase of WUE_i under DD treatment, indicating its better ability to cope with intensified drought stress. Differing from *S. superba*, *M. macclurei* did not significantly change WUE_i under DD and ED treatments. This less adjustment of WUE_i together with its higher transpiration under relatively drier seasons implied an disadvantage for *M. macclurei* when facing water stress. Moreover, other mechanisms, including controlling growth rate, adjusting leaf area index, and uptaking water from deep soil, would help plants adapt to water scarce (Lévesque et al., 2014; Nock et al., 2011; Sun et al., 2011). In our study, compared with the BC condition, the DD and ED treatments did not significantly change the Huber values (p > 0. 05), but did pose an obvious influence on the utilization of water from distinct water sources, especially for *S. superba*. Though the relatively higher use of rainfall water has decreased the use of groundwater under DD treatment, the prolonged dry condition still promoted *S. superba* to utilize deeper soil water (40-60 cm). From this point, a chronic, drought could have a stronger negative effect on *M. macclurei* than on *S. superba*. "(Line 472-487)

5) The Discussion section should be improved to provide a cohesive story about whether or not species differences matter, or different water treatments matter. I found this discussion difficult to follow because it read as many disjointed sentences highlighting when the two species behaved differently and when they behaved similarly.

R: Our writing ideas and framework are explained as follows: In the section 4.1, we focused on the comparation of tree transpiration and the possible mechanisms between the chosen tree species under control condition (treatment of BC), while in the section 4.2, the point is the effect of changed rainfall patterns on tree transpiration, and how the indicators, such as the WUE_i, Huber values, or water use proportions that varied with the treatments (DD and ED), help explain the changes in tree transpiration for both species. To follow the track of the ideas, we revised the Discussion section to avoid the structure shortcomings. Please see the revised text (in blue color) in the manuscript.

Specific Comments

Title: I recommend changing the title of this manuscript. The idea of "reshaped acclimation traits"

is not very clear, and neither is "would alter their coexisting relation." The title should represent the key findings of the study and I don't think either of these phrases capture that.

R: Yes, we have changed the title as "Species-specific transpiration and water-use patterns of two dominant coexisting tree species under manipulated rainfall in a low-subtropical secondary evergreen forest"

Line 32. The idea that physiological differences alone would explain shifts in species composition is a bit of an overstretch. What about seedling recruitment and seedling success? I would recommend ending the abstract based on the findings.

R: The overemphasized part was deleted now in the manuscript.

Line 41. Change to ". . .with much MORE SEVERE environmental conditions. . ."

R: Done. (Line 39)

Line 48. Change to ". . .for forest trees, new and appropriate forestry management strategies ARE NEEDED in the future."

R: Done. (Line 47)

Line 98. The paragraph begins with highlighting the fact that studies linking changes in rainfall and vegetation water use are typically addressed in semi-arid and arid ecosystems and that tropical areas are largely ignored. However, the citation of del Castillo (2016) for Aleppo pine refers to Mediterranean climates. Another citation would be more appropriate here.

R: As you concerned, the reference we cited here refers to a Mediterranean climate, therefore, another study that focused on tree water use of a tropical seasonal rainforest were presented here. This sentence was also changed to "For example, Liu et al. (2010) reported that *Pometia tomentosa* tree seemed to tap water mostly from depths greater than 60 cm and groundwater owing to its deep taproot, while the fog water was an important source for its seedling growth at the peak of the dry season." (Line 95-98)

Line 112. Insert ". . .the soil water recharge from SHALLOW precipitation. . ."

R: Done. (Line 110)

Line 128. What specific traits do "changed traits" refer to here?

R: We have changed it by rewriting the OBJECTIVES in the manuscript. (Line 135-141)

Line 134. ". . .and the stable isotope composition of xylem and soil water." Isn't the use of stable isotope part of examining spatial-temporal water use patterns (from objective #1)? Using isotopes

to trace water is a tool, not an underlying mechanism.

R: We have revised this part as "and the contributions of water resources to the tree transpiration..." (Line 135-141)

Line 144. Insert ". . .after more than two-decadeS OF natural growth."

R: Done. (Line 149)

Line 149. ". . .and is evenly distributed, with more than 70% of rainfall occurring from April to September. . ." This sounds contradictory. How can rainfall be even distributed if more than 70% falls during the wet season? Is this referring to spatial distribution somehow?

R: This was a mistake. We revised as "...and is unevenly distributed, with more than 70% of the rainfall occurring from April to September.." (Line 153)

Line 165. I'm not sure I understand the rationale in the precipitation exclusion treatments between ED and DD. If the dry period is from October to March and the ED period reduces precipitation from April to May, how is this different than DD?

R: DD means the drier dry season, we excluded 67% of throughfall during dry season (October to March of the following year), while ED means an extension of dry season: namely 67% of throughfall were excluded from April and May which originally belonged to the wet season and became dry. Please see the detailed information in Table 1 in the new version of manuscript.

Line 167 also says ". . .whereas for the ED treatment, 67% of throughfall was excluded in the spring (April-May) to simulate spring drought and prolonged dry season." This may extend the dry season by excluding precipitation into May, but was precipitation not altered during winter (October to March)? Some additional text explaining the rationale for the precipitation treatments would help clarify this.

R: The precipitation was not altered during winter, as we explained in the manuscript: "67% of throughfall in the spring (April-May) were excluded and the equivalent amounts of excluded water were pumped into these plots several times during wet seasons (from June to September for DD and ED treatments)". (See Line 172-178)

Line 216. At what depths were soil samples collected for SWC measurements?

R: We added the contents in the text: "Additionally, soil samples (0-30 cm) were monthly collected in the experimental plots to measure the soil water contents (*SWC*) by gravimetric method." (Line 222)

Line 239. Change to ". . .BRANCH BARK WAS removed. . ."

R: Done. (Line 245)

Line 247 and 248. What do the "n=4" refer to? Were there only four trees used in this calculation of leaf biomass? If there were five replicate trees per species for each treatment, it's unclear where n=4 comes from.

R: Yes, there were five replicate trees per species for each treatment, but here it refers to four non-sample trees used for the model establishment of leaf biomass.

Line 292. How were monthly differences in whole-tree and branch As:Al calculated? I was under the impression that As:Al was calculated at the end of the experiment. Also, were leaf tissue collected for d13C also collected monthly? Also, the previous section says that xylem water, soil water, and precipitation were collected at the end of the experiment. How can monthly differences then be calculated?

R: We are sorry for the misleading expressions. We measured the soil water content (*SWC)* values monthly, but for the WUE_i, Huber values, and the isotope analysis, the collections and measurements were carried out only at the end of the experiment. Here this sentence was changed to avoid the misunderstanding: "Differences of *SWC*, whole-tree and branch A_s:A_l, and WUE_i among tree species..." (Line 309)

Line 293. Again, it's unclear if measurements/collections were made monthly or at the end of the experiment, so it's not clear if the LSD post hoc test is the best. If monthly measurements were made on the same sets of trees, a repeated measures analyses makes more sense.

R: The measurements of WUE_i, Huber values, and the isotope analysis were carried out only at the end of the experiment (Line 259 and 282), and we used the One-way ANOVA followed by a post hoc test to test the differences among the different treatments in this study.

Line 326. "M. macclurei transpired more water than S. superba. . ." I'm not sure what data support these findings

R: The daily transpiration data of *M. macclurei* and *S. superba* was presented in Figure 3. The comparison might not be clear enough due to the relatively large amount of data. This sentence was changed to make it less controversial: " *M. macclurei* transpired more water than *S. superba* during wet and early dry seasons." (Line 346-347)

Line 338. Why was transpiration of trees from the ED treatments lower during the winter if rain

was not excluded during the winter?

R: Sorry for having not presented the sentence clearly. What we actually expressed is " Differing from those in the wet and dry seasons, E_L values of ED treatment were significantly lower for both tree species than those of BC and DD treatments during the spring drought period", rather than "during the winter" (Line 356-358)

Lines 343-350. I would consider revising this section because it's hard to keep track of the decreases in transpiration rates between different seasons.

R: Yes, we think this section did not contribute more to our findings in this study and therefore have deleted it.

Line 352-355. Please report the statistics here.

R: The statistics results were added in the text and in Table 3. "Compared with *S. superba* trees, *M. macclurei* had significantly lower branch A_s:A_l values of under BC and DD treatments ($p < 0.05$). It is remarkable that the branch and whole A_s:A_l values of *M. macclurei* trees experienced the biggest drop under the DD treatment, and the whole A_s:A_l values showed a significant difference between two species only under DD treatment ($p < 0.05$). The manipulated precipitation treatments posed significant effect in branch A_s:A_l for both *S. superba* and *M. macclurei* ($p < 0.05$), whereas no significant effect on whole-tree A_s:A_l values was observed ($p > 0.05$)." (Line 363-371)

Line 355-356. Please report statistics here.

R: The statistics results were added in the text and in Table 3. (Line 363-371)

Line 357. "To be specific, the branch and whole-tree As:Al of M. macclurei were 7.7% ~ 30.7% lower than those of S. superba among the different rainfall treatments ($p<0.005$)." This is unclear – is the p-value saying that all M. macclurei treatments (BC, EE, ED) were significantly lower than S. superba? If so, why were the control, BC, treatments different?

R: To separate the effects of tree species and precipitation treatment, we have redone the statistical analysis the results were listed in Table 3. Corresponding modification of the results was described in the text. "Compared with the *S. superba* trees, *M. macclurei* had significantly lower branch A_s:A_l values of under BC and DD treatments ($p < 0.05$). It is remarkable that the branch and whole A_s:A_l values of *M. macclurei* trees experienced the biggest drop under the DD treatment, while the whole A_s:A_l values presented a significant difference between two species only under DD treatment ($p < 0.05$). The manipulated precipitation treatments posed significant effect in branch

A_s:A_l for both *S. superba* and *M. macclurei* ($p < 0.05$), whereas no significant effect on whole-tree A_s:A_l values was observed ($p > 0.05$).” (Line 363-371)

Line 362. “Whereas for the same tree species, sampled trees in three different manipulation precipitation blocks shared similar whole tree As:Al values.” What does this mean?

R: The meaning of this sentence was the manipulated precipitation treatments posed no significant effect on whole-tree A_s:A_l values for both *S. superba* and *M. macclurei,* and here we revised this sentence to avoid confusion: “The manipulated precipitation treatments posed significant effect in branch A_s:A_l for both *S. superba* and *M. macclurei* ($p < 0.05$), whereas no significant effect on whole-tree A_s:A_l values was observed ($p > 0.05$).”(Line 368-371)

Line 367. “Normally, the rainwater use of M. macclurei for BC and ED treatments was higher than that of S. superba, but not for the treatment of DD.” Please show the statistics.

R: The results of statistical analysis were added in Figure 4 and described in the manuscript now: “Comparatively, *M. macclurei* utilized more rainwater, while *S. superba* was inclined to make use of more groundwater under ED treatment ($p < 0.05$).” (Line 390-392)

Line 377. “. . .S. superba was inclined to use more deeper water and groundwater than M. macclurei.” Please show statistics to support this.

R: The results of statistical analysis were added in Figure 4 and described in the manuscript now: “Comparatively, *M. macclurei* utilized more rainwater, while *S. superba* was inclined to make use of more groundwater under ED treatment ($p < 0.05$).” (Line 390-392)

Section 3.4 It’s still unclear to me if xylem water was collected only once during the experiment (at the end), or if samples had been collected during winter, spring, and summer.

R: We are sorry for the misleading. We have clarified the sampling time in the text “To identify the utilization of water resources by trees, we measured the hydrogen and oxygen isotopes (D and ^{18}O) of xylem water and different water sources (rain, soil water from different soil layers, and groundwater) at the end of the experiment.” (Line 280-282)

Section 3.5 Statistics are missing almost entirely from here. If slopes of one treatment is higher than another treatment, please include the statistics. If the slope were not different, please show the statistics as well.

R:Actually, we have done the statistics for the analysis of tree water use in response to *VPD,* and we added the description of statistics in the text: “To examine the differences in regressions for

both tree species under manipulated precipitation treatments, we performed homogeneity of regression slopes and an analysis of covariance in SPSS software package (SPSS Inc., 2003). Differences between the treatments were considered to be statistically significant at $p < 0.05$." (Line 314-318). The statistic results of the regression was also described in the text: "Normally, the slopes of fitted lines in BC treatment were significantly higher than those in DD and ED treatments ($p < 0.05$), with a value sequence of BC > DD > ED. During spring drought, a much flatter change in daily transpiration with increasing *VPD* was observed in *M. macclurei* of BC treatment. For the DD and ED treatments, there was no significant difference in the slopes of the fitted linear relationships for the three periods within the same tree species ($p > 0.05$)." (Line 398-404)

Discussion section. I recommend beginning with a summary of the key findings from this study before launching into the details of each type of measurement.

R: A summary of the key findings in Discussion section was added in the text: "Differing from previous studies that mainly focused on water-restricted habitats, we explored the variations in responses of water use of the two dominant tree species to the manipulated precipitation treatments in a subtropical forest ecosystem. Results support the first hypothesis that the *M. macclurei* trees usually transpired more water than *S. superba* trees due to the growth advantages in biometric characters of the former. Also, the manipulated precipitation exclusion significantly restrained the transpiration for both tree species, and the adjustments of Huber values, water use efficiency and the water uptake depth would partly responsible for the decreased tree transpiration. Our study indicated that, to cope with the potential seasonal drought in the future, the coexisting *M. macclurei* and *S. superba* trees will adopt drought avoidance and drought tolerance strategies, respectively." (Line 416-426)

Line 424. "...species would be less access to water and can further reduce the risk of xylem cavitation..." I'm not following this argument.

R: To make it easy to understand, we revised this sentence as : "Results indicated that*S. superba* had a significantly larger Huber values (A_s:A_l) (Table 2), possibly meaning a less investment in leaf biomass and a better efficient transport system (Zhu et al., 2014)." (Line 447-449)

Section 4.1 I don't see any discussion of how the different treatments influenced water use.

R: In the section 4.1, we only focused on the comparison of tree transpiration and the possible

mechanisms between the two tree species under control condition (treatment of BC), and the influence of changed precipitation patterns on water use of coexisting trees was emphasized in section 4.2: "In this study, only *S. superba* experienced significant increase of WUE_i under DD treatment, indicating its better ability to cope with intensified drought stress. Differing from *S. superba*, *M. macclurei* did not significantly change WUE_i under DD and ED treatments. This less adjustment of WUE_i together with its higher transpiration under relatively drier seasons implied an disadvantage for *M. macclurei* when facing water stress... In our study, compared with the BC condition, the DD and ED treatments did not significantly change the Huber values ($p > 0.05$), but did pose an obvious influence on the utilization of water from distinct water sources, especially for *S. superba*. Though the relatively higher use of rainfall water has decreased the use of groundwater under DD treatment, the prolonged dry condition still promoted *S. superba* to utilize deeper soil water (40-60 cm)." (Line 472-486)

Table 2. The letters used to discern differences between BC, DD, and ED treatments are quite confusing. For example, why are different letters used for Branch As:Al (b, c, d) compared to WUEi (a, b). This almost implies that WUEi and As:Al were compared, when they clearly were not.

R: To emphasize the effects of tree species and precipitation treatment separately, we have redone the statistical analysis and the results were listed in Table 3 (new version of the manuscript). Corresponding modification of the results was described in the text. (Line 363-371)

Figure 2. The letters used to show differences in SWC are too complicated. Please remove and just report the statistical findings. Why are lower case and capital letters both used? The Figure legend does not explain any of this.

R: Different small letters indicate differences among the three treatments within the same tree species. Different capital letters indicate differences between tree species for a single treatment. The letters were removed in Figure 2 and the statistical findings were reported as suggested: "According to the statistical analysis, the DD treatment possessed significantly lower *SWC* values for majority of the experimental months, with approximately 5%-30% decline compared to BC and ED treatments ($p < 0.05$), and no difference was observed between the BC and ED treatments in the wet season ($p > 0.05$)." (Line 335-338)

Figure 3. Instead of splitting the daily E into dry, spring, and summer, I would plot daily E along

one time axis. The way this figure is currently set up, the time intervals are different between panels a, c, e, and b, d, f. A better way is to highlight the different periods of the precipitation in one panel, and have M. Macclurei on top, and S. superba on the bottom. Also, why is ED lower during the dry season (Oct-Mar) if precipitation was not excluded during this time?

R: The Figure 3 was re-plotted accordingly by following reviewer's suggestion .

Figure 4. No statistics here. Why?

R: We have displayed the statistical analysis in Figure 4. The corresponding results of statistical analysis are also described in the manuscript. (Line 379-392)