Response to reviewer 1

We thank the reviewer for the positive feedback and constructive comments to improve the manuscript. We revised the manuscript according to the suggestions made. Below we provide our response to the main comments. Referee comments are repeated in bold.

Overall comment. As this article illustrates selected use cases from a complex drought risk assessment framework and a larger body of work in a relatively short article, care should be taken to provide enough details or references in the methodological sections, make sure terminology for e.g. the scenarios is used consistently and references to analyses or results that are not discussed in detail are omitted or discussed in more detail.

It is true that the manuscript discusses only a selection of the results of a larger study. We will carefully check whether methodological details and references are sufficient for the reader to understand the results, and that references to analyses that are not discussed will be omitted.

Main comment 1. Why exactly were these 5 policy actions selected? Can they be considered representative for the range of policy actions in the "extensive list"?

We selected five policy actions for this paper from an extensive list of about 150 policy actions. They serve as an example for the applicability of the risk assessment framework. We therefore chose actions that fall into either of two main categories of drought risk policy actions (reduce demand or increase supply) and that have an effect on national drought risk. Furthermore, we omitted local actions and actions aimed at research (e.g. local pilot studies). The presented approach is less suited for local measures that require detailed system knowledge and do not affect regional or national water distribution. We have clarified this in the revised manuscript on Page 4.

Detailed comments

Page 4.

The higher sandy areas do not seem to be included in the study area. It would be better to not include this general paragraph (l.78-86) on drought impacts in the Netherlands, but include a bit more details in the paragraph on the two actual study areas (l.94-99).

References to the higher sandy grounds are deleted.

It may be good to highlight that the Delta Programme is a comprehensive water management strategy and even focuses primarily on flooding.

We added some additional information on the Delta Programme in Section 2.1

Why exactly were these 5 policy actions selected? Can they be considered representative for the range of policy actions in the "extensive list"?

More explanation is added. See also our response to the main comment above.

Figure 2: relevance to showing soil types should be discussed

We believe that the soil types are relevant information for the reader, since they give a first indication of the water management situation and the vulnerability to drought. Furthermore, the area with peat soils give an indication where water supply is needed to maintain surface water levels to prevent peat oxidation and land subsidence, as explained in Section 2.1 Study area.

Page 5

Could use a reference as the methodology is not explained in detail.

We added references to literature on risk assessment methods.

Page 7

Often there are different quality requirements for production and cooling water affecting costs. Is this accounted for?

Yes, quality requirements for production water are usually more strict. The impact module for industry only takes into account production stops due to production water shortage. Cooling water availability is not expected to become a problem, except when the water temperature is too high. We clarified this in the manuscript.

Page 8.

Not entirely clear which scenario is the reference scenario, or how it is determined.

The reference situation represents current climate, land use, and water management. We clarified this in the text.

Page 10.

The results of the sensitivity analysis are not given, save for a short mention in the model limitation sections?

The effect of choosing a smaller discount rate was already mentioned in the discussion section. We agree that we do not need to mention it in the method section. We removed the sentence.

Page 11.

Figure 3: is there a reason to have the graph extent to beyond 2050?

In the Netherlands, it is required to assess cost and benefits of public investments over an infinite time period, in the calculation this is limited to 100 years ahead. We clarified this in the text and shortened the x-axis to 2070 to make it better readable.

Using Reference and Stoom and low-end and high-end scenario interchangeably at different points in the text and figures is confusing, consider using either the one or the other throughout.

Agreed. We changed low-end into Reference and high-end into Stoom in Figure 3 and in the text.

Page 12.

This is contrary to what Christodoulou et al., 2020 (https://doi.org/10.1016/j.trd.2019.10.012) found. Maybe include a discussion?

Christodoulou et al. have studied the effect of climate change on transport cost along the German part of the Rhine (Ruhrort and Kaub) and along the Danube. Ruhrort is the most relevant location for the Rhine shipping corridor. For this location, Christodoulou et al. find an increase of low flow days in some of the scenarios and a decrease for other scenarios. It is interesting to see that the use of different climate change scenarios and hydrological rainfall-runoff models lead to a wide range of future projections. That is why we have to develop adaptive strategies, as shown in our paper. In our case we assess the policy options under a Reference scenario with no change and an extreme dry scenario (Stoom).

Use the same names for the scenarios throughout the paper, don't switch between GL/WH, Reference and Stoom, and low-end and high-end.

We removed low-end and high-end names (see earlier comment). But Gl/Wh refer to climate change scenarios, and Reference and Stoom refer to combined climate change and socio-economic scenarios. This is explained in the method section.

Table 3: Be more specific to aid readers: "Impact model results for current and future drought risk". A (stacked) barchart may be more illustrative than a table and can still include the numbers.

We chose a table over a bar chart, because it was difficult to see the different categories (e.g. 1 million euro for industry over a total of 372 million euro).

Page 16

Figure 4: some discussion on this large 'other effects' may be useful

Other effects are all effects that are not included in the dynamic impact models, but for which we calculated a change in water shortage (mainly flushing and water management to limit groundwater decline in peat areas). Because of the prioritization rules for water allocation, the water shortage occurs first for irrigated agriculture and next for flushing. We extended the results and included this point in the discussion section. Because of the importance of the category in terms of avoided drought risk, it is recommended to develop a dynamic impact module

Figures 5: limit axis to 10 or put side by side and discuss difference.

We changed the y-axis of the figure as suggested.

Figure 5: discuss the minor effects of some of the categories or don't show in the legend.

We changed the figures to include the distribution of avoided drought risk among the different user categories. This now makes clear the major benefit in region North is for agriculture and 'other effects', whereas in region West the major benefit of the strategy is for drinking water supply.

We split the original Figure 5 (with upper and lower panel) into Figures 5 and 6: one figure for each region.