Action perspective on climate extremes in the Dutch river delta
modelling system-level impacts on river functions

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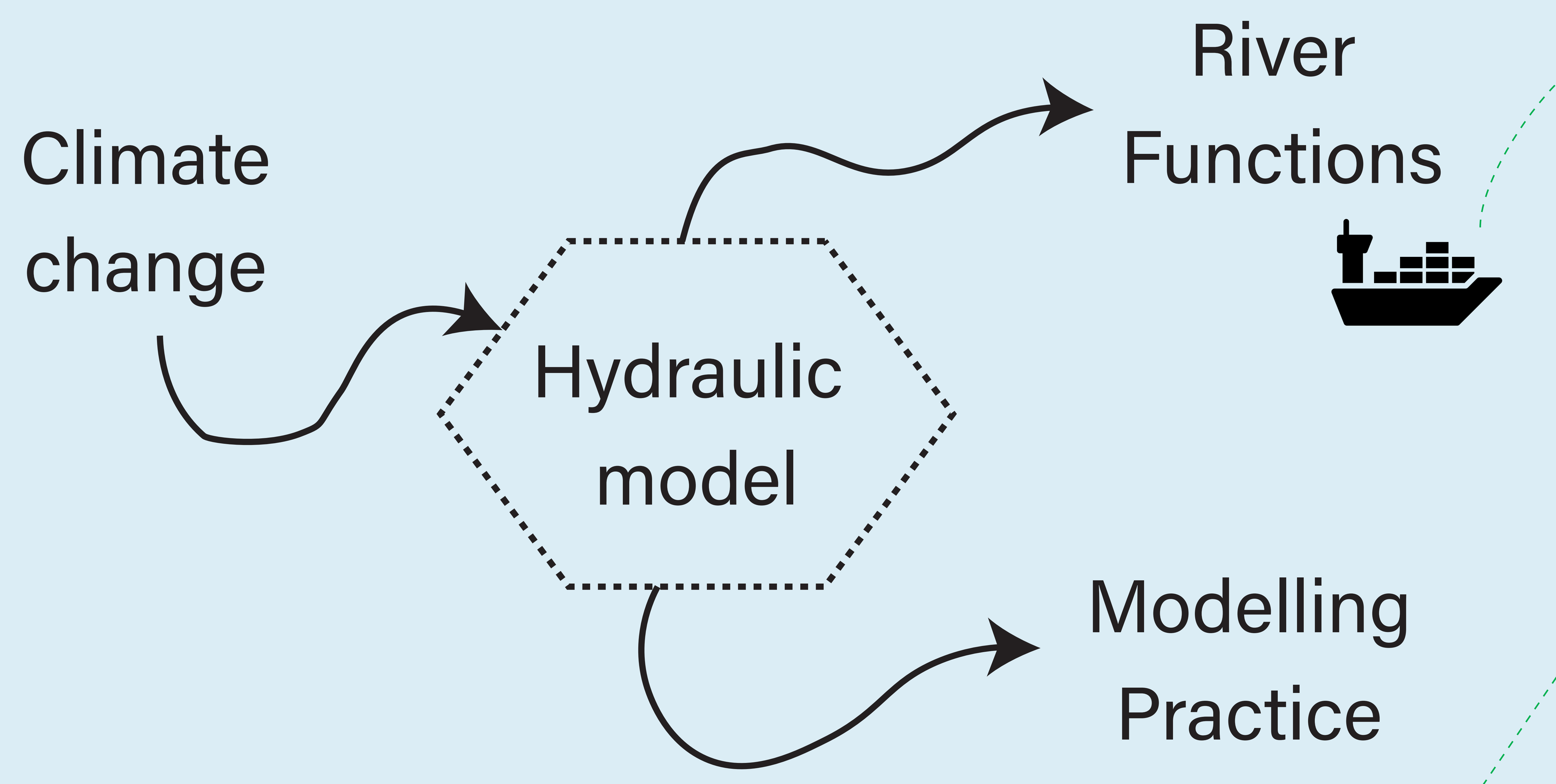
Introduction

Worldwide climate change affects the Dutch deltaic river system: extreme low discharges in summer and extreme high discharges in winter will increase. Combined with sea level rise (SLR), increasing fresh water demand and autonomous trends (e.g. bed degradation) the current main water system is put under major stresses in the future. Understanding how climate change influences the Dutch river system in the long term (> 2100) is important to timely adapt to these developments and demands.

Research aim

Within this research project, we adress how climate change impacts the interaction between rivers, lakes and estuaries, to adress **the impact of climate change on the current state-of-the-art models** and to it's impact on **key river functions using scenario discovery:**



Model (study area)

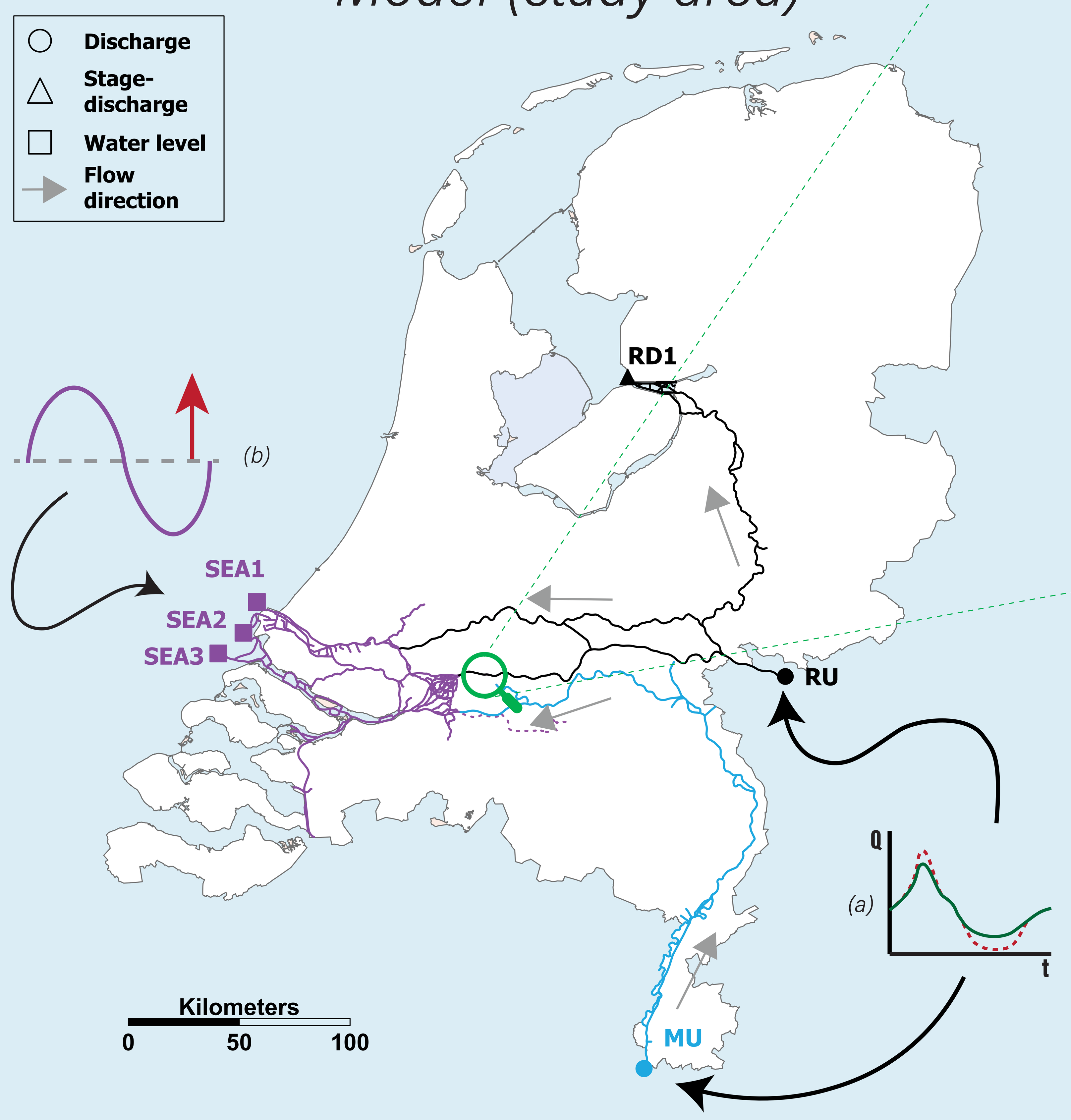


Figure 1. Study domain. Each color represents a different river-model: Rhine (black), Meuse (blue), RMM (purple). Forecasted impact on boundary conditions are schematically drawn: (a) changing hydrograph, (b) rising sea level. The green magnifying glass indicates the location where we assesed model-impact.

Research gap

Within this research project, we adress how climate change impacts the interaction between rivers, lakes and estuaries, to understand **the impact of climate change on the current state-of-the-art models** and to it's impact on a **key river function (navigation).**

Results - functions

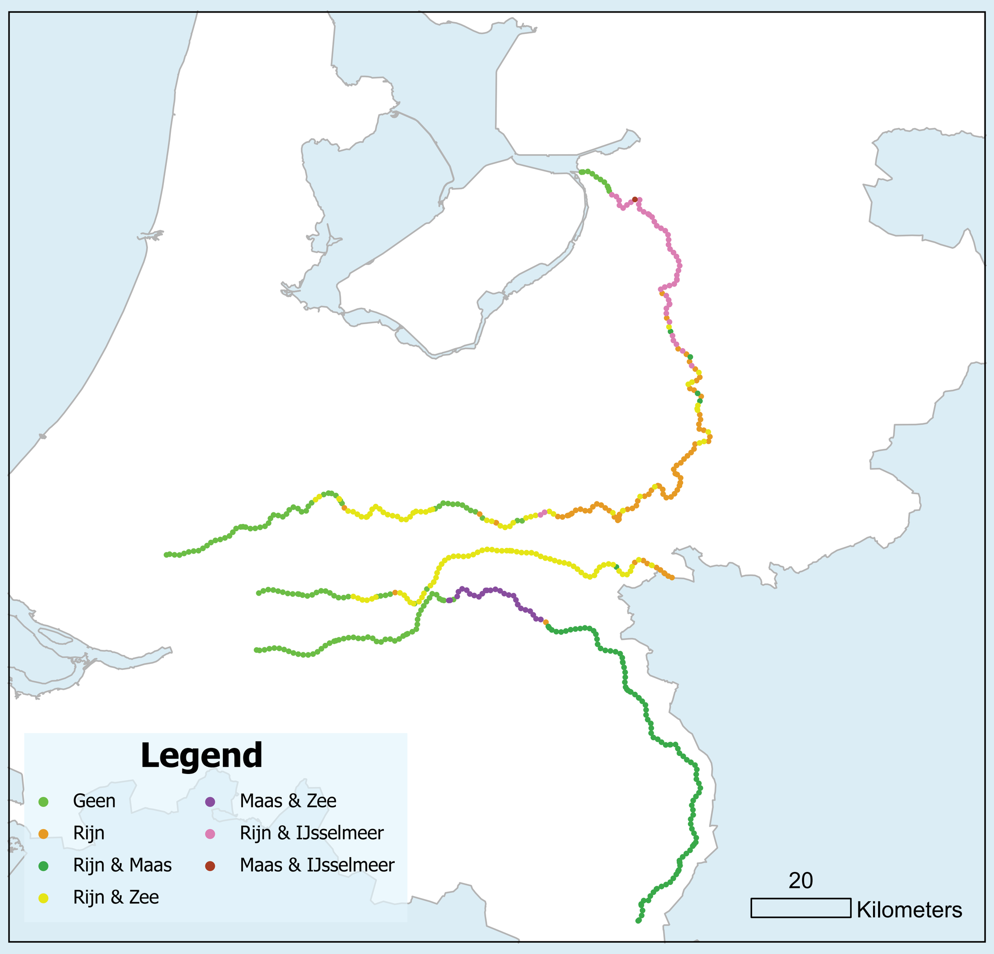


Figure 2. Dominant climate change driven changing boundary condition on shipping function in the Dutch River Delta.

Results - models

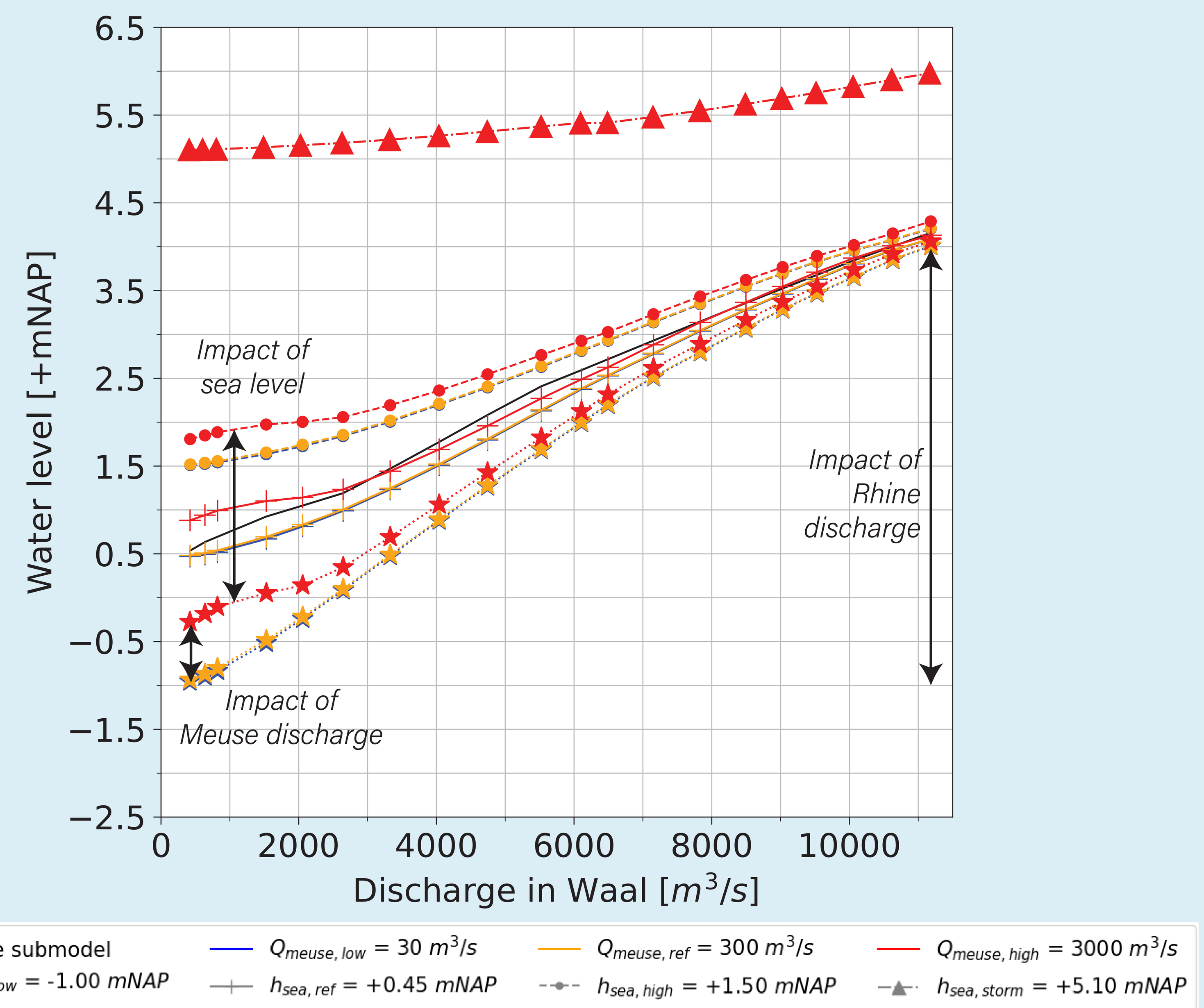


Figure 3. Impact of climate change driven change in boundary conditions. Especially during droughts the boundary conditions in hydraulic models become crucial to consider..

Conclusion

When modelling large scale developments in interconnected regions, either use an integrated model OR carefully determine appropriate boundary conditions. The relevance of boundary conditions differ spatially and for different river functions.

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