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There is increasing evidence that the hydrological cycle is changing in response to anthropogenic emissions of greenhouse gases. Given the rapid increase in emissions in recent decades and the very likely continued increase over the foreseeable future, there is little doubt that we are committed to further climate change in coming decades. These climate changes combined with land use changes and increased water demand from population and development will have an impact on the water cycle and available water resources. This is likely to be most acutely felt in the semi-arid regions of the world. In this context, appropriate adaptation will be necessary, which requires future projections of water availability and demand and, crucially, the associated uncertainty. This presentation summarises the findings of a coordinated programme of research into climate change impacts on freshwater availability in river basins around the world. Particular emphasis is given to methods to quantify the many sources of uncertainty associated with these climate change impact projections including a probabilistic approach to climate and hydrological simulations. The utility of regional climate models as a downscaling tool is considered. One often overlooked source of uncertainty lies in the calculation of evapotranspiration in hydrological models and an analysis of the sensitivity of climate change impacts to this is provided. The work considers the challenges for development of adaptation policy in the context of uncertainty using a comparison of contrasting river basins.