Risk component	Climate change impacts	Assessment methods
Flood	Variations in local floods are expected due to changes in – heavy rainfall patterns. – snow cover and snowmelt processes. – vegetation or soil moisture.	– Direct application of previous analyses. – Combination of climate projections, downscaling, and hydro-meteorological modelling (Fig. 4). – Uncertainties inherent in climate and hydrological projections and changes in the watershed model.
Reservoir water levels	Fluctuations in water storage are due to – precipitation variability, potential evapotranspiration, or decreased snow and ice storage. – changes and adaptations in land use and water demand.	– Combination of climate projections, downscaling techniques, and simulation of the system of water resource management. – Importance of non-climatic drivers (e.g. changes in land use, adaptation of a reservoir's exploitation rules).
Gate performance	– Abrasion processes due to increases in the sediment content of the water. – Blockage of the gates due to suspended material. – Changes in temperature causing stresses and deformations.	– Qualitative assessment of the impacts of new climatic conditions and stressors (Table 1). – The use of fault trees.
Flood routing strategy	Operation rules are likely to adapt under certain climate conditions (e.g. changes in heavy rainfalls inducing variations in the flood hydrographs' concentration time).	Re-evaluation of the flood routing criteria.
Failure modes	New failure modes that may arise, in particular in the context of glacier melt and slope stability or GLOF occurrence directly impacting the dam structure.	Guidelines and tools to identify, describe, and structure new failure modes or remove obsolete ones.
Probability of failure	– Temperature fluctuations may induce additional mechanical stresses in concrete dams. – Drier soils and water level fluctuations can increase processes such as internal erosion in embankment dams.	Probability can be elicited through expert judgment in different guidelines.
Outflow hydrographs	The outflow hydrograph routing is affected by – roughness of the surface. – water viscosity related to flood sediment concentration.	Inundation models can be used to assess the sensitivity of the outflow hydrographs to these factors.
Socio-economic consequences	Direct consequences can be assessed through – exposure changes due to population growth. – update of the assets' economic value. Indirect consequences include – the value of water for irrigation or hydropower production being likely to vary, which implies changes in the cost of interruption of services and/or activities.	Direct consequences can be assessed through – application of demographic projections. – detailed land use and population growth models based on socio-economic scenarios. – assessment of flood severity levels according to the socio-economic context. Indirect consequences can be assessed through – estimation as a fixed percentage of direct costs. – complex modelling of the economic system and assessment of costs induced by the interruption of services and/or activities.