Distinguished Professor John Pomeroy, FRSC, Canada Research Chair in Water Resources and Climate Change

Director, Global Water Futures Programme, University of Saskatchewan, Saskatoon, Canada.

Intervention to **Data and Information Roundtable**, Oct 24th 2022 Stakeholder Consultation for UN 2023 Water Conference.

Global Water Predictions for Adapting to Climate Change Require Advanced, Integrated Hydrological Observation, and Prediction Systems. Changing water supplies due to climate change, insufficient freshwater flows for human and ecosystem needs, growing water consumption and rapidly increasing damages to societies, economies and ecosystems from floods and droughts urgently require improved global predictions of freshwater from farm and community scales to river basin and continental scales, at time-scales from short-term forecasts to multidecadal long-term predictions of change. These global predictions can be developed by enhancing and deploying multi-scale water predictive technologies using recent advances in the next generation of integrated hydrological-water quality-water management models, coupled to atmospheric, ecosystem and social behaviour models. These models need to use all available observational information to achieve their required accuracy and precision. Observations are currently inadequately collected and shared in many parts of the world and urgently require enhancement and open-sharing of data from national hydrometeorological and water quality observing networks, research basins, community-based monitoring, industry, satellite remote sensing, reanalysis datasets, and Indigenous knowledge. The prediction system developments also need to be tightly tied to advances in hydrological sciences, which must rapidly increase understanding, algorithms and modelling systems to revolutionize integrated multi-scale water predictions, so they meet the needs of communities and nation-states across continental river basins. As more than half of humanity is dependent upon rivers from high mountain snow and glaciers, a special effort is needed to better understand and predict the effect of climate change on the cryosphere and downstream hydrology. As food and energy production are essential for humanity, a special effort is also needed to improve water forecasts, monitor groundwater, and to develop decision support systems to improve production efficiencies and balance water use with the needs of ecosystems and Indigenous cultures.