Assessing Water Security in Central Asia through a Delphi Approach

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Water security in Central Asia (CA) plays a vital role because of transboundary river systems and interconnected infrastructure assets. Each CA country has differently contextualized the water security notion to serve national priorities and needs. Various scholars have studied and interpreted the concept of water security in CA through economic, environmental, social, and technical perspectives. Yet however, there is very little information on the perceptions of policymakers and water professionals that are directly engaged with the water policy discourse in the CA region.

In this regard, we attempted to identify policy makers and water professionals' views on water management and security aspects in CA. A Delphi method was introduced through a two-round survey to decision-makers and water professionals to assess the rate of agreement on different water security dimensions that have been identified through a thorough literature review.

Namely, the dimensions associated with urban & household facilities, economic activities, environmental aspects and natural hazards were assessed, whereas different attributes related to each dimension were also considered. The first survey round explored the rate of agreement in the following six different sections: the proposed water security dimensions (1) and attributes (2) in CA; historical trends and dynamics of each dimension (3) and the implications on a policy level (4); the national priorities for each country (5); and the effectiveness of mechanisms dealing with regional water security issues (6). The second round synopsized the initial findings by exploring whether a higher agreement rate was attained in each of the sections mentioned above.

Clustering analysis was applied to better identify the agreement rate and assess decision-makers and water professionals' behavioral patterns within the two-survey rounds. A number of clustering techniques were tested out. Methods such as K-Medoids, Spectral, Hierarchical, and Agglomerative clustering, as well as the Affinity Propagation, were applied. Hyperparameters were chosen based on the observations of how well the clusters are formed, i.e., how similar the responses are within the cluster and how much they differ from other clusters. The clustering was applied to the whole range of responses, as well as separately on different sections of the surveys.

The findings indicate that the clustering of all six parts did not clearly define separation and

distinctive agreement rates in the first survey round. However, when the clustering was performed within specific sections, e.g., the national priorities in each country, behavioral patterns were revealed among respondents. The clustering trends among sections became more apparent in the second survey round. Our preliminary findings indicate that a set of socio-demographic and professional-related features of the participants are aligned with the patterns of the clustering outcomes on water security priorities in CA. The study findings could identify the major challenges that policymakers and water professionals face being mutually addressed by improving water security dialogue in the CA region.