The effect of uncertainty and variability on the economic appraisal of the Nura Clean Up Project in Northern Kazakhstan

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The River Nura is typical internal steppe river of Kazakhstan. It is concluded by a system of closed lakes of the Tengiz-Kurgaldzhinskaya depression which includes wetlands, an important site for wildlife and internationally significant one for ornithology. The river is subjected to natural cyclic process of variation of its annual flow causing variation of both Lake Tengiz salinity and the area of wetland. In the past, large amounts of mercury were discharged into the River Nura at Temirtau resulting in contamination and prohibited use of the river.

The mercury pollution seems not to be as serious as was first thought. So there is the possibility that the river can be cleaned up to the extent that its water could be used for the water needs of the new capital of Kazakhstan, Astana. This could have an adverse effect on Kurgal'dzhino due to the withdrawal of a part of the river flow and consequences of successive dry years.

Several Cost Benefit Analyses suggest that the competing water needs can be adequately met. However, they use a Certainty Equivalence Principle which may be appropriate for river systems in Western Europe, but not those in steppe Central Asia. By averaging over years, they neglect variability in natural water flow in the river, and consequently the resilience of the non-convex ecosystem. Also, the effectiveness of cleaning the river and the costs of alternative water supplies for Astana are uncertain. However, eventually, learning would lead to these uncertainties being resolved.

It is not appropriate to use a certainty equivalent analysis for this type of project, and uncertainty and learning should be considered explicitly. We consider a strategy that is 'Robust' in the presence of many uncertainties, enabling sustainable use of the river, and recognizing that decisions have to be made before uncertainties are resolved.