Groundwater quality, climate and irrigation: large-scale, long-term trends in the Aral Sea Drainage Basin

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Abstract We consider contaminant spreading under changing ambient conditions in the Aral Sea Drainage Basin (ASDB) in Central Asia, synthesising data on water-borne contaminants that occur at hazardously high concentrations. The basin has undergone an enormous irrigation expansion. Furthermore temperatures have increased by about 1°C during the 20th century, and are expected to continue to increase in the near future. Results show that high concentrations of chromium, lead and copper in groundwater systems of ASDB constitute a considerable health hazard. However, in adjacent surface water systems, concentrations of the same contaminants are much lower. If downstream surface water resources dry up due to climate changes or continued upstream irrigation expansion, polluted groundwater can become the only remaining source for drinking water supply.

Key words groundwater quality; climate change; irrigation expansion; large-scale trends