Substantial pollution of drinking and river water in Beijing, China: Serious threat for public health and local ecology

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The decline of the water quality in fast developing Asian megacities has become a matter of public concern. We analyzed a number of tap and river water samples collected in the Beijing urban area on selected inorganic pollutants, such as specific anions, heavy metals and trace elements. 27% of the analyzed tap water samples show one or more constituents above the national guideline limits. 9% of the samples reveal concentrations above the official threshold value for NO_3^-, while 5% exceed the standard value for As, which makes this tap water unsuitable for daily consumption, due to a serious health risk, especially for children and babies. Multiple stable isotopes ($\delta^{15}N$, $\delta^{18}O$, $\delta^{34}S$, $\Delta^{33}S$) of tap water indicate urban sewage as the major origin of anthropogenic pollutants probably released in large amounts by leaking wastewater pipes to the local groundwater. Substantial pollution by urban sewage and industrial emissions could be also detected in Beijing rivers. 13% of the river water samples in the wet season (summer) and 30% in the dry season (winter) show class IV quality, whereas 8% of the summer samples and 21% of the winter samples do not even comply with the lowest category class V. The latter river water can be regarded as toxic waste, which is hazardous for human health and highly destructive for the water ecology in the respective rivers. Both drinking and river water is most affected by urban pollution in the highly industrialized areas of Beijing. The results of this combined geochemical and multiple stable isotope study point to a critical status of the local rivers and aquifers, caused by the rapid growth of Beijing accompanied by an irresponsible handling of urban effluents.

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