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Quality of groundwater on the newly dry bottom of the Aral Sea

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Anthropogenic impacts on the groundwater can be quantified through the concentrations of non-organic and organic pollutants. We report results of chemical analyses of the water samples collected recently from groundwater wells on the newly dry bottom of the Aral Sea, a well as the Sea itself, and Amudarya River deltaic region. Of all the contaminants, the most important role in the Aral Sea region belongs to nitrates. The content of nitrates in the groundwater generally spans between 50 and 155 mg/l. At the same time, the water of the Aral Sea itself at different locations contained from 93 to 136 mg/l, while the tributary river (Amudarya) water was characterized by concentrations from 181 to 248 mg/l. The highest concentrations of nitrates were observed in the water sample collected from the nearby Sudochye Lake, i.e. 620 mg/l. These figures point towards very significant pollution resulting from agricultural fertilization. The level of pollution in the groundwater appears to be somewhat lower than that in the surface waters.

Pollution of groundwater is also manifested in contents of some microcomponents, namely, Co, Cd, Pb, Mn, and Sr. The respective average contents of these elements in the analyzed groundwater samples were 1.7 mg/l, 0.9 mg/l, 0.16 mg/l, 0.2 mg/l, and 10.0 mg/l. The average mineralization of the groundwater was 65 g/l. The accumulation of heavy metals is likely to have been mainly associated with agricultural chemicals and/or mineral fertilizers. The more mobile components, such as Co and Sr, apparently migrated following the retreat of the Sea's shoreline, while the less mobile ones were mainly accumulated in the areas of irrigation and agriculture.