The work describes the processes occurring in the natural waters from a kinetic perspective, highlighting the role of various components of the oxygen cycle and putting into evidence two water quality parameters that evaluate the contents in two intermediate products of oxygen reduction up to water, namely hydrogen peroxide and OH radicals. The flows of oxidative equivalents, hydrogen peroxide, and reducers that interact with it are evaluated by the redox state indicator. The pollution by OH “traps” is evaluated by measuring the inhibition capacity (Σki,OH[Si,OH]) parameter. In this work, the authors present the pollution assessment and water self-purification process supported by hydrogen peroxide and OH radicals during the years 2015-2019. The monitored objects were Nistru River in the Dubasari-Vadul-lui-Voda dam segment; its tributaries, Raut and Ichel, at the mouths of confluence with the river; and the Ghidighici and Danceni lakes, the surface water bodies in the Republic of Moldova.