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## Aquatic organism behaviours at multiple trophic levels for water monitoring: the case of Gran Sasso - Sirente aquifer

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Emerging contaminants could exert combined toxic effects, including synergetic and antagonistic ones, that cannot be identified by chemical analysis tools. The biological early warning systems (BEWS) perform a real-time and continuous (24 h) monitoring of physiological and/or behavioural parameters of organism alterations, potentially correlated to water pollution. They are based on the response of living sentinels (i.e. molluscs, algae, crustaceans, fish) to a contaminant or mixture of them. Early warnings can be sent by SMS, e-mail, etc. to operators, in order to activate response actions. Belonging to different trophic levels, the crustacean *D. magna*, the alga *C. vulgaris* and the mollusc *P. casertanum* have been used to control Gran Sasso-Sirente aquifer in three different locations. Drinkable water of Teramo province and irrigation water of L'Aquila have been continuously monitored by the commercial tools "bbe® Daphnia Toximeter (DTOX)" and "bbe® Algae Toximeter (ATOX)", respectively. In Tirino river spring, a novel sensor "SmartShell" has registered for the first time the valve movements of the autochthonous bivalve. After the first testing period, DTOX and ATOX did not register any typology of alarms in the potable and irrigation water. The valve movements of *P. casertanum* have been examined through spectral analysis in order to evaluate the behavioural rhythms useful for further investigation on their alterations as early warnings. The objective has been to reinforce the aquifer protection by installing instruments internationally recognised as efficient tools and exploring new proposals for guaranteeing human and ecosystem health.