

Effects of volcanic eruptions on water quality and aquatic fauna in southern Chile

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We provide basic information on water quality and aquatic fauna of rivers affected by three volcanic eruptions in southern Chile: Puyehue – Cordón Caulle volcanic complex (PCC vc) (June 4th, 2011), and volcanoes Villarrica (March 3th) and Calbuco (April 22th 2015). River waters were a priori categorized as turbid (brownish color), mixed (yellowish color) and clear (transparent) rivers based upon water color and loads of tephra. Statistical analyses showed no significant differences in pH, sulfates and silicates, among the river categories <10 days after eruptions. Total suspended solids (TSS), conductivity and fluoride, were significantly higher at the turbid rivers versus mixed and clear rivers. Results of DFA showed that variability in water quality can be significantly explained by those variables.

During a 9 month period, abundance of aquatic insects in nearby rivers to PCC vc, were lower at turbid rivers affected by flood transport and high load of pyroclasts (PP); after that, abundances were similar to those of mixed and clear water rivers. Aquatic insect abundance was also lower in those turbid rivers affected by lahars and high load of PP resulting from the Calbuco's eruption. Right after the eruption, no fishes were found at the most turbid rivers located nearby PCC vc affected by flood transport and PP; reappearance of fishes at those rivers occurred ca. 1,5 years after eruption. Similarly, days after Calbuco's eruption, no fishes were found at those turbid rivers affected by lahars and PP; while these vertebrates occurred along rivers not disturbed.

Volcanic eruptions affect significantly color, TSS, conductivity and fluoride in river waters, as well as habitat structure of insects (deposition of pyroclasts on river basins) and physiological processes in fishes (gill clogging due to high load of pyroclasts). That effects probably explains the observed depleted abundances or even absence of aquatic fauna after volcanic eruptions.

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