

## Environmental implications of persistent degassing: Evidence from Masaya volcano, Nicaragua

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Understanding the effects of persistent gas emission is of great importance for human toxicology and agricultural productivity as volcanic contaminants that enter the food chain via uptake by plants can pose a serious ecological threat. In this study the active system at Masaya volcano (Nicaragua) is investigated in order to assess the environmental impacts caused by its continuous degassing.

Contaminant deposition in the plume-affected area was assessed by the quantification of sulphate deposition and heavy metal concentrations in the soils (Fe, Cr, Cu, Mn, Ni, Zn, Se, As and Hg). The organic carbon contents and pH of the soil samples were also determined. Vegetation samples of *Dalechampia scandens* (Euphorbiaceae) and *Tillandsia recurvata* (Bromeliaceae) were also analysed for heavy metals, and their potential as biomonitors of volcanic pollutants assessed.

The data demonstrate that organic carbon and pH play important roles in the accumulation of heavy metals by influencing the cation exchange capacity and bioavailability of the soil (White, 2006). High levels of organic carbon were associated with a greater accumulation of metals, while the effect of pH was more closely linked to specific metals. Heavy metal concentrations were highest in the agricultural soils, with some elements such as Cu and Mn exceeding soil guideline values (Environment Agency, 2009). The transfer of soil contaminants into *D. scandens* is closely linked to soil properties but the plant also appears to be greatly affected by the atmospheric conditions. The growth distribution of *T. recurvata* is linked to the concentration of contaminants, and suggests a level of resistance that allows the plant to grow until a certain contamination threshold has been reached. This may allow us to recognise concentrations of contaminants associated with its presence.

Because Masaya volcano is continuing its current degassing cycle, the further accumulation of heavy metals may significantly impact soil quality, soil-plant transfer and agricultural productivity in the region. Further monitoring of the effects of volcanic emissions on the local environment is therefore required in order to help minimise the adverse effects of this plume.

**Environment Agency**, (2009), Human health toxicological assessment of contaminants in soil, Science Report SC050021/SR2

**White, R.E.**, (2006), Principles and Practice of Soil Science, Blackwell Publishing