

On the sudden disappearance of *Egeria densa* from a Ramsar wetland site of Southern Chile: a climatic event trigger model.

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Abstract

Contemporary shallow lakes theory proposes that these ecosystems may experience abrupt regime shifts due to small changes in controlling variables or triggers. So far, these triggers have been related mostly to nutrients as the immediate driver. During May 2004 the río Cruces wetland, a Ramsar site located in Southern Chile, underwent a major regime shift, from a clear water state, vastly dominated by the invasive macrophyte *Egeria densa*, to a turbid water state. In this article we show, through the analysis of long term meteorological data that late fall 2004 was anomalous due to the presence of a high pressure cell that persisted most of the month of May over southern Chile. This climatic event caused an almost complete absence of precipitations and low temperatures during this period, including several freezing nights. Eco-physiological experiments showed that 6 hour-exposure to desiccation kill the macrophyte. We developed a simple-biology dynamic model, under Stella Research 9.1, to show that the climatic anomaly of May 2004, plus the increased sedimentation of the wetland's floodplains, and the associated response of *E. densa*, explains its sudden disappearance from río Cruces wetland.

Keywords: regime shift, trigger model, climate, *Egeria densa*, wetland