

The water ran brown: an examination of the social and ecological conditions around New Zealand's Lake Omapere

Nathaniel W. Hough-Snee, Northland Region, New Zealand

New Zealand's Lake Omapere became eutrophied by phosphorus and nitrogen-enriched runoff from surrounding pastoral farmlands sometime in the 1980's. However, the trophic condition of the lake was unknown until the late 1990's due to biological invasion by the aquatic weed, *Egeria densa*. Upon the eradication of *E. densa*, blue-green algae (*Macrocystis sp.*)—potent toxin-producing bacteria—became the dominant primary producer in the lake.

The nutrient-induced shift from an invasive macrophyte to algal dominance has reduced water clarity, dissolved oxygen, in-lake floral and faunal diversity, and rendered Lake Omapere useless as a water supply to the local town of Kaikohe who now relies on rainwater for potable water. The conditions that precluded the degradation were brought on by rising dairy and meat prices that encouraged farmers to use marginal (seasonally inundated or high slope) pastures that erode easily or are flooded, introducing nutrients to the lake as soluble nitrogen forms or sediment-bound phosphorus forms.

The conditions present in Lake Omapere are not limited to New Zealand, and have historically occurred in water bodies throughout the world where agriculture persists. Restoring these lakes is expensive and involves cooperation between various stakeholders.

One possible mechanism to encourage/fund riparian restoration around degraded water bodies in Kyoto nations is carbon forestry. The feasibility of the EBEX 21 and Permanent Forest Sink Initiatives of New Zealand are examined as potential carbon forestry initiatives that may fund ecological restoration while increasing native vegetation. We concluded that, in theory, carbon forestry provides an economic incentive for farmers to shift land use from pasture to native riparian forests only if constraints to implementation are overcome and/or the future price of carbon credits begins to match those of current dairy commodities.