

# Restoration Ecology

## Hydrological responses of a valley-bottom wetland to land-use/land-cover change in a South African catchment: making a case for wetland restoration

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### Abstract:

Valley-bottom wetlands are valuable assets as they provide many ecosystem services to mankind. Despite their value, valley-bottom wetlands are often exploited and land-use/land-cover (LULC) change results in trade-offs in ecosystem services. We coupled physically based hydrological modeling and spatial analysis to examine the effects of LULC change on water-related ecosystem services in the Kromme catchment: an important water-providing catchment for the city of Port Elizabeth. LULC scenarios were constructed to match 5 different decades in the last 50 years to explore the potential effects of restoring the catchment to different historic benchmarks. In the Kromme catchment, valley-bottom wetlands have declined by 84%, driven by key LULC changes: an increase in irrigated land (307 ha) and invasion by alien trees (336 ha). If the wetlands were restored to the relatively pristine extent and condition of the 1950s, riverflow could increase by approximately 1.13 million m<sup>3</sup>/a, about 6% of the current supply to Port Elizabeth. Wetland restoration would also significantly improve the catchment's ability to absorb extreme rainfall events, decreasing flood damage. We conclude that in the face of the water scarcity in this region, all ecosystem services, particularly those related to water flow regulation, should be taken into account by decision makers in charge of land zonation. Zonation decisions should not continue to be made on the basis of provisioning ecosystem services alone (i.e. food provision or dam yield). We recommend prioritization of the preservation and restoration of valley-bottom wetlands providing water-related ecosystem services to settlements downstream.