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Can ecosystem services navigate the balance between agriculture and environment in the Hikurangi Catchment?

Key words: Agriculture, Environment, Ecosystem Services, Soil Erosion, Flooding

Abstract:

The Hikurangi Catchment in the Northland Region sits in the headwaters of the Kaipara Harbour Catchment and is highly modified. Where once the floodplain would have represented an entire wetland in itself, today only 3.5% of the area is still classified as wetland. Of further note is the existence of remnant riparian forests. Since drainage began in the early 1900s, increasing areas of the catchment have been used for intensive farming. In the 1930s existing drains were extended to help manage floods. In 1968 the Hikurangi Swamp Scheme was implemented in order to prevent spillage of water into agricultural land except in the most extreme of weather events. It straightened river channels, installed drainage networks, and constructed control banks, spillways and pump stations. The spillways direct water into one of seven pockets, from which water is pumped back into the Wairua River after the water level in the channel has receded. With increased flooding due to climate change the frequency with which water is spilled into the pockets is increasing to the point where pastoral farming is becoming uneconomic. Also, soil erosion has been increasing and the Wairua River is transporting over 100 thousand tonnes of sediment to the Kaipara Harbour where increased sedimentation is putting pressure on many estuarine ecosystems. With these pressing environmental issues in the catchment, we have taken an ecosystem services approach to investigate whether a better balance between agriculture and environment can be achieved to obtain sustainability of services. A modelling framework of ecosystem services was used to evaluate services from a range of land use and management scenarios. One scenario where all streams were fenced, all first-order subcatchments had flood retention bunds, and soil conservation was applied in priority areas, obtained significant improvements in environmental outcomes with minimal reduction in economic profit.