



Impact Assessment of Berkeley Vale Subcatchment Pollutant Loads in Nearshore Zone of Tuggerah Lake

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Berkeley Vale is on the south-western shore of Tuggerah Lake situated on the Central Coast of NSW. Stormwater from densely urbanised fringing subcatchments flows directly to the nearshore zone of the lakes via open drains and stormwater treatment zones (STZs). In many areas, nutrient-rich stormwater is retained in the nearshore zone, rather than mixing and diluting with lake water further offshore, due to a barrier formed by wrack accumulations (dying seagrass leaves) and seagrass beds. Catchment nutrient loads have led to eutrophication of the Berkeley Vale nearshore zone, that is, excessive growth of marine plants fueled by nutrients in stormwater. High loads of organic matter (from the decay of marine plants), nutrients and fine sediments have accumulated in nearshore sediments and have led to the formation of ooze sediments in the nearshore zone at Berkeley Vale which have very high concentrations of hydrogen sulphides that produce a strong rotten egg gas smell, resulting in a loss of public amenity. Ooze sediments are a precursor to 'monosulphidic black ooze', a thick jelly-like substance which is highly toxic to marine life, that overlays patches of ooze sediments in the worst affected nearshore areas. The NSW Office of Environment were contracted by Central Coast Council to undertake a detailed assessment of the sub-catchments draining to Berkeley Vale foreshore to identify pollution sources and pathways, to understand why ooze is present, and to provide potential management options to reduce the pollutant load and the incidence of eutrophication and ooze formation. Water quality was assessed in open drains and nearshore waters in Berkeley Vale during dry and wet conditions to identify potential stressors (for example, high nutrient concentrations, low levels of dissolved oxygen) on ecological health. Standard physico-chemical parameters, suspended sediments, nutrient concentrations, turbidity and chlorophyll-a concentrations were assessed. Results confirmed that the nearshore zone is suffering severe eutrophication from the localised impacts of stormwater from fringing subcatchments. Water quality was significantly poorer during the dry sampling run when catchment inputs were minimal and internal biogeochemical processes dominate. In their current state, most STZs in Berkeley Vale are highly degraded eutrophic environments that are most likely exacerbating the problems along the nearshore zone and reducing public amenity due to unsightly accumulations of pollutants and offensive odours. It is recommended that council develop a comprehensive plan for the foreshore zone that aims to improve both the function and aesthetics of STZs. A catchment model was developed for Berkeley Vale using MUSIC to estimate streamflow and pollutant loads generated in each subcatchment. The nature of pollutant generation within the Berkeley Vale subcatchments needs to be analysed in more detail with a targeted streamflow and water quality monitoring program be implemented for model calibration / verification. The management of eutrophication in the Berkeley Vale nearshore zone will require a coordinated long-term effort by all stakeholders to have tangible gains in ecological health and public amenity.