Treatment performance variability in two at-source stormwater treatment systems

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Stormwater treatment systems (STSs) are being integrated across our urban landscapes in New Zealand and around the world with the intent of contaminant removal. Downstream water quality and ecological health improvements are expected to follow STS installation; however, this is often not the case due to variability in treatment performance. This study seeks to identify and quantify the impact of the most influential variables affecting the performance at-source STSs.

Two media filtration STSs, which target the removal of dissolved Zn from galvanized roof runoff, were tested at the University of Canterbury in Christchurch. Both STSs were located on different sections of the same roof, with variations of media: one incorporated fresh mussel shells, dried and crushed, while the second incorporated pre-crushed, weathered mussel shells. Runoff was analysed for total and dissolved metals.

Treatment variability of dissolved zinc was higher within the 'fresh-shell' STS than the 'weathered shells' STS, with removal efficiency ranging respectively from 20% to 45% (average 34%), and 71% to 87% (average 82%). Treatment performance of the 'fresh-shell' STS may be influenced by the smooth media surface that is comparatively un-weathered, providing fewer binding sites. Variability in treatment from both STSs stems from variation in dissolved zinc concentrations in runoff.

Research / Career Interest
- Stormwater quality characterisation
- Ecological treatment systems for water quality