Dataset methodological description

Sites Descriptions

Runoff and subsurface water samples were collected from nine zero order catchments (ZOCs) having distinct vegetative cover and contrasting texture of the surface soil horizon. ZOCs are largely non-channelized drainages common on hill-slopes and referred to as hollows or swales. Landuse, vegetation and soil descriptions of ZOCs are given in **Table 1.** Surface water samples were also collected from the Myponga River and Myponga Reservoir.

The key features of the study ZOCs are as follows: Site 1: native vegetation on sandy soil (NV-S); Site 2: pine on sandy soil (P-S); Site 3: grass on sand over sandy clay (G-S/SC); Site 4: native vegetation on sandy clay loam over sandy clay (NV-SCL/SC); Site 5: pine on sandy clay loam over sandy loam (P-SCL/SL); Site 6: grass on sandy clay loam over sandy clay (G-SCL/SC); Site 7: re-vegetation with native vegetation (planted in 2006) on sandy loam over clay (Re-NV-SL/C); Site 8: grass on sandy soil over sandy loam (G-S/SL); Site 9: pine plantation on a sandy loam over clay soil (P-SL/C).

Table 1 Landuse and soil texture for each ZOC

Site No.	Landuse	Description	Soil texture
S1:NV-S	Native vegetation	Eucalyptus obliqua, E. fasciculosa over Lepidosperma semiteres, Hakea rostrata, Pultenaea daphnoides, Acrotriche serrulata, Hibbertia exutiacies woodland.	Sand
S2:P-S	Forest	Pine plantation – *Pinus radiata*	Sand
S3: G-S/SC	Grass	Phalaris aquatica and Lolium perenne with some Trifolium subterraneum	Sand over sandy clay
S4:NV-SCL/SC	Native vegetation	Eucalyptus obliqua, E. fasciculosa over Lepidosperma semiteres, Hakea rostrata, Pultenaea daphnoides, Acrotriche serrulata, Acacia pycnantha, A. humifusum, Leptospermum myrsinoides, Hibbertia exutiacies woodland.	Sandy clay loam over sandy clay
S5: P-SCL/SL	Forest	Pine plantation- *Pinus radiata*	Sandy clay loam over sandy loam
S6: G-SCL/SC	Grass	*Phalaris* aquatica and Lolium perenne with some Trifolium subterraneum.	Sandy clay loam over sandy clay
S7:R-NV-SL/C	Native vegetation	Eucalyptus leucoxylon, E. fasciculosa Woodland with E. camaldulensis Woodland	Sandy loam over clay
S8:G-S/SL	Grass	*Phalaris* and sub clover based pasture	Sand over sandy loam
S9: P-SL/C	Forest	Pine plantation — *P. halepenis (Aleppo pine)*	Sandy loam over clay

Site Instrumentation

ZOCs were either instrumented with surface flow barriers and auto-samplers to measure and sample surface runoff through Replogle-Bos-Clemmens flumes at lower slope sites as described by Fleming and Cox (2001), or with barrier sheeting (~30 m length and 12 cm height). Barrier sheeting was used to divert surface water captured to a central location (lowest point) where the water discharged through a polyethylene pipe (19 mm) and was collected in Polyethylene Terephthalate (PET) bottles.

Suction cup tension lysimeters were used for subsurface water collection. The lysimeters were installed at depths of approximately 30 cm and 60 cm. Subsurface through-flow water samples were also collected by installation of 90 mm diameter PVC piezometers. The tops of piezometers have loose fitted caps.

DOC Concentrations

Measurements of DOC were made on water samples after pre-filtered through 0.45 µm pre-rinsed sterile cellulose membrane filters. DOC concentration was determined using a TOC analyser (Model 900, Sievers Instruments).

UV absorbance

UV light absorbance at 254 nm wavelength was measured using a spectro-photometer (UV-120, MIOSTECH Instruments) using a quartz cuvette of 1 cm path length. Samples for UV absorbance analyses were pre-diluted by addition of high purity Milli-Q water, where needed, to reduce UV absorbance at 254 nm to be less than 0.7 cm^{-1} and pre-filtered through 0.45 µm pre-rinsed sterile cellulose membrane filters.

Colour

Samples for colour analyses were pre-filtered through 0.45 µm pre-rinsed sterile cellulose membrane filters. Colour in Hazen Units (HU) was determined by comparing the absorbance at 456 nm with a platinum/cobalt standard (50 HU). Visible light absorbance at 456 nm wavelength was measured using a spectro-photometer (UV-120, MIOSTECH Instruments) using a glass cuvette of 5 cm path length.

Fluorescence Excitation-Emission Matrix (F-EEM)

F-EEM spectra were acquired using a Model LS 55 spectrometer (PerkinElmer). A series of emission spectra (over 280–600 nm) were acquired at 0.5 nm increments over excitation wavelengths between 200 nm and 500 nm at 5 nm increments. Samples for F-EEM analysis were pre-diluted by addition of high purity Milli-Q water to minimize the inner filter effect, and pre-filtered through 0.45 µm pre-rinsed sterile cellulose membrane filters. High purity Milli-Q water spectrums were acquired on the same days as for the samples.

pH

pH was determined using a pH meter (WP-81, TPS Instruments) with a pH electrode, Ag/AgCl, double junction with porous Teflon junction.

Conductivity

Conductivity was determined using a conductivity meter (WP-81, TPS Instruments) with a platinum electrode.

Turbidity

Turbidity (NTU) was determined using a turbidimeter (2100N, HACH Instruments) equipped with a glass cell of 25 mm path length.

Nutrients Analyses

Total phosphorus (TP) concentration was measured using Standard Method 4500-P (F), (APHA, 2012).

Total Kjeldahl Nitrogen (TKN) concentration was measured using Standard Method 4500-N (org A), (APHA, 2012).

Nitrate + Nitrate (NO_2 + NO_3) concentration was measured using Automated Flow Colorimetry, using Standard Method 4500-NO_3 (I), (APHA, 2012).

Jar Test

For determination of the treatability of the organics by alum, DOC concentrations of water samples, as collected, were standardized by addition of MQW. Jar tests were performed at

ambient temperature and at pH 6 ± 0.1 using aluminium sulphate (alum), as $Al_2(SO_4)_3.18H_2O$. The amount of acid or alkali (0.4M NaOH, 0.4M HCl) required to achieve the target pH was determined by prior pH titration and then added to the test water before addition of alum. Six alum doses [i.e. 50%, 75%, 100%, 150%, 200% and 300% of the predicted dose by mEnCo© model (van Leeuwen 2005, 2009)] applied in jar tests.

Jar testing was performed using a variable speed jar tester (S.E.M., Laboratory Flocculator) with six flat paddle impellers and six rectangular Gator jars were used. Water in jars and pH correction chemicals were mixed as follows: initial mixing at 200 rpm for 1.0 min., followed by slow mixing at 20 rpm for 14 min. and then settling of flocs for 15 min. The settled water samples were filtered through Whatman No. 1 filter papers for measurement of filtered turbidity.

Chlorine Decay Test

Chlorine decay tests were performed under standard conditions of pH 7.1 ± 0.1, 23 °C and DOC 2 ± 0.1 mg/L. An incubator (Thermoline, Scientific) was used to control the temperature (23°C) of the samples during the test duration. Free chlorine (4 mg/L) was added using sodium hypochlorite (13% free chlorine). Total and free residual chlorine concentrations were measured at predetermined time intervals from dosing, over 10 days using a titration method, Standard Method 4500 F (APHA, 2012). Chlorine decay tests were also performed on a high purity Milli-Q water samples (as controls) under the same conditions. The free residual chlorine concentration for control samples was measured on the same days as for the samples.

THMFP

Trihalomethane formation potential (THMFP) and the formation of constituent THM compounds (chloroform, bromo-dichloromethane, dibromo-chloromethane, bromoform) were determined for standardized water samples (DOC less than 20 mg/L) using a headspace sampler (Perkin Elmer, TurboMatrix 110) and a gas-chromatograph with electron-capture detection (Perkin Elmer Clarus® 500 GC). THMs were formed under controlled laboratory conditions of 35 °C, pH 7.4 for 4 hours, with 20 mg/L chlorine addition.

Bromide concentrations

Bromide (Br^-) ion concentration was measured using Standard Method 4110 (APHA, 2012).

References

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