DEVELOPING SOLUTIONS FOR ENVIRONMENTAL-FRIENDLY WATER MANAGEMENT IN PERI-URBAN LANDSCAPES (WESTERN SYDNEY, AUSTRALIA)

UNESCO United Nations Educational, Scientific and Cultural Organization — International Hydrological Programme

WESTERN SYDNEY UNIVERSITY

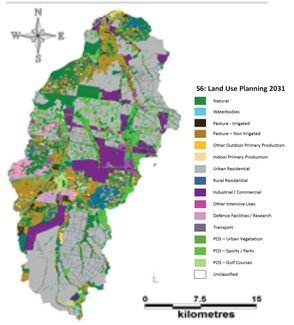
Up-dated in August 2015

Demosite description

Lithology / Geochemistry

Alluvial soils in the Plain's. Sandstones in the east and around the northern and western fringe and shales also occur from Pitt Town to Kellyville

33°51' S, 151° 11' E



Courtesy of B. Maheshwari, 2015

Main description:

- **The Hawkesbury-Nepean catchment area** runs from Lake George in the South, to beyond Lithgow out west, follow the foothills of the Blue Mountains into the Hawkesbury region and pours out to sea at Broken Bay.
- **The South Creek catchment (fig.1)** provides water services to its inhabitants and dwellings which are expected to increase respectively by 40% and 25% from 2011 to 2030.
- The **UNU Regional Centre of Expertise on Education for Sustainable Development (Greater Western Sydney)** has research groups focused on the studies of the site.

Conserve Ecohydrological processes in natural ecosystems	Enhance Ecohydrological processes in novel ecosystems	Apply complementary Ecohydrological processes in high impacted systems
✖ NO	✔ YES	✔ YES

Ecohydrology Principles and Solutions

EH IMPLEMENTATION PRINCIPLES

*** Quantification of the hydrological processes at catchment scale and mapping the impacts**
*** Ecological Engineering**

EH SOLUTIONS

*The pollution removal performance of **stormwater bioretention units** built to protect river health* — ECOHYDROLOGICAL INFRASTRUCTURE

*Water reuse and conservation using **rainwater harvesting system** in urban and peri-urban* — ECOHYDROLOGICAL INFRASTRUCTURE

*Estimation of **water allocation, stream flows, stormwater runoff** through the hydrological model* — HYDROLOGICAL FLOW

Lifezones

Life Zone
Dry Forest
Warm Temperate

PPT (mm/yr) 800 — *T (°C)* 17

PET ratio: 1,25
Elevation: 10 m
Humidity: sub-humid

Fig.1- South Creek catchment (courtesy of B. Maheshwari, 2011)

Major Issues

*** Growing population**
*** Land use change due to peri-urban activities (fig.2)**
*** Run-off of pesticides and fertilizers from agricultural fields**
*** Loss of riparian vegetation**
*** Droughts**

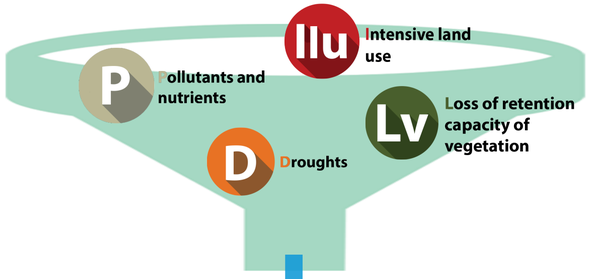


Fig.2-An example of land use changes due to urbanization in the South Creek Catchment (courtesy of B. Maheshwari 2015).

Social-Ecohydrological System

Catchment Ecohydrological sub-system

EH Objectives

Water	●●●●○
Biodiversity	●●○○○
Services	●●●●○
Resilience	●●●●○

Are inputs to:

EH Methodology

* Spatial and temporal monitoring of river health and landscape parameters
* Work with municipal councils, community groups and government agencies and other stakeholders
* Develop tools and local knowledge to assist policy makers

Set conditions for:

Catchment Sociological sub-system

Objectives

* Evaluate the effects of land use changes and urbanization on water quality and microclimate
* Monitor ecohydrological changes in the catchment
* Develop and apply tools and new technologies to improve liveability of local urban areas

Set conditions for:

Stakeholders

* Researchers
* Sydney Periurban Council Network
* Fishing and Oyster industries
* NSW Office of the Water
* Environmental Protection Authority
* Local Land Services
* Earthcare Centre

Participate in:

ACTIVITIES

*** Setting-up the WISER project (Water and Irrigation Strategy Enhancement through Regional Partnership in Western Sydney)**
*** Monitoring ecohydrological parameters to assist decison makers**
*** Assessment of the current water practices and policies to define new ones which will meet the growing water demand in peri-urban areas**
*** Development of Water Sensitive Urban Design guidelines**

Results

MAIN EXPECTED OUTCOME

To assess the hydrological and economic impacts of changing water allocations and to maintain river health in the peri-urban area

LATEST RESULTS

- Nine key variables of river water quality that define river health have been identified using multivariate analysis variables and data collected over 30 years (U. Pinto and B. Maheshwari, 2011). A framework has been developed for assessing river health in peri-urban landscapes (U. Pinto and B. Maheshwari, 2014).
- Defining concept of river health from a range of perspectives (U. Pinto *et al*, 2012).
- A simple model has been developed to predict river health with minimum number of measurements (U. Pinto *et al*, 2013).

CLICK HERE TO SEE THE REFERENCES

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