Chapter 4.28
Sustainable Urban Stormwater Management:
Water Sensitive Urban Design Perceptions, Drivers and Barriers

Shinyi Lee
Queensland University of Technology, Australia

Tan Yigitcanlar
Queensland University of Technology, Australia

ABSTRACT

Stormwater has been recognised as one of the main culprits of aquatic ecosystem pollution and as a significant threat to the goal of ecological sustainable development. Water sensitive urban design is one of the key responses to the need to better manage urban stormwater runoff, the objectives of which go beyond rapid and efficient conveyance. Underpinned by the concepts of sustainable urban development, water sensitive urban design has proven to be an efficient and environmentally-friendly approach to urban stormwater management, with the necessary technical know-how and skills already available. However, large-scale implementation of water sensitive urban design is still lacking in Australia due to significant impediments and negative perceptions. Identification of the issues, barriers and drivers that affect sustainability outcomes of urban stormwater management is one of the first steps towards encouraging the wide-scale uptake of water sensitive urban design features which integrate sustainable urban stormwater management. This chapter investigates key water sensitive urban design perceptions, drivers and barriers in order to improve sustainable urban stormwater management efforts.

INTRODUCTION

Due to increasing environmental and social pressures stemming from the adverse impacts of

DOI: 10.4018/978-1-60960-472-1.ch428

urbanisation and other anthropogenic activities, it is now widely accepted that a new paradigm in urban water management must be found in order to transition to the more sustainable use and management of urban water (Brown, 2005). Sustainable development demands that water resources are preserved and protected from urban development (Carmon, 1997). Stormwater, in particular, has been recognised as one of the main culprits of aquatic ecosystem pollution in Australia (Roy et al., 2008), and is a significant threat to achieving the goal of ecological sustainable development. Increasing urbanisation, population growth, aging infrastructure, and extreme weather events such as droughts and bushfires have pushed urban water managers into exploring more innovative ways to tackle increasingly complex traditional problems. Water sensitive urban design (WSUD) is one of the more popular ways in which urban stormwater is now managed.

The WSUD model was initially promoted in the last decade due to a focus on merging land use planning with water management (Gardiner & Hardy, 2005); today, it has grown to incorporate the promotion of sustainable urban development. It does this by featuring opportunities to enhance urban design, while at the same time playing important roles in stormwater drainage and water quality improvements, as well as enabling stormwater harvesting to augment existing supplies–- an important feature in a world with an unstable climate (Victorian Stormwater Committee, 1999; Lloyd et al., 2002, Rahman & Webber, 2003). Furthermore, WSUD is a response to traditional stormwater management goals that do not go beyond flood prevention and rapid conveyance of runoff in order to pursue more inclusive objectives such as preservation of environmental integrity and the recognition of stormwater as a resource rather than a nuisance (Wong, 2001). In other words, WSUD is deemed 'holistic' because it is concerned with both quantitative and qualitative issues of urban stormwater. Features of WSUD includes the use of natural channel designs, porous pavements, grassed swales and rainwater tanks to reach the target of implementing a total urban water cycle (Rahman & Webber, 2003). The protection of the receiving water bodies will ensure that freshwater sources stay as unpolluted as possible, so as to be fit for both ecological use and human consumption. Reduction of runoff also has the additional benefit of reducing the size and costs of stormwater systems (Carmon et al., 1997).

Implementing WSUD strategies consists of integrating best planning practices (BPP) –concerned with site assessment, planning and design–with the elements of best management practices (BPM): the structural and non-structural elements that perform its prevention, collection, treatment, conveyance, storage and reuse functions (Lloyd, 2001). These best planning and management approaches attempt to achieve objectives of sustainable urban water management and include the assessment of the best physical and natural attributes of the sites, such as climate, geology, vegetation and drainage patterns (Lloyd, 2001).

On the surface, holistic management of urban stormwater in Australia appears to have 'evolved beyond conceptual, investigational and demonstrational stages linked with government and academic partners' (Gardiner & Hardy, 2005). In reality, however, uptake has been slow and sporadic at best, as urban water agencies, policymakers and developers are still reluctant to take the risk of attempting a different and innovative approach (See Wong, 2001; Brown, 2005). Traditional water management strategies still dominate the majority of water institutions and agencies (Brown, 2007). Most of these are frequently fragmented, with operations that do not take into account the multi-dimensional aspects of urban water management, focusing instead on the technological aspects (Farrelly et al., 2007). For policies and practices to be efficient and specific to local scenarios, current settings need to be evaluated in order to specifically identify the problems and issues involved. The first step towards this would be identifying the WSUD perceptions of