May 12, 2010

Local Surface Water Policy Under Conditions of Climate Change

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From the Proceedings of

LANDSCAPE LEGACY: Landscape Architecture between Art and Science,
a joint conference of
the International Study Group on the Multiple Use of Lands (ISOMUL)
and
the Council of Educators in Landscape Architecture,
Maastricht, Netherlands, May 12-14.

Abstract

Climate change means two things for local stormwater managers – that storm events will become more severe, and rainfall will, in many instances, become more erratic, causing enhanced periods of drought and flood. Two approaches are needed to deal with the eventualities: mitigation and adaptation.

While urbanization increases stormwater runoff and decreases the lag time of stormwater discharge, there is also a resulting lack of infiltration and reduction in evapotranspiration (Brunke and Gonser 1997). Stormwater detention, retention and infiltration have attempted to compensate, resulting in the concentrated point location infiltration of stormwater, which replenishes groundwater and baseflow. Equally important to local hydrology and ecosystems, however, is the presence of moisture in the upper two feet of soil that is available for plant uptake and evapotranspiration across the landscape. If absent, and evapotranspiration is decreased, the result is a troubling trend of increasing desertification (Richards and Brabec 2003). Mitigation of this trend requires diffuse infiltration across broad areas of greenspace, with an emphasis on urban and suburban forest systems.

Therefore BMP and urban greenspace systems will have to deal with larger, more erratic storm events, the ability to store rainfall to compensate for drought conditions, and the requirement of broad, watershed-wide infiltration to mitigate against desertification trends. These changes implicate the need for increased green infrastructure and reinforce

a conundrum emerging in the planning and design of urban space in response to climate change imperatives. On the one hand, mitigation requires dense communities that minimize indices per capita such as vehicle miles travelled and impervious surfaces. On the other hand, adaptation requires an emphasis on urban greening and increased areas of open space to mitigate the trend towards desertification, increases in urban temperatures, increasing fluctuations in rainfall and other key ecological functions.

An analysis of case study responses to climate change indicate that urban space to address the twin faces of climate change planning will likely come from two related responses: the first is through more intensive multiple use of existing open space in urban metropolitan areas, and the second is actual removal of some roads with corridors that serve transit and adaptation functions. The resulting design and location of roads, transportation systems, stormwater management systems, urban development patterns and the green infrastructure that support all of those land uses will be substantially different under conditions of climate change.

Keywords: stormwater management; climate change; mitigation; surface water management policy

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