HydroDesign and the Digital Campus

By David R. Maidment
Dept of Civil, Architectural and Environmental Engineering
University of Texas, Austin Tx 78712

December 2013

In 2010, Jack Dangermond, the President of the Environmental Systems Research Institute (ESRI) of Redlands, CA, introduced the idea of "GeoDesign" at a TED talk (Dangermond, 2010). This idea has been further developed in books (McElvaney, 2012; Steinitz, 2012). Implicit in this concept is the idea of design using geographic information systems to describe the landscape so that the effect of design alternatives can be rapidly assessed and visualized. In parallel, one might define a concept called "HydroDesign" as an analogous method of assessing and designing the way that people interact with water in their environment. There are many such interactions, but principal among them are flooding, water utilization and water pollution.

Flooding is the natural hazard that most frequently impacts people. Of all federal disaster declarations in the United States, about two-thirds have flooding as one of the causes of the disaster. As humans we use water in many ways, both directly and in processes needed to produce other commodities we need, such as power and food. Natural waters are rarely pristine and human activities degrade their quality, sometimes to an unacceptable level. HydroDesign is concerned with shaping the environment we live in to mitigate flood impacts, use water efficiently, and prevent water pollution.

The campus of the University of Texas at Austin is a like a small city that exemplifies all these things. It contributes flood waters to Waller Creek running through the campus, and flooding can threaten nearby campus buildings; water is used in many ways within buildings, for sustaining and beautifying the landscape, as part of producing power and air conditioning for the campus; contaminants in runoff from the campus can pollute Waller Creek.

The Digital Campus is a compilation of geospatial and observational data that describes the spatial layout and environmental conditions of the campus, which can support modelling and assessment of alternatives for HydroDesign. During the Spring Semester of 2014, the Digital Campus will be used as a basis for teaching a senior-level design course in Hydraulic Engineering Design in the Department of Civil, Architectural and Environmental Engineering.

References:

Dangermond, J., (2010), "Geodesign at TED2010", http://video.esri.com/watch/125/jack-dangermond-talks-about-geodesign-at-ted2010

McElvaney, S., (2012), "A Framework for Geodesign – Case Studies in Regional and Urban Planning", ESRI Press, Redlands, CA, 147 pp.

Steinitz, C., (2012), "Geodesign – Changing Geography by Design", ESRI Press, Redlands, CA, 224 pp.