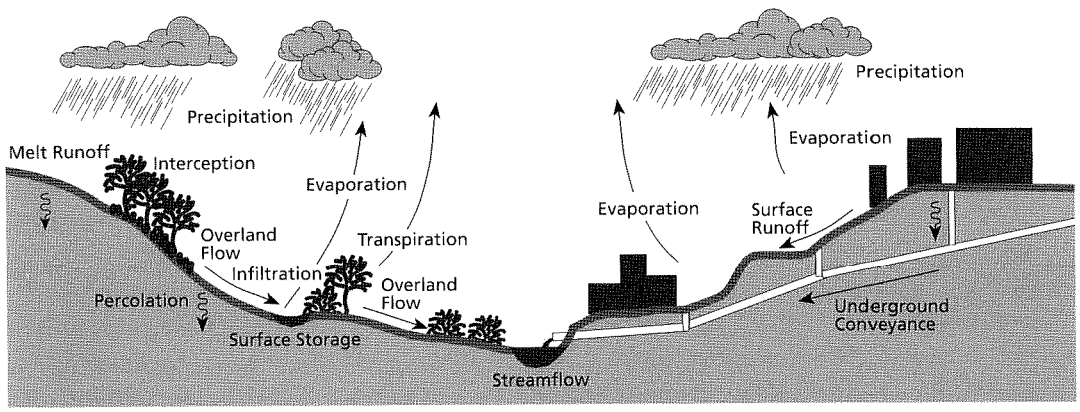
Where Waterworks Meet Nature

Cynthia L. Girling



Right: Diagram of natural versus urban hydrology. Courtesy Kerry KenCairn. Opposite page: Diagram of water purification process in Shop Creek, Denver, Colo. Designer: Wenk Associates. Courtesy Kerry KenCairn.

Cities nationwide are recognizing the valuable ecological role riparian corridors, wetlands and other elements of natural surface water systems play in reducing, slowing, filtering and temporarily storing surface runoff.

This expanded concept of the value of natural systems in urban areas has also broadened approaches to open space planning. In the past, parks and recreation planners were concerned exclusively with providing green space and facilities for public recreation. Now, because of increased concern for the quality and health of the urban environment, planners are taking a broader view — an ecosystem perspective. Open space is being required to meet the needs of increasingly diverse populations while serving clearly defined environmental functions, such as controlling floods, enhancing water quality and preserving wildlife habitat.

Recent trends in stormwater management provide a clear example. In the past, flood control and stormwater removal have been regarded as autonomous systems, hidden in underground pipes and physically separated from public spaces. Conventional systems involve vast networks of underground sewers that feed into open channels and, eventually, into natural waterways.

Building and maintaining these systems is costly, yet they often fail to control runoff under extreme flood conditions. Moreover, it is now understood that urban runoff is a major contributor to water pollution — carrying contaminants like oil from vehicles, heavy metals, toxic chemicals used in daily life, pesticides, herbicides and fertilizers to natural waterways — and that it should be cleaned before being dumped into rivers, lakes or oceans.

Streams and wetlands, always valued for their visual, educational and recreational values, are now recognized for the vital role they play in storm water management. In natural surface hydrology, forested uplands hold water close to where it falls, reducing the quantity of runoff, while riparian corridors filter runoff and stabilize streambanks. Wetlands are large storage basins and help filter out silt and break down some pollutants.

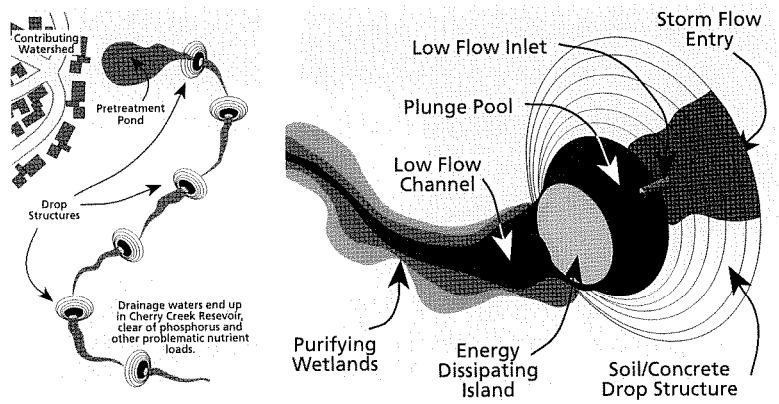
Bellevue's Open Drainage System

Bellevue, a suburb of Seattle, is an exemple of how cities can reclaim their natural systems by coordinating open space and surface drainage planning. In just over forty years, it has grown from a small settlement of 6,000 people in a hilly, forested landscape into Seattle's predominant edge city, with a population of more than 100,000 and businesses that employ more than 80,000.

In the mid-1970s, at the insistence of citizen activists, planners in Bellevue made some landmark decisions that caused it to have dramatically different settlement patterns and landscape character than most suburban cities. One concern was that Bellevue's rapid suburbanization was stressing the area's remnant natural systems. Backed by a University of Washington study that predicted the destruction of the Kelsey Creek fishery, a group of residents (organized as the Citizens Advisory Committee on Stream Resources) asked the city to preserve riparian areas and prevent further degradation of water resources. At the same time, many of the newly annexed areas of the city were experiencing frequent flooding, and residents there were calling for action, too.

The city decided to augment natural drainage systems to handle urban stormwater, rather than to build extensive new underground piped systems. City engineers in the newly established Stormwater Utility Department estimated that a surface drainage system would cost thirty percent less than a conventional underground system, despite land acquisition costs that were four times as great.

By the 1980s Bellevue had what was considered a ground-breaking storm drainage system, initially designed by a Seattle consulting team, Kramer, Chin and Mayo – Water Resources Engineers and Yoder, Trotter and Orlob and Associates. The system was characterized by a fine structure of naturalized local waterways — vegetated swales, creeks and streams — periodically interrupted by



natural ponds and wetlands or constructed dams and detention basins. Within eleven drainage basins there are 740 acres of wetlands, fifty miles of open streams, three small lakes and numerous ponds. Engineered interventions include small dams or hand-operated weirs at the heads of flood control ponds. Several major flood control sites are monitored and controlled by computer.

The system was designed to take advantage of the flood control, water quality and wildlife habitat values of riparian corridors and wetlands. At first, the primary mandate of the stormwater agency was to protect the community from floods. But in 1987, after Congress reauthorized and amended the Clean Water Act, requiring large communities to clean urban runoff before releasing it into natural waterways, Bellevue's engineers began to consider water quality as a serious mandate. The city's 1994 storm drainage plan reflects those concerns by setting goals to meet state clean water standards, upgrade fisheries, maintain a natural stormwater system capable of handling a 100-year flood, acquire and rehabilitate wetlands, preserve habitat for upland species and increase the use of native plants citywide.

Bellevue's Utilities Department and its Parks and Community Services Department plan and manage the waterways. These agencies work with the same open spaces but use them in different ways. The Utilities Department[1] has primary responsibility over water resources, has a budget for land acquisition and owns extensive natural or semi-natural lands along waterways.

The parks department's mandate is to develop a system of open spaces with a strong, though not exclusive, orientation to recreation and education. Its goal is to acquire ten percent of the city's area for public open space, from urban parks and plazas to recreational parks and playgrounds to sensitive natural areas with interpretive trails and limited human access. A second objective is to connect these spaces in a greenbelt, integrating recreation, education and alternative transportation.

Many of the city's natural open spaces are elements of the storm water system. Each department owns certain properties, and to maintain clarity about their relationships, especially with regard to landscape management, the departments make formal agreements. Typically, issues related to hydrology (such as water quality, the quantity and direction of water flow, and streambank erosion and siltation) are the purview of the Utilities Department. Although the Utilities Department undertakes revegetation projects and monitors habitat conditions, landscape management is typically passed to the parks department, which plans, designs and operates all recreation facilities and trails.

Expressing an Open Drainage System

Lake Hills Greenbelt Park best exemplifies the multiuse aspect of many of Bellevue's public open spaces. This 150-acre park, much of it bog or wetland, lies within the 100-year flood plain of Kelsey Creek. The site, traditionally farmed by Asian immigrants, continues to be primarily agricultural in character while also serving as a crucial link in the trail system, a wildlife habitat area and a primary cleaning and storage component of the storm water system.

At the northern extreme is Larsen Lake, a small body of open water surrounded by wetlands. The south shore of Larsen Lake has a large blueberry farm, and annual crops are planted on lands extending to the south. The steady stream of walkers and joggers on the paths through the wetlands and along the lake can see a landscape teeming with waterfowl, hawks, songbirds and the occasional stalking heron. On the ecotone between upland residential areas and the greenbelt there is a ranger station whose employees are primarily engaged in environmental education. Adjacent to that is the city's demonstration organic garden. At the southern extreme is

Left to right:
Street trees, wetland and schoolyard at Larsen Lake; Larsen Lake area; trail passing through a blueberry farm; downtown Park; Lakemont Park, with a path to residential area; Lakemont Park, with overview of sand filtration beds and detention ponds. Far left photo by Kenneth Helphand, other photos by Cynthia L. Girling.

Phantom Lake, site of a small park and a dock for launching nonmotorized craft.

Together these facilities form a hub of environmental education and appreciation for the community. In times of flooding the whole area transforms into a lake that helps protect the surrounding homes and the downstream community from damage.

Designed landscapes have been less successful at achieving a seamless merger between the working hydrological system and recreational areas. Lakemont Park is proudly cited as the most collaborative effort to date between the utilities and parks departments. This sixteen-acre community park lies in a steep valley between two streams and is surrounded by new single-family housing. Roughly ten acres between the two streams has been developed. A playground, tennis courts, a baseball field, picnic areas and trails encircle two large storm water facilities, a sand filtration bed and a detention basin.

While the recreational facilities have the simple, clean design qualities of many of Bellevue's parks, the drainage facilities have the clumsy, inelegant qualities of a purely functional response. The missed opportunity was to create an attractive, evocative feature that celebrates the cleansing and storage of water. Instead, when children began to explore the sand filter (unattractive to begin with) the Utilities Department erected a chain-link fence around it. Now, the heart of this park is an inaccessible eyesore.

In an article in *Orion* magazine's special issue, "Nature by Design," Jory Johnson and Douglas Johnston explained, "If ecological designers intend to more than mitigate or reverse environmental degradation (a worthy enough goal), if they want to transform public values about their landscapes, then they must strive to increase our awareness of the interdependence of human and natural ecology..."[2] In Bellevue, the raw material of check dams, weirs, detention sites and filtration beds all exist. They are the noticeable human interventions upon a primarily natural system and they await more creative and expressive interpretations of the junction of landscape, engineering and art.

Notes

1. Until 1994, the Storm and Surface Water Utility was a separate department with a dedicated fee structure. In 1994, all utility departments in Bellevue amalgamated.
2. Jory Johnson and Douglas Johnston, "Nature Constructed: Ecological Design and Public Understanding," *Orion* 12:1 (Winter, 1993).

General References

Bellevue Drainage Master Plan Summary Report (Bellevue, Washington: City of Bellevue, Utilities Department, January, 1976).
Comprehensive Drainage Plan (Bellevue, Washington: City of Bellevue, Utilities Department, 1994).