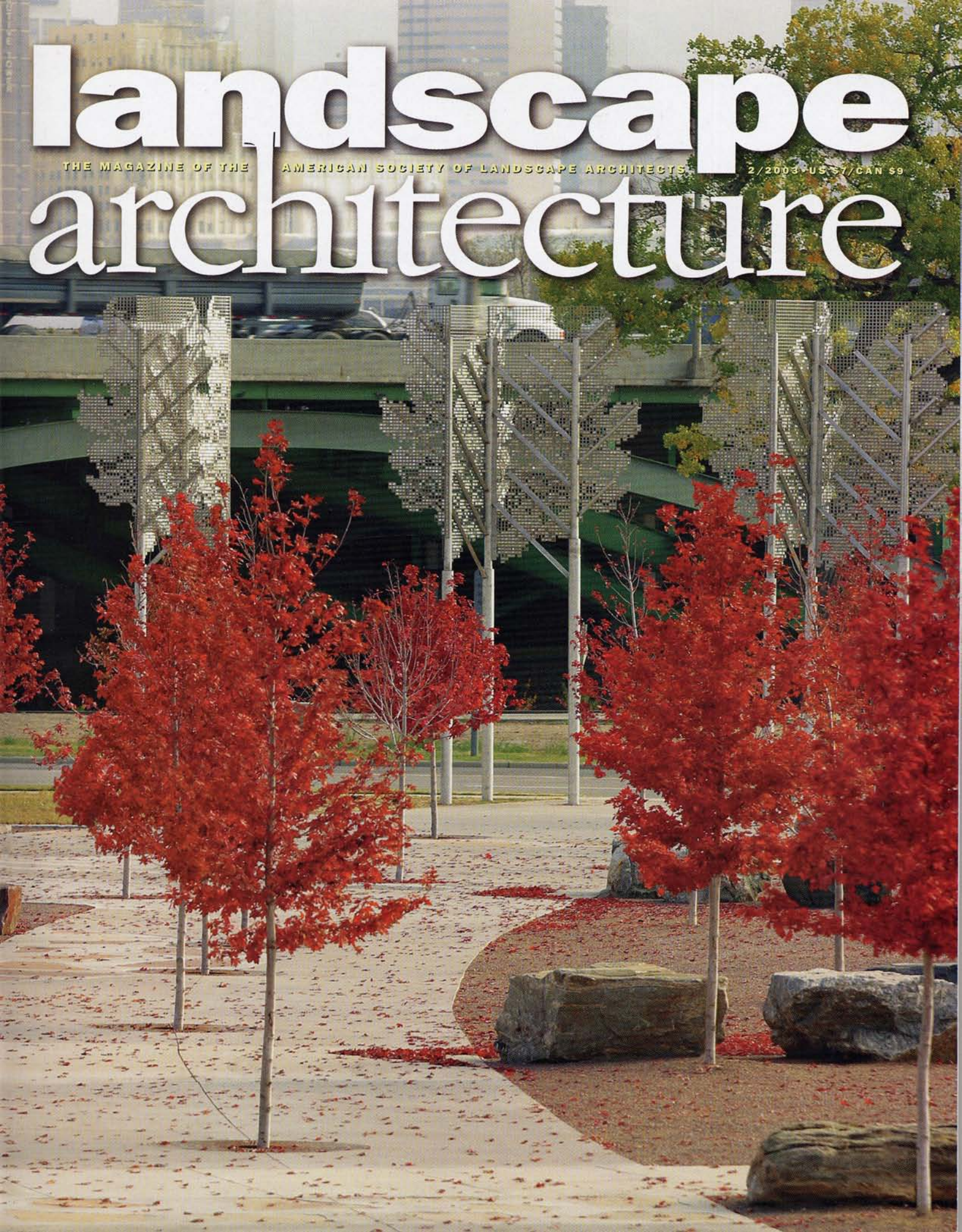
landscape architecture

THE MAGAZINE OF THE AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS

2/2003 • US $7/CAN $9



A water district headquarters in Clearview, Washington, uses an onsite spring and stormwater to supply a recirculating stream and plants.

Of Salmon, Soil, and Stormwater

Near Seattle, innovative uses of an onsite water surplus. BY KIM SORVIG

"People from other states think we have webbed feet," says Seattle landscape architect Sandra Hasegawa Ingalls (Foresight, Inc.). One of Ingalls's recent projects may convince people she has gills, too. The landscape of Cross Valley Water District headquarters in Clearview, Washington, north of Seattle, is beautiful and instructive to people, but a major influence on the design was...fish. Salmon, to be precise.

To understand how a terrestrial landscape architect can say she designs for salmon requires looking at two other paradoxes: that Seattle, with nearly 40 inches of annual rainfall, has water conservation worries (see sidebar, "Waterless in Seattle?"); and that a program to protect salmon streams is reshaping Seattle soils.

Underlying these riddles is a Pacific Northwest trend that links healthy soils to healthy water in an endless and seamless cycle. Around this region, soil–water links have produced creative thinking about topics as diverse as compost application, stormwater retention, and soil-protection legislation.

At Cross Valley Water District (CVWD), these concepts are at work below the surface of Ingalls's design.

Cross Valley is one of Seattle's smaller water districts, serving fewer than 6,000 customers. Its new headquarters building lies in a residential area. General manager Gary Hajek wanted the headquarters to fit in with the neighborhood, its landscape to integrate existing vegetation (remnant forest plus specimen trees), and the main message to be the efficient use of water. "We're always telling customers to conserve," says Hajek. "We felt it would just be wrong sitting here with plants requiring lots of water."

The site, however, had too much water: seeping springs plus a shallow water table. These might have been engineered away in a pipe, and irrigation water piped in. Instead, Ingalls and architect Brandt McCorkle (Page & Beard Architects, Kirkland, Washington) saw an opportunity. The springs, plus runoff from the building roof, feed a 150-foot-long recirculating stream that visitors cross en route from parking to building.

The stream feature, designed for seasonal variations, reflects both the local environment and Seattle's cultural links to Asia. Naturalistic stonework forms an interesting streambed, even when dry in Washington's droughty summers. In wetter periods, overflow goes first to a grassed infiltration swale, then into a detention pond with enough storage to prevent offsite runoff during a 100-year storm.

Funds budgeted for irrigation were used instead for the stream. All vegetation can survive summer dry periods without irrigation: water-efficient plantings (some native), plus carefully retained specimen trees established by previous owners. A temporary drip system, installed aboveground, will be removed this year as plantings become established. "Lots of people put in irrigation for establishment," says Hajek. "But then it stays forever, overwatering things."

How does all this benefit fish? The closest thing to salmon in the artificial stream is a whimsical plastic fish. To understand how this landscape works for salmon, you must look beyond the site and beneath its surface.

One effect of drought in the Northwest has been low stream

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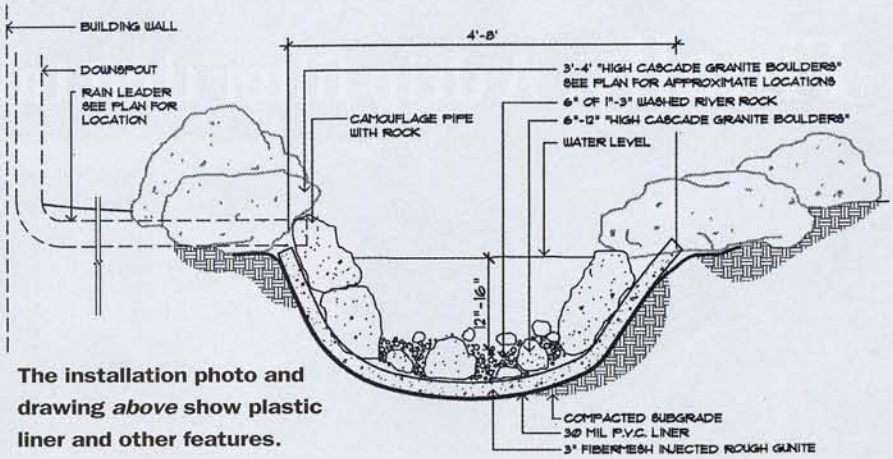


The installation photo and drawing *above* show plastic liner and other features.

levels at salmon-spawning time. With Chinook salmon listed as endangered, maintaining stream flow is mandatory. Despite some bitter "fish versus farmers" headlines, the threat to salmon motivates most Seattle residents to conserve water.

CVWD's design infiltrates some of the runoff from its roofs and parking lots and slows peak flows by recirculating water through the artificial stream. (It could do better, Ingalls acknowledges: Some paving might have been eliminated or made porous, and a simple solar pump could harvest water from the detention tank for the site's small lawn.) By helping, however modestly, to conserve available water, reduce the extremes of flood–drought fluctuations, and decrease erosion and sedimentation, CVWD contributes to the health of salmon streams and spawning grounds.

A less obvious contribution, high on Sandra Ingalls's list for educating her clients, is soil management to restore water quality. This strategy of holistic management, dubbed "Soils for Salmon" in Seattle, is the focus of a well-publicized regional educational outreach, codeveloped by Washington Organic Recycling Council, King County Natural Resource Department, Seattle Public Utilities, and other groups. Several web sites and publications (see Resources) and a conference have resulted. Designing around the soil–water interlinkage is an invaluable tool for landscape architects in any region.

Healthy soil, which Ingalls likes to call the most complex ecosystem on earth, contains about 4 billion microorganisms per teaspoon. These microbes, and the organic compost they recycle, are responsible for several key capacities of soil: holding and gradually releasing water, cycling nutrients and supporting plant cover, and biodegrading pollutants. When microbes are killed or removed—as in the compacted subsoil of many construction

Waterless in Seattle?

The drought emergency declared in March 2001 by Washington Governor Gary Locke doesn't fit the Northwest's image of limitless water and horticultural abundance. Other places have water supply problems: the chronic lack of rain in the arid West, or saltwater infiltration of Florida's overworked wells. Yet Seattle's reality is that population growth has necessitated water conservation.

Derek Booth, director of the University of Washington's Center for Urban Water Resource Management (CUWRM), says plainly, "Population growth has just gotten ahead of infrastructure." Ironically, water—for boating, fishing, gardening—attracts much of that growth.

Seattle's water supply is unusual, relying heavily on surface sources. (Less than 10 percent of area water comes from underground, reports Booth's CUWRM colleague Richard Palmer.) Surface water requires seasonal storage, and Booth and Palmer point out that, per capita, Seattle's reservoir volumes are relatively small. Existing reservoirs were designed for flood control, not water supply. Both state and city want to build more, potentially conflicting with Washington's scenic/recreational attractions. Reservoir expansion, says Palmer, "simply isn't possible."

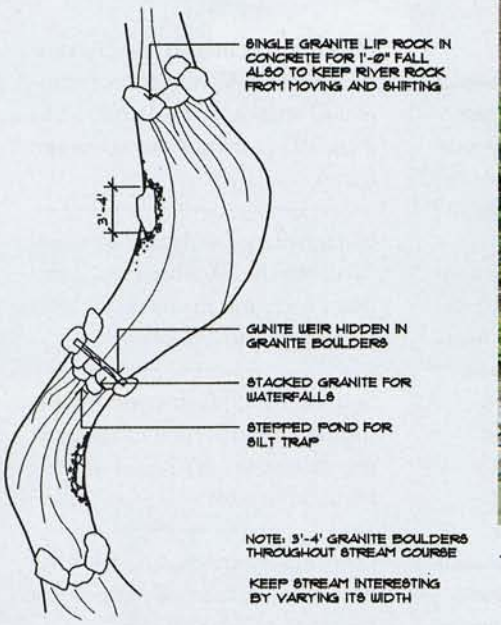
Seattle's main growing season is also the time of least rain. From late June into September, monthly rainfall averages about one-quarter of other months'. "Precipitation doesn't come at the times or places it would be most useful for water supply," notes Booth.

Ingalls suspects another contributing issue: Water from the Northwest, long seen as surplus, is actually exported to other regions, lessening local availability.

Even locally, "water rights are overallocated," says CVWD's general manager, Gary Hajek. Like many Western states, Washington water laws don't aid conservation: "First claimed, first served" means the oldest water claimants don't have to share during drought; and "use it or lose it" means that unused water rights revert to the state, spurring wastefulness. Governor Locke, calling these laws outdated disincentives to conservation, recently made reform a priority.

So despite abundant rain, Seattle is familiar with low-flow plumbing, limits on irrigation, and incentives to cut use. Recently, the Seattle mayor's office proposed $77-million polypropylene "swimming pool covers" for eight reservoirs to protect against algae, evaporation losses, contamination, and (supposedly) terrorist poisonings. Reclaimed water (treated effluent) is also in Seattle's future. The most unusual Seattle strategy is "Soils for Salmon" (see main text).

Seattle's "drought in the rain" illustrates a disturbing fact. Even where water is abundant, reallocating too much away from preexisting natural functions can cause major problems.



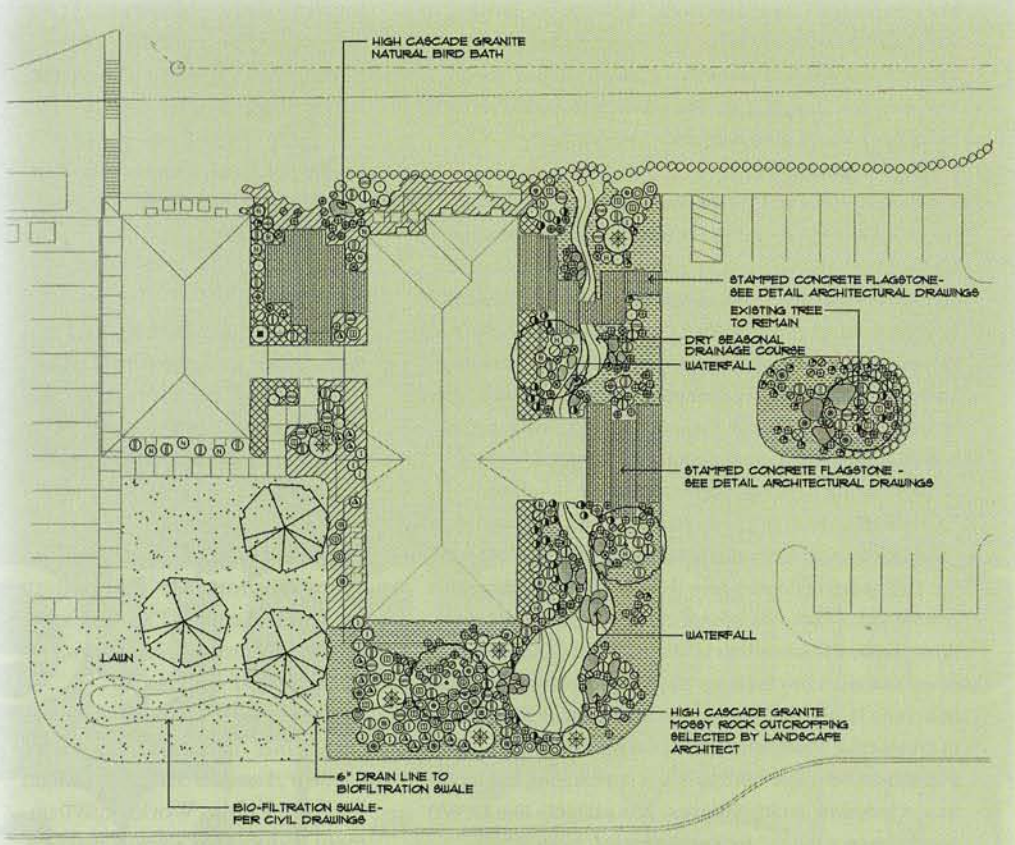
The stream, *above* and *left*, receives stormwater from the building's roof. Any overflow goes to a biofiltration swale, shown *below*.

sites, or in sterilized commercial soil-mixes—soil stops serving these functions.

These facts are nothing new, as any well-trained landscape architect knows. What is less widely recognized is that each of these soil functions directly affects stream water quality, says Josh Marx, a key author of Soils for Salmon and a planner with the King County Department of Natural Resources. For every acre of soil degraded by human activity, streams and rivers decline, and with them not only aquatic wildlife, but also the supply of clean fresh water available to humans.

"The better landscape architects," says Marx, "have been promoting soil health for years. It's the get-the-job-done types who are less likely to know and more reluctant to change." Salmon's high visibility, however, has helped persuade a growing number of professionals. State guidelines, which Marx helped draft, encourage conservation of native soils and improvement of damaged soils. Careful cost–benefit studies by the city of Redmond (see Resources) showed that soil improvement pays for itself in 2–6 years.

At CVWD, Ingalls followed Soils for Salmon recommendations. These include microbial analysis of site soils (see Resources), preserving undisturbed soil, stockpiling topsoil, adding organic compost to disturbed soils during construction, and ongoing maintenance with an increasingly popular product known as compost tea (see sidebar, "Micro-Herd Roundup").



While none of these practices is strictly new, their in-depth use by Ingalls and other landscape firms is an important trend. New research on soil microbiology and compost is bringing the truisms of "organic gardening" into commercially feasible practice. Designing for and with healthy soil, Ingalls says, lays the foundation for everything else—water conservation, water quality, the health of vegetation and wildlife, and human use and enjoyment of the land. Healthy soil, she stresses, is the link that connects them all.

To an unusual degree, McCorkle's building—a Craftsman-style timber and masonry structure—functions as a whole with Ingalls's landscape. The two had previously collaborated, and they brought to CVWD an admiration for integrative designers: Frank Lloyd Wright inspired McCorkle, while Seattle landscape architect Richard Haag influenced Ingalls, as did studies in Japan.