No Place for Old Trees—Part IIa

By Cass Turnbull

The New Green Infrastructure—Friend or Foe of the Urban Forest?

The Enemies of Trees

The enemies of the urban forest are many and varied. The usual suspects—developers, parking lots, utilities, arborphobes, and viewmongers—are coupled with other less objectionable opponents—space for vegetable gardens, lawn for the kids to play on, room for rapid transit, and solar panels. In a strange twist of fate, the latest threat to our urban forest is the rush to embrace Low Impact Development and the new green infrastructure technologies (green roofs, bioswales, rain gardens, permeable pavement, etc.). Our old building setbacks and landscaping requirements are being traded for balconies, parking strip bioswales, and green roofs. These are good things but they are not the same. Not the same at all.

Where Are the Trees?

After looking at a new *green street* design, my friend Gerry asked a Seattle planner, "Where are the trees?" None had been included. Frankly, I'm not surprised. Trees have become an afterthought here in Seattle and on the national stage. They are barely mentioned in discussions of sustainability and listed almost perfunctorily in green infrastructure documents.

New Green Infrastructure Technologies

New technologies, such as green roofs, green walls, bioswales, and rain gardens, are used to replace the ecological functions of trees and greenspaces on building lots. That way the land can be used for buildings while still keeping stormwater run-off clean and manageable, lowering the cost of cooling hot buildings, and keeping a denser city beautiful.

The question is: Will they really work over the long haul? Maybe, maybe not.

These technologies are untested in America over any length of time. They are being used in Europe, mainly Germany, because Germans don't have anymore un-built land left in their cities to retain. And, well, they're Europeans and can be counted on to correctly fund and maintain their community green infrastructure.

The City of Seattle, on the other hand, is more than capable of underfunding and under-maintaining its infrastructure and its public greenspaces for decades on end. When times are tough, building owners and managers choose to cut funds for green maintenance first and always. The use of cheap, unskilled labor is the norm. And then there are homeowners. We will talk about them later.

With regards to maintenance, I must admit I have serious misgivings about the future success rate of the new green. Yes, I know I'll get letters.

Green Roofs

The idea behind green roofs is that the tops of buildings are planted with either low plants in layers of thin soil (easy to accommodate structurally) or bigger plants on thicker soil and maybe in planters, which takes more engineering, watering, and maintenance. The insulating soil cools the building, saving energy that would have been needed for air conditioning. The green roof also combats the urban heat island effect, which affects everybody—more and more every year.

In addition, rain water will be caught in the soil/plant layer, evaporating or at least slowing the rain water going to the street below. This helps prevent stormwater problems like street and basement flooding and the pollution of Puget Sound. Both of these are serious problems costing taxpayers heaps of money to fix with grey infrastructure (concrete sewer systems, underground water storage vaults and tunnels, and treatment plant upgrades).

Builders must mitigate the environmental and infrastructure strains caused by their flat, reflective building surfaces. They want to sell buildings that can save owners energy costs for air-conditioning. And green roofs are an opportunity to do some public good. They have the co-benefit of looking really cool.

Developers use a flexible point system called the Green Factor to meet their landscaping requirements. The retention of green space and existing trees is rated so low that it rarely is chosen over green walls, facades, roofs, bioswales, etc. Additionally the city encourages their use by allowing more lot coverage or greater building heights. Even balconies are considered to be a landscape green factor.

One of my main concerns is the sustainability of these new technologies, including green roofs.

Green roofs sound nicer than they actually are. I wonder if anybody has ever lingered on a green roof garden to enjoy the day. It's either too baking hot, too windy and chilly, or too bright and exposed even with taller trees and shrubs in pots. In other words, it's unpleasant. Because people don't visit their green roofs much, nobody's there to notice if the maintenance is falling behind. All gardens need weeding and someone to realize that the irrigation has broken. With no feedback mechanism, the maintenance and survivability of the design will suffer.

I remember when Washington's Governor Dixy Lee Ray (1977) campaigned to plant gardens on all the city rooftops to mitigate car/air pollution. I wonder how many of those gardens remain. I suspect less than 2%. Greenlake Park, on the other hand, was planted in trees in 1903. That is a green infrastructure that has stood the test of time.

If condo dwellers don't see or use the roof tops gardens, the planting beds will get invaded by the usual suspects—shot weed, blackberries, and the decidedly-not-ornamental grass. (How do the seeds get there? On the feet of birds? Carried in by the wind?) As a result, even fewer people visit. Then things can go very wrong: unchecked sedums clogging drain pipes and causing overflows, malfunctioning irrigation drowning sedums and then washing soil into the drains, sedums dying from receiving insufficient irrigation, allowing the now barren soil to blow away or erode and, you guessed it, clog the drains. The membrane under the soil level can get compromised. Fixing it requires that all that the soil and all those plants be taken out, the membrane replaced or repaired, and everything put back. And remember for this project everybody needs to use the 5'x 6' elevator with really clean, nice carpet. The same one the residents use. It's expensive, and it's difficult. In the worst case scenario the roof leaks. That's a biggy. How many times do you think the building manager is going to be willing to fix these things? Will he give up on having a green roof? Who's going to report him? The roof police?

Lord knows that looking down onto rooftop gardens is so much nicer than looking down on torch-down roofs or dirty white lids. I've even seen trees living there. But for the reasons listed above I don't think a green roof has even a 50% chance of success. Some people are cutting down trees (increasing the need for energy to cool the house) to put in solar panels on one story homes. Elsewhere, other people are hauling trees up to the top of 125-foot apartment buildings. I would suggest that we put the gardens and the trees on the ground, which they prefer, and the solar panels on top of the tall buildings. And while we are designing those smarter tall buildings, why not put in a rooftop catchment system leading to a very large underground cistern—one that can do some real good in a drought?

Bioswales

I've also seen the city cut down rows of street trees to install bioswales. Bioswales are a bit like landscaped ditches lining the edges of the street or in big mall parking lots. Upon seeing a bioswale for the first time, I thought it might be a drunk-driver trap or an effective collection system for litter and grocery carts. When I was told they were good for habitat, I thought 'mosquito habitat?' But I've since been trained to see them in a different way.

The idea behind bioswales is to catch stormwater run-off from the streets and hold it so it sinks into the ground and metes out slowly to the sewer outflow pipe. This keeps the wastewater system from becoming overwhelmed (and in some cases pushing raw sewage into Puget Sound) and prevents urban flooding. The main contributor of pollution to Puget Sound is no longer industry. It is non-point source pollution, meaning it comes from everywhere. It is from fertilizer in our yards and the crud in the stormwater that runs off our streets and roofs. Even pet waste is a major contributor. For an amazing three minute lesson on stormwater just Google up Laura Jame's underwater video taken of the outflow pipe off of Alki point. Type in key words—**Alki, video, stormwater.** That should do it.

Bioswales not only slow the flow, the plants break down toxins and unwanted sediments settle to the ground. This keeps our bodies of water clean and the marine life healthy, including some you might want to catch and eat. Bioswales do a great job.

I've heard bioswales described as being low maintenance and that's what got me thinking. I'm not so sure. Can they really pass the test of time? They are overplanted at a rate of three times as much as can exist successfully in the site, which leads to a lot of whacking later in a futile attempt to keep plants in check. I've heard the promoters have had trouble training the maintenance staff. Well, duh! I've been trying to convince landscapers to prune the right way for over 25 years. Good luck with that.

As for weeding and controlling invasives like blackberry and ivy, the fact that a bioswale is hard to get down into and navigate doesn't bode well. Overplanting means you can't get in there without poking your eye out. God forbid you run into a rugosa rose.

Just take a drive around town to see planted traffic circles that have not been maintained (a much easier task than maintaining bioswales). Nearby residents had to beg the city to put in traffic circles and sign a blood oath to weed, water, and care for them. Everybody in the neighborhood goes by every day and can see if the upkeep is being done. Compared to green roofs, green walls, bioswales, and rain gardens, traffic circles are dream to maintain. They're flat, small, and easily accessible from all sides. But years after the traffic circle boom of the 90s, I think fewer than 50% remain as intended, with the shrubs and ornamentals. Most of the pretty plants have died, and weeds and grasses have taken over. The only survivors of the original plantings are the trees.

I have read that the leaf debris in bioswales just disappears by decomposing in place. You weed it once a year and then just toss in a new layer of mulch. I have also read that after many years of filtering toxins, the soil itself can become toxic, ceasing to be a cleaner of stormwater. If this happens, you are supposed to clean out the accumulated bad soil and debris. It is not clear

to me how this is supposed to be accomplished. You can't just scoot your flat point shovel across the top of the ground, skimming off the layer of silt particles. There are shrubs in the way, stems emerging from the ground every 24 inches or so, and the ground is full of tangled roots.

I mentioned my concerns about maintaining bioswales to a water quality expert who was giving a talk at the same conference as me. He suggested that the maintenance could become a good public works program—you know, green jobs. A good friend of mine pointed out even if bioswales were to devolve into pits of blackberrry bushes, morning glory vines, and Styrofoam teriyaki boxes, they would still do their job for stormwater management. Of course he's right and that is, after all, their purpose.

Maybe I'm wrong about the maintenance of bioswales. I've been wrong before, which my husband will confirm. It has been pointed out that from time to time I see future disaster where none exists. They could be as easy to maintain as stated in the booklets. If so, readers will contact me with their success stories. I will be happy to have my concerns allayed.

Please don't misunderstand me. I'm not against green roofs or bioswales. Like you, I am rooting for them because they feature one of my favorite things, plants. I always want to see more plants. Anything that makes people aware of how neat plants are is worthy of my support. All the new green infrastructures, when they are well designed and maintained, will provide immeasurable positive services to the city. Because we are in deep ecological doo-doo, we must give them a chance to prove their worth.

The most important thing is to **ensure that green roofs and bioswales be used as an addition to—not a replacement for—a healthy urban forest**, which is the most reliable, historically proven, low tech, easy-care, long-lasting, inexpensive green infrastructure there is. Sometimes it just shows up in your back yard as a Doug fir seedling.

Next Issue: green walls, green facades, permeable pavement, and rain barrels. ▲

The Big Green Stormwater Experiment

Because green stormwater management methods are relatively new, little is known about how long structures like rain gardens will last or what ongoing maintenance permeable pavement will need—or even whether these methods make any difference when it comes to protecting the environment.

—from How We Got Into Such A Mess With Stormwater by Ashley Ahearn and Katie Campbell
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