Gray to Green: Constructed Wetlands for Water Quality, Habitat, and Education

Preliminary Overview from Margaret Robertson and Jennifer Hayward
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Overview:
Lane Community College's parking lots, roads, sidewalks, and roofs produce (x) gallons of stormwater runoff per year, all of which runs, untreated, into pipes and is discharged directly into the Russel Creek watershed and thence into the Willamette River watershed. This grant will fund the first step of transforming Lane's stormwater management system from gray infrastructure—that is, pipes—to green infrastructure—that is, constructed wetlands.

When the College was built in 1966, an area of wetlands which formed part of the Russel Creek watershed system was excavated and converted to a three-cell wastewater treatment lagoon system. In recent years the College has installed a packaged wastewater treatment system in their place, and the lagoons are no longer used for wastewater treatment. The College envisions restoration of the underlying wetland system, restoring both hydrologic function and habitat health, while redirecting its stormwater runoff so that it is cleansed and infiltrated through the restored wetlands. The result will be improved water quality in the Russel Creek watershed and improved groundwater recharge to the underlying aquifer. The restoration will include native plant communities, habitat islands, and peninsulas for increased habitat diversity. It will provide opportunities for wildlife viewing, education, and research via paths, viewing areas, and interpretive signage.

This wetland on the south side of 30th Avenue is part of a larger system of wetland habitats in the Russel Creek Basin; it will reconnect hydrologically with a series of jurisdictional wetlands on the north side of 30th Avenue. The College has applied for an Oregon Watershed Enhancement Board (OWEB) grant to begin study and inventory in that north area. The Gray-to-Green project will integrate wetland restoration of the former sewage lagoons with the north wetland project.

Multiple Goals:
(1) Improve water quality in the Russel Creek watershed by treating stormwater runoff
(2) Habitat restoration
- Provide appropriate nesting and feeding habitat for birds, fish, amphibians, reptiles, mammals, and invertebrates
- Provide habitat corridors connecting upper Russel Creek drainage and upland forest with lower Russel Creek wetlands
- Increase biodiversity and biological productivity

(3) Education: Foster place-based learning
- Make stormwater processes visible
- Provide learning opportunities for LCC environmental science, watershed technician, biology, and other classes
- Provide interpretive signage, printed materials, and teaching materials

(4) Community recreation
- Provide trails and viewing areas for public use

Increase public understanding of the importance of wetlands, the multifaceted relationships between humans and wetlands, and the wider roles wetlands play in the watershed
Provide education programs and volunteers for class visits from local schools

Purpose of Grant:
Funding for inventory and analysis by a team of wetlands experts including hydrologists, biologists, surveyors, civil engineers, and landscape architects
This is the beginning step of a larger stormwater management and watershed restoration project.

Steps in Larger Gray-to-Green Stormwater Management Project:
Form task force. Invite broad participation by campus and larger community.
Define goals
- Define hydrologic and habitat goals
- Identify design-storm size to be accommodated
- Define level of maintenance (e.g., design to operate with minimum of maintenance; use simple, self-regulating natural systems to avoid reliance on complex technical systems)
- Define education goals

Budget
- Prepare budget: inventory and analysis; engineering modeling; design; construction documents; construction labor and materials; construction supervision; monitoring and management; legal fees; reserve fund for unforeseen expenses

Phasing
- Prepare phasing plan, with suggested timeline

Site inventory and analysis
- Map historic Russel Creek watershed using aerial photography, soils, 19th-century surveys.
- Identify current Russel Creek tributary locations and flow rates
- Detailed topographic survey (Requires professional surveyor)
- Soil survey data
- Hydrology. Collect rainfall data, campus stormwater runoff data, evapotranspiration data. (Requires landscape architect or civil engineer.)
- Identify groundwater recharge areas
- Water quality. Perform water quality testing above and below wetland. (Could be performed by students in class projects.)
- Habitat and vegetation. Identify endangered species. Identify invasive exotic species. (Requires ecologist or biologist. Could be performed by faculty?)
- Evaluate habitat, riparian, and wetland function upstream and downstream of site
- Map wind patterns and solar orientation
- Cultural and historic inventory
- Aesthetics: evaluate views into and out of site
- Wildlife corridors: Evaluate wildlife movement corridors and potential conflicts with roads

Preliminary design
- Calculate water budget (model the water balance) if gray infrastructure remains in use
- Calculate water budget following conversion to green infrastructure
- Calculate storage capacity required and minimum water levels required
- Develop design strategy to accommodate both existing gray system and future green system
- Determine wetland type(s) required: deep water, emergent, forested wetland, etc.

Identify habitat requirements, including shoreline, peninsulas, islands, vegetation types, wetland types
Select locations for paths, boardwalks, viewing platforms, blinds, bridges
Identify key sites for interpretive kiosks
Model landforms to restore topography, provide required flow rates, storage capacity, sediment settling areas, and freeboard to accommodate extreme storm events
Select additional water control structures: e.g., overflow devices, weirs, flow splitters
If aeration is required, develop designs for waterfall(s) or aeration pumps
If community use is intended, evaluate parking and access
Select plant materials (requires expertise of ecologists, biologists, landscape architects)

Community participation
- Invite broad participation from the beginning
- Provide ample opportunities for participation by campus community
- Identify potential in-house expertise
- Outreach to city, county, neighborhoods, local watershed council, other organizations
- Consider developing three to four alternative designs for community input
- Determine whether visitors and public use could have positive revenue implications for Lane

Construction
- Develop RFQ for bidding process: ensure that contractors have experience with wetlands
- Prepare soil protection and conservation plan
- Prepare erosion control plan
- Prepare water redirection plan if required. Drain and redirect water
- Excavation and finish grading: swales, pools, berms, islands
- Prepare soil surfaces. Install liner layer, gravels, soils and planting areas.
- Construct other physical features: shoreline and wetland edges, check dams, stones or large woody debris for habitat, waterfalls, paths, platforms, etc.
- Planting (spring or fall). Install nets or fences to protect young plants from herbivory
- Hydrology: reintroduce water gradually
- Allow plants to become established before introducing contaminated runoff

Regulatory tasks
- Identify federal, state, and local permitting requirements
- Begin permit application process

Monitoring and adaptive management
- Develop maintenance plan. Schedule routine inspection of water control devices and vegetation. Mow if required. Remove invasive exotic plants.
- Monitor and record data on water level and hydrologic function
- Monitor and record data on species composition, viability, and overall wetland health
- Develop adaptive management plan

Education
- Develop interpretive materials: signage, brochures (requires graphic designers)
- Develop other education materials

Future tasks
- Identify land for potential acquisition to improve habitat connectivity
- Identify additional grant funding opportunities