



Barriers and Opportunities for Low Impact Development: Case Studies from Three Oregon Communities

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Contents

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Executive summary

It is anticipated that by the year 2030 Oregon's population will grow 40 percent. Such growth could have enormous negative effects on local natural resources, especially water sources and streams. Communities that wish to avoid costly, inadvertent effects on their local resources and economies must consider adopting low impact development (LID) designs.

In 2006, Oregon State University's Sea Grant Extension Program conducted needs-assessment workshops with local decision makers and residents in three Oregon communities of vastly different populations—Portland/Metro, Grants Pass, and Brookings. The workshops addressed (1) the biggest barriers to planning and implementing future development while minimizing impacts to water resources (that is, adopting LID practices); (2) their needs for education, training, or other resources on these issues; and (3) the audience(s) to which these efforts should be directed.

Key findings and proposed actions

Despite geographic and demographic differences in size and location, consistent themes emerged from these three Oregon communities:

1. LACK OF BASIC UNDERSTANDING OF PLANNING AND THE IMPACTS OF GROWTH

The workshops' most significant theme was a lack of basic understanding of the connection between today's land use and development decisions and tomorrow's consequences, in terms of both costs and resource quality. Neither the public nor local officials grasp the effects that individual planning decisions will have on infrastructure capacity, stormwater management, and water quality.

WORKSHOP SUGGESTIONS:

Employ computer-generated visualization tools or “build-out” scenarios to convey the consequences of planning decisions on the future of a community. An independent organization in partnership with local leaders and communities should develop and hold forums to raise awareness of the social and environmental consequences of conventional development versus LID practices and to present research-based LID information. Provide help in analyzing the costs and benefits of incorporating LID practices into a community's ordinances.



The challenge in managing stormwater to protect water quality is to mimic how water moves through a well-vegetated landscape (left), when the land is developed (below), using impervious areas (streets, driveways, rooftops, parking lots, etc.), compacted soils, and efficient storm-drainage pipe collection systems. Low impact development aims to meet this challenge.



2. NEED FOR ACTIVE LEADERSHIP

Participants expressed a need for strong administrative support and direction to incorporate LID practices into codes or to encourage developers to try LID projects. It is unreasonable to expect a local government staff person to deviate from normal practices without significant support from superiors. Leadership also needs to play a role in coordinating education and outreach between government (for example, public safety, planning, and health) and industry (developers, contractors, real estate pros, landscapers, suppliers, etc.), and across jurisdictions (such as departments and governments).

WORKSHOP SUGGESTIONS:

Develop, co-sponsor, and fund educational forums and outreach campaigns to foster the needed leadership and teamwork to simplify LID practices, permits, and incentives:

- Forums on natural resource planning to inform political and industry leaders. Help leaders understand the long-term “costs” of doing business as usual (for example, via build-out analysis). Coordinate educational efforts and communication between local government and industry groups, and encourage consistent standards

and enforcement among adjacent jurisdictions. Present information on how LID techniques can be incorporated into affordable housing.

- Forums to empower citizen advisory committees, planning departments, and local chapters of the Home Builders Association to address LID issues.
- Forums to spark demonstration projects to familiarize builders, the public, and community officials with LID techniques. Identify local champions of these techniques.

3. NEED FOR TECHNICAL INFORMATION AND ASSISTANCE

Technical impediments to instituting LID practices included a basic unfamiliarity with low impact techniques and designs, and a difficulty in shepherding these designs through the local government approval processes.

WORKSHOP SUGGESTIONS:

Technical resources and assistance. Local planning departments need introductory workshops, streamlined access to LID technical assistance, funding sources, technical assistance for demonstration projects, short- and long-term cost/benefit analyses, and suggestions on how LID practices might be adapted in special environments (low-permeability soils, hill slopes). To streamline local approvals of these designs, departments need help reviewing current codes and ordinances and creating new ones to support LID. Local agencies also need information on funding and technical consultation to help them develop standards and become proactive in implementing LID.

Incentives and disincentives. Host cross-discipline discussions to identify incentives for developers to incorporate LID techniques into their designs. LID designs would be easier for developers to implement if the codes and enforcement became more consistent among adjacent jurisdictions (for example, in street and highway design). Reduce the “disincentive” of risk to developers from uncertain timelines of approval by establishing a known, streamlined process for approving LID designs.

Outreach capacity. Participants suggested establishing a regional position to assist local jurisdictions in educating local builders on LID techniques, enforcing existing regulations and developing new ones, and coordinating enforcement among adjacent jurisdictions.

4. FUNDING, ECONOMICS, AND INCENTIVES

Small jurisdictions do not have the staff or funding to develop, revise, and enforce new codes or regulations, or to educate builders and developers on LID techniques. How can local governments generate the funding required to cover the “delayed” costs of growth to taxpayers, that is, demands on infrastructure (insufficiently sized roads, stream crossings, stormwater facilities, maintaining open spaces)? Can a local government afford to offer financial incentives to developers to employ alternative designs? If the local public is educated on LID techniques and benefits, will it create the economic demand and incentive

for green buildings and alternative development methods?

WORKSHOP SUGGESTIONS:

Using a forum setting, explore:

- what funding sources have been tapped in other jurisdictions to pay for infrastructure and open space associated with any new development
- the real costs of not fixing problems in existing and future infrastructure (for example, reduced water quality or quantity, limitations in allowed hookups, building moratoriums)
- the differences in property values and public infrastructure costs between the status quo and LID methods of development; employ economists or others with specialized knowledge
- the short- and long-term values of “green development” designs in terms of natural resource quality and infrastructure needs, and marketability for developers. Can these techniques save money and resources while yielding a higher-value, more marketable finished product?

NEXT STEPS:

University Extension Service staff will use these scoping workshop results to develop funding proposals, partnerships, and programs to assist jurisdictions with several identified LID issues.

Introduction

Oregon is nationally known for its bountiful natural resources and conservation-minded approach to land use development. However, recent rapid population growth has challenged the ability of many communities to keep up with development pressures (for example, meeting infrastructure needs) without jeopardizing the long-term health of their local environment.

In response to this need, the watershed education program of Oregon Sea Grant (OSG) began exploring its potential role in helping commu-

nities manage growth and land use development in ways that promote the health of their economy and natural resources.

Many Oregon communities are facing rapid growth without a commensurate increase in planning staff and resources to evaluate and guide their growth options. In response, OSG conducted workshops to determine what these communities needed to better protect their natural resources while accommodating growth. We focused on areas where the need was greatest: the rapidly growing, smaller



This pervious parking strip in Portland is one example of low impact design. Image © Bureau of Environmental Services, Portland, Oregon.

Low impact development (LID):

“A stormwater management strategy that emphasizes conservation and use of existing natural site features integrated with distributed, small-scale stormwater controls to more closely mimic natural hydrologic patterns in residential, commercial, and industrial settings” (*Puget Sound Action Team 2005*).

communities that are often so overwhelmed with today’s demands that they cannot anticipate tomorrow’s. We assessed what forces were driving their land use decisions, and what educational or other resources the Oregon State University (OSU) Extension Service, OSG, or their collaborators could provide that might help these communities engage in low impact development planning.

We enlisted local, state, and national partners to join us in presenting “scoping workshops” in three different communities in Oregon: Portland,

Grants Pass, and Brookings. We chose these locations to represent a range in population size and in the local capacity to address development issues. The Portland metropolitan area is the most populated concentration of communities in Oregon, but the smaller cities within it face difficulties similar to those elsewhere.

In this report we use the term *low impact development* (LID) to mean “a stormwater management strategy that emphasizes conservation and use of existing natural site features integrated with distributed, small-

scale stormwater controls to more closely mimic natural hydrologic patterns in residential, commercial, and industrial settings” (*Puget Sound Action Team 2005*). Examples of such practices include bioretention areas (bioswales, rain gardens, etc.), pervious pavement, vegetated roofs, and soil amendments. Such practices may be incorporated into existing as well as newly built developments in a community.



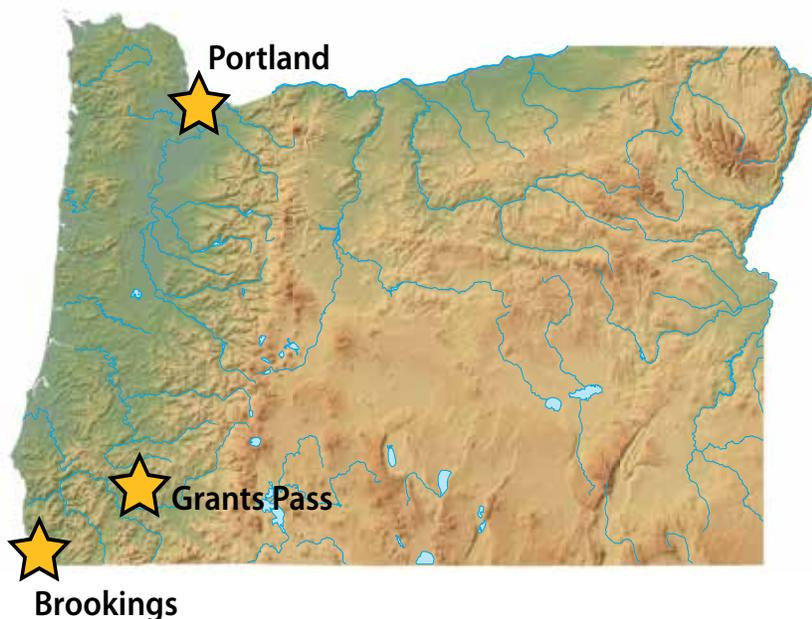
More examples of low impact design. Left: eco-roof planted with sod. Right: flow-through planters. Images © Bureau of Environmental Services, Portland, Oregon.

The challenge of rapid growth in Oregon communities

Oregon's population is anticipated to grow 40 percent between 2000 and 2030 (U.S. Census 2000). The three workshop communities—Portland/Metro, Grants Pass, and Brookings—represent a broad range in current population and local government size. Portland is the state's population center, with approximately two million people—roughly 57 percent of the state's population—in the greater metropolitan area. Portland is far larger than the next-most-populated metropolitan areas in Oregon (Salem and Eugene, at 200,000 each). Twenty-five cities and three counties lie within "Metro," the regional government that serves the Portland metropolitan area. Jurisdictions within Metro's planning

area include vigorous suburbs such as Beaverton (population 84,000) as well as small enclaves such as Wood Village (population 3,000) and King City (population ~2,000, situated on 250 acres). Recent additions to Metro's urban growth boundary¹ are spurring master planning for vast acreages of rapid urban development. For example, the City of Damascus, incorporated in 2004, boasts 10,000 to 11,000 acres and fewer than 10,000 people in 2006, but over the next 20–30 years it is anticipated to house 90,000 people (Clackamas County Web site; Liberty 2006).

The second workshop site—Grants Pass—has a population of 30,390 and is located in the rapidly growing Rogue River Valley in southern Oregon. It has seen a population growth of 13.3 percent since 2000 and 49.5 percent since 1990 (U.S. Census; City of Grants Pass Web site 2007). The third workshop was held in Brookings, Oregon, a small, somewhat isolated community on the rugged and scenic southwest Oregon coast, just north of



¹Under Oregon law, each city or metropolitan area in the state has an urban growth boundary (UGB), which controls urban expansion onto farm and forest lands. Land inside the UGB supports urban services such as roads, water and sewer systems, parks, schools, and fire and police protection (Metro Web site).

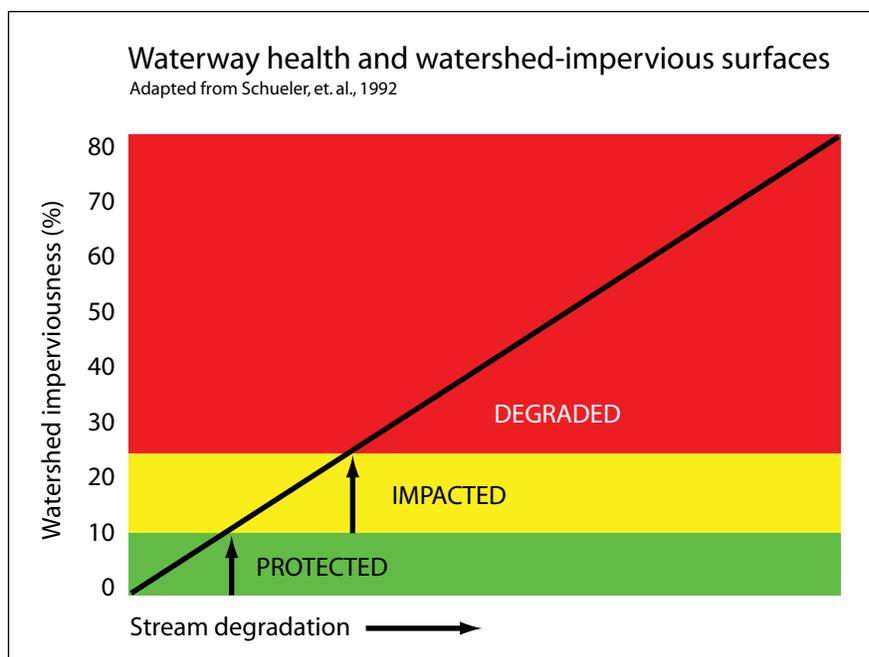
the California border. Brookings had a population of 6,185 people in 2006 and has experienced 13.5 percent growth since 2000 (U.S. Census 2000; Proehl 2007), largely driven by an influx of retirees. This rapid rise in population has fueled proposals for increasingly larger residential developments in recent years (Ross 2004).

Many local planning and public works departments—and municipal staffing in general—have not kept pace with population growth. Fast-growing cities often face complaints from the development community about long delays in permitting. Their staff funding source also plays a role in their ability to keep up with demand. For example, some planning and public works departments are tied to development fees, so if growth is fast-paced, there are more fees to pay for more positions. But this funding is not secure: as development slows, the same communities must “tighten their belts” and lay off or stop hiring needed staff.

Another issue several Oregon counties are facing today is the loss of annual federal revenues.² Although these cuts were avoided in fiscal year 2007, many counties, including Josephine and Curry, have already laid off a high percentage of their staff and have no plans to hire them back (C. Harper, pers. comm.).

Oregon state law requires local governments to be “proactive” by addressing urban planning elements in their approved comprehensive plans. However, many do not have updated standards and review processes in place to consider the impacts

²Monies from the Secure Rural Schools Act.



of new development on local natural resources. As the number of permit applications increases, planning staff find it harder to perform tasks such as code updates. A weightier problem is that existing codes often contain conflicts that effectively hinder cities from protecting water quality and managing stormwater, such as restrictions against disconnecting downspouts, or requiring streets to have curbs and gutters instead of the option of curbsless streets draining to bioswales. The upshot is that as a “package,” the bits and pieces scattered throughout a city’s development codes and public works standards become their *de facto* stormwater regulations, even if they were not originally written for that purpose and they omit important considerations (C. Harper, pers. comm.).

The rapid growth rates described above can lead to development patterns that do not protect, or even consider the consequences to, indigenous natural resources. For example,

in the 20th century, covering existing landscape elements with impervious surfaces such as asphalt, cement, and roofing was an accepted feature of urbanization. However, these surfaces prevent water from percolating into the soil, thus disrupting the natural water cycle and affecting both the quantity and quality of local water resources. Research has shown that the amount of impervious surface in a watershed is a reliable indicator of the impacts of development on water resources. These impacts may include increased flooding and streambank erosion, and degraded water quality in streams from polluted runoff, which are particularly undesirable outcomes in the salmon-sensitive Northwest. A change in development patterns is necessary if the local natural resources are to be preserved or remain functional. Adopting low impact development (LID) designs and techniques can greatly relieve these inadvertent impacts on local resources.

Community workshops

We used a “scoping workshop” approach to solicit input from local decision makers and residents to determine what forces were driving local land use decisions in their communities; what education or resources they needed to allow them to pursue low impact planning and development; and how OSU, OSG, or their partners might be able to address some of those needs.

We enlisted local, state, and national partners to join us in presenting scoping workshops in these three communities. The national partners were from the Nonpoint Education for Municipal Officials (NEMO) program, based in Connecticut.³ The National NEMO network is a confederation of programs in 30 states that seeks to help local decision-makers understand how land use decisions affect the quality of the community’s water and other natural resources (NEMO 2006). They emphasize face-to-face educational workshops for local officials.

The Metro regional government in Portland, the City of Grants Pass, and the South Coast Watershed Council agreed to host the event in their respective communities. In addition to OSU Extension staff, our primary state and local partners included the Oregon Department of Land



The Metro workshop included a tour of recent developments with low impact designs sponsored by the Oregon Homebuilders Association.

Conservation and Development’s (DLCD’s) Coastal Management Program, the local hosting agencies, and the Rogue Valley Council of Governments. The local hosts helped develop the list of workshop participants. We suggested that they invite individuals in their communities representing a range of interests linked to watershed management, such as city, county, or regional planners; representatives from the local engineering departments; planning commission members; watershed council members; developers; major landowners; and other interested publics.

The three workshops followed the same general format. The national partners began by delivering an overview of the impact of growth and development on stormwater and water quality. They included specific examples of how the national NEMO

network has empowered local communities around the U.S. to address these issues. We then discussed and sought audience input on two questions:

1. What are the biggest issues and barriers confronting your ability to plan and implement future development while minimizing impacts to water resources?
2. What education, training, or additional resources would help you address these issues, and to what audience(s) should these efforts be targeted?

³The “nonpoint” part of their name refers to “nonpoint source pollution,” the type of diffuse water pollution resulting from a variety of land uses (including urban runoff) rather than from a “point” discharge source, such as a pipe or outfall. The decisions that communities make about where and how to grow can influence the amount of nonpoint pollution flowing into their waterways.

What we learned from growing communities: barriers and opportunities

The input we received from these three communities was surprisingly consistent, despite their differences in size, location, and situation.

Though expressed at each venue, some of the common issues were more or less prominent depending on community size. The few differences we encountered were primarily reflective of the varying geographic terrain of the local communities (that is, steep slopes versus flat valleys, and coastal sites versus inland).

Barrier: LACK OF BASIC UNDERSTANDING OF PLANNING AND THE IMPACTS OF GROWTH

“We need broad public education that enhances the basic understanding of water quality, the hydrologic cycle, soils, infiltration and how we influence it, how water quality affects insects and fish—how the transport of pollutants affects aquatic organisms including fish. What are the real costs of reduced water quality, and how can we assess the costs of not fixing the problems?”

—Watershed council member at Brookings workshop

“In the NEMO education modules, we do start by examining water quality issues, but quickly broaden to other land use topics. Water quality is a

good approximation or combination of all these low impact issues. The NEMO program has resources on related issues—economics, forest and habitat fragmentation, etc. But if you broaden the issues too much when working with a community, you’ll lose focus, and the community may become paralyzed. So, focusing on impervious surfaces can serve many of these purposes in one easier-to-handle package.”

—NEMO representative

“There is not one audience. There are the commissions, the developers, the city staff. We’re all part of the solution; it won’t go forward without all players.”

—Grants Pass participant

“When the public meeting is about changing the development code, no one shows up, even though they may be more affected by that than by one particular development that gets them in the door. There’s much citizen apathy.”

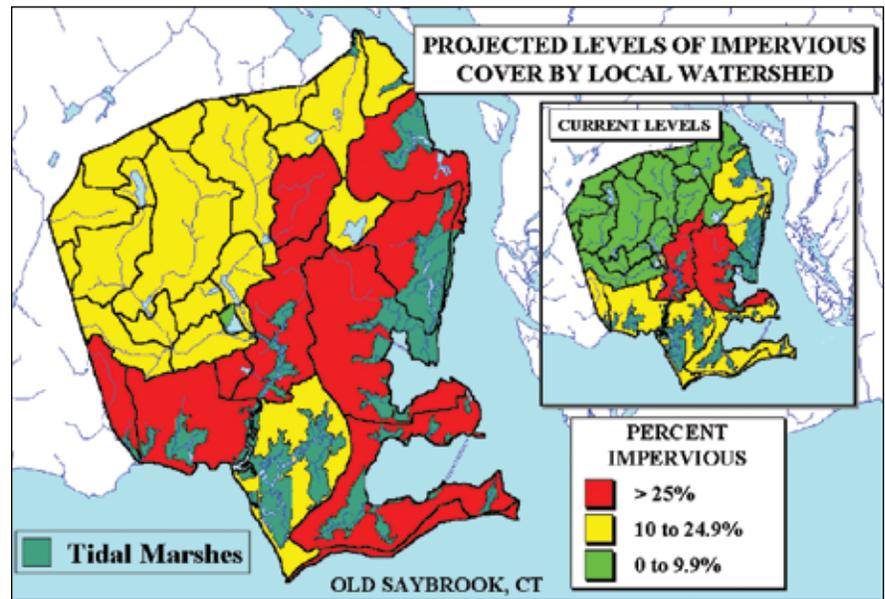
—Grants Pass participant

The most significant theme to emerge from the workshops was a lack of basic understanding of the connection between today’s land use and development decisions and tomorrow’s consequences, in terms of both costs and resource quality. For example,

the general public does not grasp the impacts that individual planning decisions will have on infrastructure capacity, stormwater management, and water quality. Locally elected and appointed officials (such as planning commissioners) also may not be fully aware of these connections. Furthermore, the public does not understand how and when to engage in the planning process to affect their community's future. The public is more likely to get involved when a proposal in their neighborhood is approved or construction begins, which is often too late in the process for substantial change.

NEMO representatives suggested that one of the more effective techniques for conveying the consequences of planning decisions on the future of a community is to employ computer-generated visualization tools, or "build-out" scenarios. (One such computer-mapping program they've used is called CommunityViz.) However, the value of outputs from visualization programs is directly dependent upon both the quality and quantity of local-resource inventory data available to put into the program. Smaller jurisdictions, such as Brookings, may not have completed basic inventories of their natural resources, and therefore cannot accurately predict the future impacts of their decisions about open space, areas slated for development, and the consequent effects on sensitive resources.

To raise awareness of how growth and community-planning decisions affect the livability and resource values in a community, participants consistently voiced a need for an independent



Example of a build-out analysis for Old Saybrook, Connecticut.

organization to hold forums that present research-based LID information. Additionally, every community asked for help in analyzing the costs and benefits of incorporating LID practices into their ordinances.

Opportunities:

Workshop participants suggested the following forums to increase basic LID fluency and to better understand the impacts of growth on a community.

1. Create build-out scenarios for locally elected and appointed officials, professional planners, public works staff, builders and developers, municipal decision makers, and the public that include the social and environmental consequences of conventional development versus LID practices. Start by examining alternative development effects on stormwater and water quality, then branch out to other issues of importance to the workshop audience, such as fish and wildlife habitat.

2. Bring builders and policy makers together to explore issues and barriers to adoption of LID practices and ordinances, to develop joint solutions that work for both constituencies. Coach them to recognize opportunities to try LID techniques.

3. To raise awareness and demand for LID growth practices, provide contrasting graphic examples of how conventional and low impact development affect habitat and water quality.

Barrier:

NEED FOR ACTIVE LEADERSHIP

"The government needs political will to implement solutions. If they develop strong citizen involvement, the local governments will be less paranoid to go forward."

—Grants Pass participant

"Education and experience with these methods needs to be coordinated between local governments and the development industry, but leadership

is required from both these groups.”
—Metro workshop participant

“We need a local champion that can instigate active partnerships, and they don’t have to be large-scale demonstration projects. A champion can be a great communicator and partner-builder. I can think of a few projects in my area suitable for LID techniques, but on a smaller scale. And much of the development still happens in two-acre parcels. In fact, the big projects are not my biggest concern; it’s the myriad small development projects that add up to non-point impacts here.”

—Concurrence between a regional state planning representative and a soil- and water-conservation district representative at Grants Pass workshop

Workshop participants expressed a need for strong administrative support and direction to incorporate LID practices into codes or to encourage developers to try LID projects. Many felt that it is unreasonable to expect a local government staff person to risk his or her reputation or the safety and timeliness of permit decisions to deviate from the norm without significant support from superiors. For example, even though the Metro regional government actively supports LID methods, the staff at some individual jurisdictions within the Metro region felt a lack of administrative support to suggest designs that would create additional permit reviews. Without tangible support from their superiors, local staff members do not feel empowered to make decisions concerning low impact development.

Workshop participants also felt that leadership would need to play a role in:

- coordinating education between government and industry, as well as across jurisdictions
- alleviating concerns that new codes and techniques could make new housing more costly, adding to the current inability of locals to buy homes in their own community (already difficult, due to real-estate inflation)
- resolving perceived conflicts between Oregon’s UGB density requirements and the common LID practice of pairing clustered development with open space

Opportunities:

Workshop participants made the following suggestions to foster the necessary leadership and teamwork to overcome these hurdles.

1. Deliver educational programs that address natural-resource issues, such as the NEMO modules, to prime political and industry leaders.
2. Help leaders understand the long-term “costs” of doing business as usual (for example, via build-out analysis). Explore the differences between using incentive tools to encourage LID practices versus development-restriction tools, a switch that would put local leadership in a proactive rather than a reactive role.
3. Coordinate educational efforts and communication between local government and industry groups, encourage information sharing among jurisdictions, and encourage consistent standards and enforcement among adjacent jurisdictions.
4. Build inter-jurisdictional teams—of surface-water managers, land use planners, planning commissioners, and city engineers—that can support implementation of LID projects. Build acceptance across the board for code updates. In the case of several smaller cities, explore means to provide a county-wide LID coordinator.
5. Hold forums examining how Oregon’s UGB density requirements may alter the way or the scale at which the LID model of clustering development and retaining open space would be implemented.
6. Present information on how LID techniques can be incorporated into affordable housing for a variety of income levels.
7. Support the adoption of LID-related standards (for example, for stormwater and erosion) where such standards have already been developed but not adopted.
8. Match communities with others that have adopted LID standards so they can learn from others’ experience.
9. Work with stakeholder groups to ensure that their expectations and fears about permitting hurdles are being adequately addressed.
10. Reinvigorate and empower citizen advisory committees, planning departments, and local chapters of the Home Builders Association (or related groups), and deliver NEMO-style educational programs to prepare them to address LID issues. Support this shift by facilitating discussion between these groups and the elected officials and jurisdictional staff.
11. Instigate demonstration projects to familiarize builders, the public, and community officials with LID

techniques and lower the barriers for acceptance of new stormwater management codes. Identify local champions of these techniques.

Barrier: NEED FOR TECHNICAL INFORMATION AND ASSISTANCE

“Developers want to know what is expected of them (clear costs, steps, timelines, etc.) in a timely manner. We need to focus our efforts to integrate LID into a system of codes and provide developers with a clear path for review and approval of projects and plans.”

—Watershed council member at Brookings workshop

“In our experience, the development community is supportive—they just want to know what the rules are. As the NEMO education teaches good basic planning, the goals and objectives for a community will be clarified, therefore making it less likely that a local developer will be wasting his or her time pursuing LID techniques. Once the planning commissions

become informed, they start asking different things of the developers, who may respond, but then the contractors don’t know how to install these alternative designs, so now contractor training comes into the picture as well.”

—NEMO representative

“Each jurisdiction has its own internal struggles. A developer may be willing to use innovative designs, but every time you change something, you need individual approval to deviate from each engineering standard and drawing. There’s just too much process involved. Jurisdictions are going to have to pull ahead and start doing this process themselves—must update the engineering design manuals.

Either there are no existing specifications for these alternative designs, or the specifications are not flexible enough. Our needs are to: (1) update the engineering manuals to have flexible specs, and (2) help city permit reviewers look at plans for LID design opportunities.”

—City planner at the Metro workshop

“Developers are not opposed to LID technology. They need a streamlined process—what is the straight answer from code reviewers? What is the schedule for approvals, what are the most important elements for the design approval process? The information must be presented to the developers in the right setting—matching their schedules and priorities. Remember that regulators are also rushed.”

—City environmental program manager at the Metro workshop

Workshop participants frequently identified two forms of technical impediments to instituting low impact development practices: (1) basic unfamiliarity with low impact techniques and design options, and (2) difficulty shepherding these alternative designs through the local land use or engineering approval processes, which often favor the status quo.

IMPEDIMENT 1.

Basic unfamiliarity with low impact techniques and design options

Opportunities:

Workshop participants provided a number of suggestions for familiarizing local planning departments with the principles, specific design features, and performance of LID designs in local conditions. To minimize the investment of their own staff time, they need streamlined access to LID technical assistance, including: details on local examples of LID designs in practice (photos, directions to sites, etc.); information on funding sources



*Vegetated swale designed to infiltrate and filter stormwater runoff.
Photo: City of Grants Pass.*

or technical help to develop a demonstration project; a breakdown of the short- and long-term costs/benefits associated with these practices; how to implement LID practices at the site and neighborhood scale; and suggestions on how LID practices might be adapted in special environments (for example, soils with low permeability, hill slopes, and high rainfall areas).

Participants submitted the following specific ideas for information and resources that could be offered by OSG, the OSU Extension Service, or our partners:

- Develop a technical design manual that includes cost/benefit analyses for implementing LID techniques appropriate to Oregon climates and at a scale that is applicable to the audience being addressed.
- Create a library of trusted sources, collaborators, and partners that supply useful, research-based LID information and share professional experience to build on existing efforts.
- Facilitate Web sites or a listserv to share information and real-world experience using LID techniques in Oregon. Possibly partner with annual “Street of Dreams” programs to showcase LID practices.
- Work toward establishing regional standards (for example, road standards) that allow the flexibility needed to implement LID techniques. Work with existing recommended standards where available.
- Develop educational materials and deliver workshops targeting home-owners, the landscape industry, and public land managers

and their crews to teach plant selection and landscaping techniques that support LID, open space management, and water conservation.

- Create and use natural resource inventories that will support LID planning and decision making:
 - Identify what tools and data already exist for the local area (data layers, GIS stations, etc.).
 - Assess local capacity to use these tools and develop and obtain new ones.
 - Facilitate education on how to use these tools.
 - Identify and obtain additional useful tools.
 - Use these inventories to illustrate the resource-based approach to growth planning.
- Use technical tools to analyze future cumulative impacts on water quantity and quality, groundwater, infrastructure, required travel distances for daily activities, etc.
- Partner with the Home Builders Association to identify their members’ needs for technical assistance, then design trainings and develop materials to meet those needs.
- Provide consultation on site designs for new developments to recommend the incorporation of LID and stormwater practices into construction plans.

IMPEDIMENT 2.

Difficulty in shepherding alternative designs through local approval processes

There was significant discussion at all three workshops about the difficulty and uncertainty of getting LID designs approved through the standard

permitting process. In addition, finding the time to review and revise local engineering standards to allow LID designs, or alternatives to standard stormwater management techniques, presents a significant challenge to a small city staff beleaguered by a backlog of applicants.

Opportunities:

Such discussions yielded the following questions, providing guidance for future assistance efforts:

- How can those who approve design proposals at the local level (city engineers, planners, etc.) gain familiarity with and confidence in alternative designs?
- Can planners and engineers suggest LID practices to developers when they feel they are appropriate, and how can they gain the support of their superiors to do so?
- What resources or guides are available to help local planners and council members overhaul their existing codes so that LID practices are encouraged and facilitated?
- Can we establish a streamlined process to get LID designs approved at the local level to reduce developers’ risk in trying something new?
- Will it be easier to implement LID designs if the development codes and enforcement become more consistent among adjacent jurisdictions (for example, in street and highway design)?
- In rural areas, can we coordinate such codes at a larger, regional scale rather than separately for each town?

SUMMARY OF TECHNICAL OPPORTUNITIES:

In summary, the following themes and suggested remedies fell under the “technical assistance” heading:

1. *Technical resources and assistance.* Local jurisdictions need assistance in reviewing codes and ordinances and creating new ones to support LID. The regulations should be scrutinized against the LID planning goals to identify inconsistencies. In some cases, model codes may be available (for example, DLCD’s Water Quality Model Code Guidebook, or Metro’s Model Ordinance for Habitat-Friendly Development Practices) (DLCD 2000 and Metro 2007, respectively), but smaller jurisdictions may lack dedicated person-hours or the expertise needed to complete the task. Funding and technical consultation should be made available to help local agencies develop standards and become proactive in implementing LID.

2. *Incentives and disincentives.* Participants suggested cross-discipline discussions to identify incentives for developers to incorporate LID techniques into their designs. Local governments (public works, roads, and planning staff) need resources and direction on how to create incentives in their existing and new regulations, and they may learn from other jurisdictions’ models. Reducing the “disincentive” of risk to developers (from uncertain timelines of approval) is perhaps the most immediate need. Establishing a known, streamlined process for approving LID designs is the proposed solution.

3. *Outreach capacity.* Local jurisdictions lack capacity to assist in

educating local builders and developers on new LID techniques, enforce existing regulations and develop new ones, and coordinate enforcement among adjacent jurisdictions. Participants suggested establishing a regional position to provide this type of assistance.

Barrier: FUNDING, ECONOMICS, AND INCENTIVES

“The City of Brookings is currently reviewing their comprehensive plan, and we have discussed these concerns. We wonder how to motivate builders to do things differently than they have in the past. What incentives will it take to get them to incorporate new LID techniques into their developments? We haven’t identified the carrot yet.”

—Brookings City Councilman

“Growth has outpaced infrastructure. We (city staff, council, and planning commissions) have held two workshops so far, we identified the problems, and perhaps some solutions, but how do we come up with dollars and cents, how to fund these projects NOW even if much of the money will be recouped from developers later? We have failing traffic intersections NOW. Developers must be part of this solution.”

—Grants Pass participant

“We need system development charges (SDCs) here. We are so far away from really being effective —these concerns have been going on for years, but few actions have been taken and implemented to solve these age-old problems, perhaps due to funding. We need to identify possible sources of funding, which is tough in

uncertain state-wide economic times. Developers are used to paying these charges elsewhere, and are making quick bucks in Curry County before we put these things in place. Curry County does not have SDCs, but the City of Brookings does. There’s a lack of infrastructure throughout the county, both inside and outside cities, including designated enterprise zone areas. There’s a timing problem, too: Subdivision developers have to pay for their own infrastructure costs, but downstream systems need to be upsized as well, which they don’t pay for, yet the downstream improvements must go in first, before any SDC money arrives. SDCs allow developers to be part of the solution.”

—Brookings participant

“In Medford, the housing developers did things the same old way because if that’s all that was available, that’s what people would buy. But with a local champion, when the locals began to have the choices, there was a surprisingly huge consumer demand for the greener housing options.”

—Regional coordinator of the Governor’s Economic Revitalization Team at Grants Pass workshop

Small jurisdictions often face serious financial limitations when it comes to developing new programs, training staff, or hiring additional staff to administer new programs. Participants from all workshops voiced concerns that local jurisdictions do not have the staff or funding to develop, revise, and enforce new codes or regulations, or to educate builders and developers on LID techniques, and they requested funding assistance. Their funding concerns included:

- Current growth-related demands on infrastructure will have cumulative costs to local taxpayers. Examples include insufficiently sized roads, stream crossings, stormwater structures, water treatment facilities, etc. Given that these costs cannot be tied to any one proposed development, how can a local government generate the funding required to cover these delayed costs of growth?
- Where will the funding come from to manage and maintain open spaces associated with new development, such as parks and greenways, as well as LID landscape features?
- Can a local government afford to offer financial incentives for developers to utilize alternative designs?
- Without knowledge of low impact techniques and their benefits, the local public will not create an economic demand for green buildings and homes and alternative development methods.

Opportunities:

Workshop participants identified a number of ways in which OSG, OSU Extension, or our partners could assist in addressing these economics-related issues. Clearly, there is a need to research what funding sources (for example, system development charges [SDCs] or others) may have been tapped in other jurisdictions to pay for the increased costs of infrastructure and open space associated with any new development. In addition, the real costs of not fixing problems in existing and future infrastructure (for example, effects of reduced water quality or quantity,



Stormwater wetland on Hamilton Creek in Ashland. Photo: Rogue Valley Council of Governments.

limitations in allowed hookups, and building moratoriums) need to be identified and presented in a forum setting. Build-out scenarios could show the differences in property values and public infrastructure costs between the status quo and LID methods of development. Workshops would benefit from the participation of people with particular knowledge of these subjects (for example, economists). Other forums could discuss interrelated economic issues such as the monetary costs and values of “green development” designs, as well as their short- and long-term values in terms of natural-resource quality and infrastructure needs, and marketability aspects for developers. Previous demonstration projects may provide practical information on how these techniques can save money and resources while yielding a higher-value, more marketable finished product.

Barrier:

UPPING THE ANTE—RAPID, LARGE-SCALE URBANIZATION AND IMPACTS

In some specific regions of Oregon, large parcels of land without existing infrastructure are being urbanized quickly. This “all-at-once” scenario heightens the social and environmental consequences of a planning decision and forestalls introducing innovation gradually over time. In our workshops, we heard specifically about the challenges in creating a new city, Damascus, in the Portland/Metro area (slated to increase from 10,000 to 90,000 people on 11,000 acres over the next 30 years) (Liberty 2005), and the UGB expansion and large developments under way in Brookings, Oregon. In Brookings (population 6,000), for example, a development of 1,000 new units is under construction on recently annexed city land (Brookings Oregon

Results of similar efforts

Area Information Web site 2007). The local governments in these areas expressed a need to be able to forecast the real environmental and monetary consequences of such proposed developments, and to persuasively calculate both the short- and long-term costs and benefits of adopting LID practices as an alternative to status quo development.

Opportunities:

Workshop participants suggested using visualization tools, economic data, and forecasting to answer “big picture” questions related to future growth, show the possible contributions LID techniques could make to ameliorate long-term environmental impacts, and examine long-term cost/benefit analyses. They also suggested borrowing appropriate techniques from special area-management planning to address large expansion areas, or areas that have unique environmental challenges. The suggestions made previously in this article—such as educating political leaders and stakeholders, facilitating discussion, and building inter-jurisdictional teams—would be of the utmost priority in these situations.

In our workshops, we learned: (a) that these three communities face several challenges when it comes to putting low impact development concepts into practice, (b) what those challenges are, and (c) that these challenges are very similar. Their similarity, despite variation in community size and staffing capacity, suggests that these challenges are likely shared by many other growing communities in Oregon. Two recent grant-funded projects tend to support our findings, namely OSU’s “Rainstorming” project and the Oregon Environmental Council’s (OEC’s) Stormwater Solutions Team project.

OSU’s Rainstorming project provided assistance to small communities in coastal Oregon watersheds from 2003 to 2005. OSU partnered with DLCDC and the Department of Environmental Quality to assist with land use planning issues (for example, code review and stormwater management plans) and to facilitate LID stormwater demonstration projects in communities of fewer than 10,000. They found that overburdened local staff often did not have enough time to take advantage of additional resources when available. For example, if a half-time city planner had to find time to write a grant application to obtain assistance, the money would remain on the table. Likewise, local LID demonstration

projects were not likely to get off the ground unless the Rainstorming partners offered specific designs or examples for the target area, as these communities lacked the technical materials to design LID projects or even to set up a permit process favorable to them. They also found that local staff had limited capacity to effect code changes when model codes were suggested to them. In sum, the Rainstorming partners learned that to be successful in these circumstances, they had to provide practical, hands-on assistance and continue working with the staff on a step-by-step basis, from developing code changes to adopting them (Godwin 2005a). Because the speed of these local processes was slow in relation to the Rainstorming project’s timeline, the partners created a binder of reference materials before the two-year project ended (Godwin 2005b). The lessons learned from the Rainstorming efforts provided insight and served as a springboard to plan the scoping workshops discussed in this paper.

In the second project, the Oregon Environmental Council (OEC) is developing strategies to reduce stormwater impacts from Oregon’s urban areas. In a scoping process parallel to our own, OEC first con-

Moving from challenges to actions using a Logic Model framework

ducted a Web-based survey to better understand the barriers and challenges facing Oregon communities in reducing nonpoint source pollution and improving stormwater management. Their January 2007 survey of local government staff, homebuilders, developers, and stormwater practitioners in small and large Oregon cities yielded results very similar to our three scoping workshops. The 150 respondents identified the following challenges to adopting alternative stormwater management techniques:

- Obstacles embedded in codes and rules
- Insufficient government staff capacity and resources
- General resistance to change
- Concerns about maintaining LID facilities over time
- Concerns about the designs' applicability to all sites (for example, with limited space, on steep slopes, or specific substrates)
- Concerns about delays in designing and permitting these facilities, with possible financial consequences to developers

The specific survey results are included in the Stormwater Solutions Team's ensuing report (see Huntsinger 2007).

The scoping workshops and related efforts have identified target audiences, activities, and other types of assistance that would support adoption of low impact development in Oregon communities. Responding to such complex needs and issues effectively would require the partnership of many organizations. A tool becoming popular with University Extension services nationwide is the "logic model," which facilitates education programs with multiple team members (Figure 1). A logic model

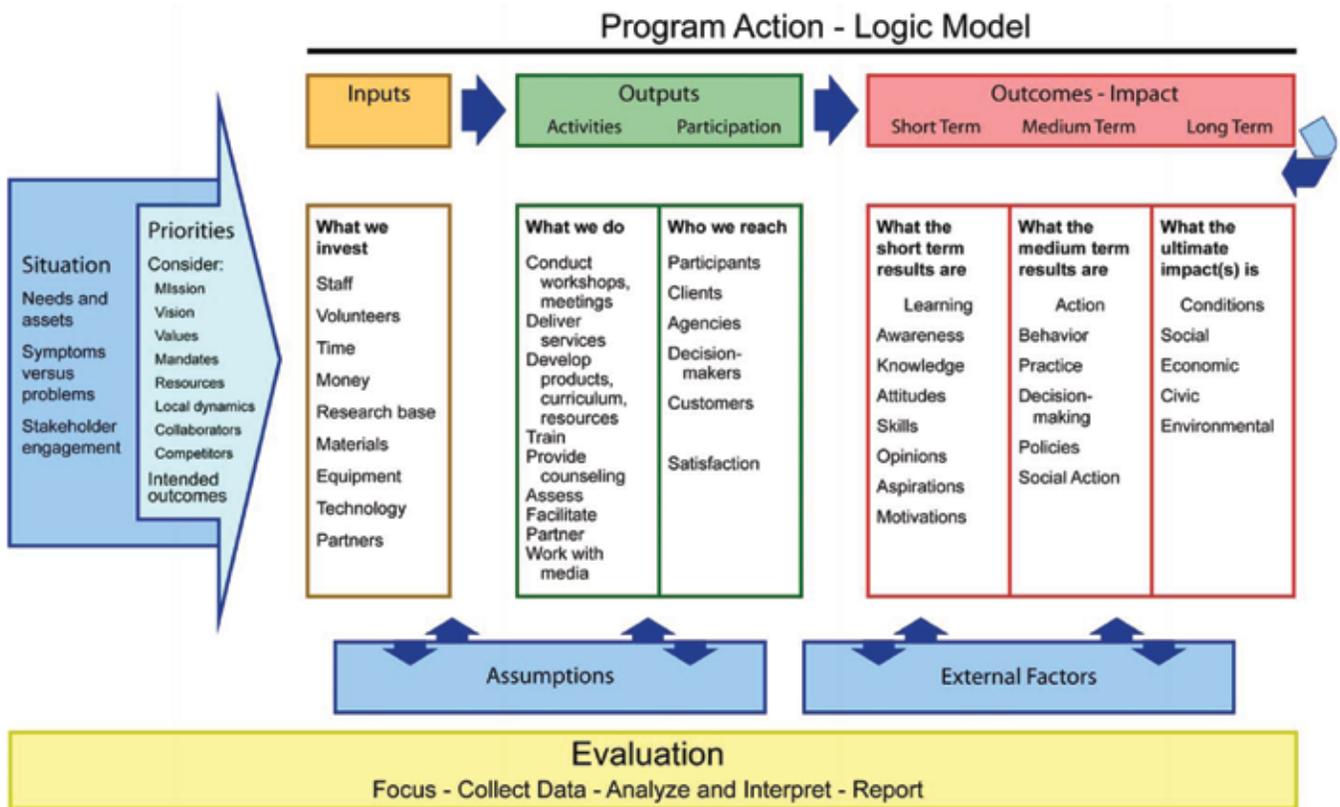
serves as a planning and evaluation tool. As a planning tool, it can help educators identify what they will put into a given program (inputs) and what they hope to do and whom they hope to reach (outputs). The model also identifies short-, medium-, and long-term outcomes for the program. As an evaluation tool, it can help educators see what and when to evaluate (Arnold 2002). We suggest using a logic model approach to plan and evaluate LID assistance to communities in Oregon.



Participants from throughout the Portland Metropolitan area participate in a workshop on low impact development sponsored by Oregon Sea Grant Extension and Metro.

PROGRAM DEVELOPMENT

Planning – Implementation – Evaluation



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Figure 1: Logic Model

STEP 1: DEFINE SITUATION AND IDENTIFY AND QUANTIFY INPUTS

Our scoping workshops provided many of the logic model components for delivering educational or technical assistance on stormwater management and LID (Figure 1). We gathered the background information necessary for defining the situation (barriers and issues) facing growing communities. The inputs, or programmatic investments, will need to be identified and quantified by each organization. As for funding, a variety of state and federal sources

are available to address stormwater and water quality issues. These funding opportunities are increased when organizations partner in development and delivery.

STEP 2: DESCRIBE OUTPUTS

Also compiled here is an extensive list of outputs, which the logic model divides into participants and activities. The participants, or target audiences, for the LID educational programming include these four categories: Land Use Planning Practitioners (for example, planning

department staff and consultants), Land Use Development Practitioners (for example, developers, builders, landscapers, engineers, architects, landscape architects, realtors, and the workforce), Decision Makers (for example, elected officials, stakeholders, planning groups), and Engaged Citizens (homebuyers, or people wanting to be a part of planning processes, to provide community leadership, or to conduct projects on their own property). Regardless of the categories used, it is important to characterize the

target audiences, assess how they are making decisions, and identify what to provide to best meet the desired outcome.

This report provides many suggestions for activities that could be provided to the target audiences. These range from providing technical assistance, such as GIS-based build-out scenarios in a forum setting, to opportunities that build leadership within citizen advisory committees, to facilitating demonstration projects. The activities should be creative and designed to resonate with the target audience. The trainers' background and experience are often important in ensuring that the audience is receptive. For example, consultants and building contractors with experience in implementing LID practices can be very effective in teaching their peers. We recommend employing a variety of learning styles to effectively reach audience members.

STEP 3: PROJECT OUTCOMES

The paper has not specifically discussed outcomes for the target audiences. However, the barriers and issues listed could be used in creating short-, medium-, and long-term outcomes. Here, "short-term outcomes" refers to an increase in learning, such as an elected official understanding the impacts of particular development practices on stormwater runoff. Medium-term outcomes are measured by actions, such as a citizen becoming involved in the land use planning process or building a rain garden on her or his property. In our application, it could include revisions to local codes. "Long-term outcomes" refers to changes in

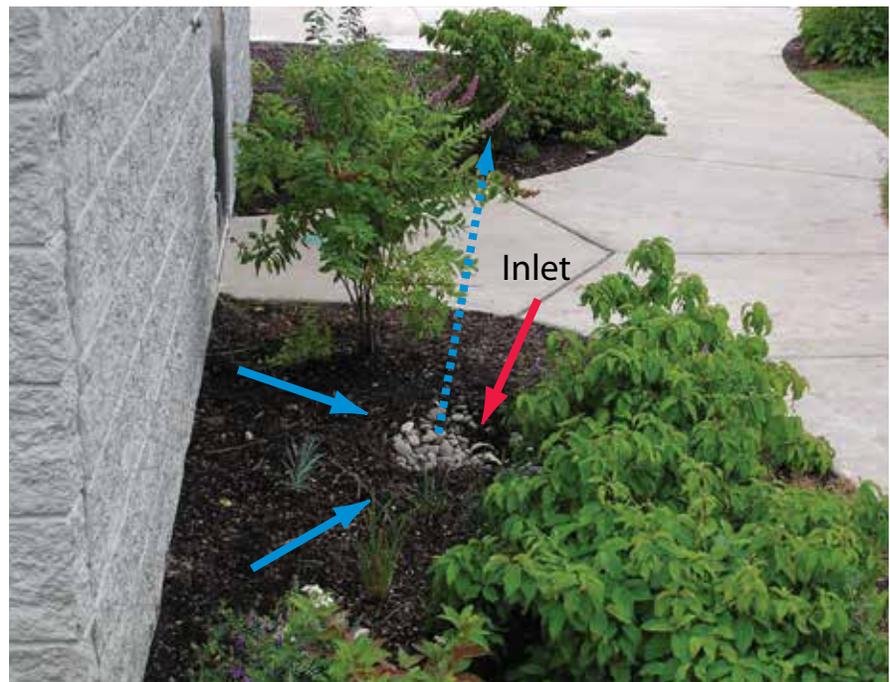
conditions, such as improved water quality or increased capacity in a planning department.

STEP 4: DESIGN EVALUATIONS TO MEASURE OUTCOMES

Program evaluation is too often overlooked and left out of the planning phase; however, this element is essential in measuring whether outcomes are achieved and whether and how the program delivery should be modified. It is also critical for obtaining and reporting accomplishments to funding agencies. Evaluation methods range from simple to complex, depending on the outcomes being measured, and several methods are often combined. For example, evaluations at the conclusion of trainings could measure program quality and increases in knowledge and skills, while follow-up surveys could be used to quantify how these were

applied in community activities. (Arnold 2002).

This report has highlighted the challenges facing many growing communities in Oregon, identified opportunities for Oregon Sea Grant and other organizations to engage a variety of target audiences toward meeting those challenges, and provided a framework in which to plan and evaluate these future programs. The issues facing rapidly growing communities are complex and will require the partnership of a broad group of organizations and engaged citizens. In the coming years, Oregon Sea Grant hopes to build the capacity and partnerships to deliver programs addressing stated needs. Meanwhile, the following section is provided as a basis for building interdisciplinary groups that link growing communities with stormwater and water quality solutions.



Building roof collection. Stormwater flows to inlets then to stormwater detention pond elsewhere on site. Photo: City of Grants Pass.

Suggested organizations for assistance

Oregon State University (OSU) Extension Service—
<http://extension.oregonstate.edu>

Oregon Sea Grant—
<http://seagrants.oregonstate.edu>

Oregon Department of Land Conservation and Development (DLCD)—www.lcd.state.or.us

- Transportation and Growth Management (TGM) program, in partnership with the Oregon Department of Transportation—www.lcd.state.or.us/LCD/TGM/index.shtml
- Resources for Stormwater Management Planning—[www.oregon.gov/LCD/OCMP/WatQual_Intro.shtml# Resources_for_Stormwater_Management_Planning](http://www.oregon.gov/LCD/OCMP/WatQual_Intro.shtml#Resources_for_Stormwater_Management_Planning)

Metro Regional Government—
www.metro-region.org

- Nature in Neighborhoods Program—www.metro-region.org/pssp.cfm?ProgServID=122
- Green Streets Program—www.metro-region.org/article.cfm?articleID=235

Rogue Valley Council of Governments (RVCOG)—
www.rvcog.org

Oregon Department of Environmental Quality (DEQ)—
www.oregon.gov/DEQ

Portland Bureau of Environmental Services (BES)—
www.portlandonline.com/bes

National NEMO Network—
<http://nemonet.uconn.edu>

Oregon Environmental Council—
www.oeconline.org/rivers

References

Arnold, Mary E. 2002. "Be 'Logical' about Program Evaluation: Begin with Learning Assessment." June 2002. *Journal of Extension* 40:3.

Brookings Oregon Area Information Web site. Accessed December 6, 2007. www.brookingsremax.com/brookings_oregon.php?action=page_display&PageID=5

City of Grants Pass Web site. Accessed December 6, 2007. www.grantspassoregon.gov/Index.aspx?page=329

Clackamas County Web site. Accessed December 6, 2007. www.co.clackamas.or.us/about.htm

Department of Land Conservation and Development, and Department of Environmental Quality. 2000. Water Quality Model Code and Guidebook. Also found online at www.paroleboard.state.or.us/LCD/OCMP/WQ_modelcode.shtml

Godwin, Derek. 2005a. *Rainstorming! Assisting Coastal Communities in Reducing Stormwater Runoff, Improving Water Quality, and Meeting Water Quality Standard*. Final Report from OSU Extension/OSU Sea Grant on DEQ Agreement No. 002-04.

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Godwin, Derek. 2005b. *Rainstorming! Water Quality and Information Guide*. Informational binder, a product of the final report from OSU Extension/OSU Sea Grant on DEQ Agreement No. 002-04.

Harper, Craig. September 25, 2007. Personal communication.

Huntsinger, Teresa. 2007. *Stormwater Solutions: Turning Oregon's Rain Back into a Resource*. Oregon Environmental Council. Portland, OR. www.oeconline.org/rivers

Liberty, Robert. 2006. "Introduction" at Metro Area Workshop on Low Impact Growth. May 23, 2006.

Metro Regional Government Web site. 2007. UGB definition may be found at www.metro-region.org/index.cfm/go/by.web/id=277; the Habitat Protection Model Ordinance at www.metro-region.org/index.cfm/go/by.web/id=15311

National NEMO Network Web site. 2006. <http://nemonet.uconn.edu>

Proehl, Risa S. 2007. "Population Estimates for Oregon, July 1, 2006." Portland State University, Population Research Center. www.pdx.edu/media/p/r/prc_2006_Population_Report.pdf

Puget Sound Action Team and Washington State University Pierce County Extension Service. 2005. *Low Impact Development Technical Guidance Manual for Puget Sound*. January 2005 (Revised May 2005). Publication No. PSAT 05-03. Olympia, WA.

Ross, Winston. 2004. "Coastal boom on the tide: Controversial 1,000-home development may be the first of three for Brookings." *The Register-Guard*, Eugene, OR. August 22, 2004.

University of Wisconsin Cooperative Extension. 2003. "Program Action—Logic Model." UWEX-Cooperative Extension, Program Development & Evaluation. www.uwex.edu/ces/pdande

U.S. Census 2000. www.census.gov

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