3.10 Summary of Current Status and Health of Oregon's Urban Ecosystems

James R. Pratt • Environmental Sciences and Resources, PSU.
Deborah Tolman • Department of Geography, PSU
Lynnae Sutton • Department of Geography, PSU
Bob Doppelt • Center for Watershed and Community Health, PSU

Report Card

- The annual rate of conversion of forest and farmlands to residential and urban uses has declined dramatically since comprehensive land use planning was implemented during the 1980s. Most of the current conversion is within specific Urban Growth Boundaries, designed to contain urban sprawl.
- Urban areas are working to better protect streamside habitat and enhance riparian corridors to allow fish passage along streams and rivers. Runoff from impervious surfaces drain oil and other pollutants into urban waters. With riparian edges reduced, there is very little buffering capacity left along most urban streams.
- Urban water quality is threatened by a variety of sources, especially nonpoint sources. Pollutants from urban areas include pesticides, fertilizers, other chemicals, runoff from roadways and parking lots, and sediments from soil erosion. Sewage overflows remain a problem, but may be significantly reduced over the next decade by infrastructure improvements in several cities.
- There have been significant improvements in Oregon's air quality during the past 15 years, with decreases in measured levels in ambient air of fine particles, ozone, sulfur and nitrogen dioxides, carbon monoxide and lead. However, Medford and Portland both have had concentrations of ozone above the standard for several days in recent years.
- Most of Oregon's solid waste is generated in urban areas, although the large majority of disposal takes place in rural areas.
- Urban areas include much of the state's contaminated land. The Portland metropolitan area contains approximately one-third of the known sites where land and affiliated groundwater are contaminated by spills and past practices (other than underground petroleum tanks). However, many of these urban sites are being restored and managed for beneficial reuse of the land.

Indicators

1. Percentage of assessed groundwater that meets the current drinking water standards
2. Frequency that the Air Quality Index exceeds the existing standards
3. The amount of carbon dioxide emitted
4. Trends in aggregate toxic and hazardous emissions
5. Trends in waste production compared to recovery

Introduction

Urban systems are a small part of the landscape; all of Oregon's urban areas (as defined by urban growth boundaries) occupy about 6% of the state's area. However, urban areas, while vitally important to the state's growing economy, have great potential to produce adverse environmental effects within their own boundaries and on the larger ecoregions and watersheds where they are located. Most of the state's human population live in just a few urban areas. Much of the energy consumption, materials use, waste generation and consumptive water use occurs in the state's urban areas, where most industrial production occurs and where transportation grids are used intensively.

This summary report provides a brief socioeconomic profile as well as an overview of environmental conditions and trends in six urban areas within Oregon:

1. Bend (East Cascades ecoregion)
2. Coos Bay (Coast Range ecoregion)
3. Eugene-Springfield (Willamette Valley ecoregion)
4. LaGrande (Blue Mountains ecoregion)
5. Medford (Klamath Mountains ecoregion)
6. Portland Metropolitan Area (Willamette Valley ecoregion)

The Science Panel could not assess the conditions of every Oregon community, so they chose to limit its focus to these communities because they represent different ecoregions, sizes, densities and socio-economics. All socioeconomic data were taken from the Oregon Employment Department's *Regional Economic Profiles 2000*.

We have grouped specific urban components into three sets of measures of ecological health: water quality, air quality, soil and groundwater contamination. Energy use and efficiency and waste generation and recovery are treated in a separate chapter. Several measures of urban ecological health were considered and developed through discussions with numerous individuals. We acknowledge that the list of measures is very limited and provides but a thumbnail sketch of the environmental conditions within each urban area. Each community may want to use the information provided here to initiate more in-depth assessments of the conditions of their environment and risks to the future health of their urban ecosystem.

Community Visioning: planning Oregon's future

With the assistance of the Oregon Visions Project, several Oregon communities have undertaken community visioning projects. Indeed, Oregon communities have a long tradition of planning for the future including Portland's Future Focus I and II, Bend's Your Community 2000, and the Coos Bay Area's Vision 2010. The authors acknowledge the important work done by these groups. However, this report does not attempt to summarize the results of these processes or how they compare to the conditions and trends found within the urban areas assessed. The authors do acknowledge the potential role that community visioning processes can play in shaping future environmental conditions of each community.

Urban ecosystems

The annual rate of conversion of forest and farmlands to residential and urban uses has declined dramatically since comprehensive land use planning was implemented during the 1980s. Most of the current conversion is within specific Urban Growth Boundaries, designed to contain urban sprawl. However, these laws were not written to address ecological issues, such as clean water or ecosystem function within urban boundaries. In order to meet the economic and social needs of humans, native vegetation and habitats in urban areas may be destroyed and converted to buildings and paved surfaces. The runoff from these impervious surfaces can drain oil and other pollutants into urban streams. With riparian edges reduced, there is very little buffering capacity left along most urban streams.

Urban areas are facing demands to better protect streamside habitat and enhance riparian corridors to allow fish passage along streams and rivers. A combination of healthy upland and aquatic habitats is needed to ensure healthy conditions for fish. Elevated water temperatures in many Oregon streams and rivers, including those in urban areas, will remain an important challenge - approximately 30% of assessed streams are warmer than the standard set to protect salmon.

Water quality is threatened by a variety of sources, especially nonpoint sources. Pollutants from urban areas include pesticides, fertilizers, other chemicals, runoff from roadways and parking lots, and sediments from soil erosion. Sewage overflows remain a problem, but may be significantly reduced over the next decade by infrastructure improvements in several cities. While wastewater flowing into municipal wastewater treatment plants has tripled since 1940 (primarily because of population growth), pollution loads from treatment plants have dropped 60% in this period. Obstructions in the natural drainage systems alter water quality and affect fish and other aquatic organisms. Overloading nature's capacity to assimilate pollution such as excessive sewage, storm water overflow, chemicals, and sedimentation all affect the health of aquatic ecosystems and may constitute human health hazards.

There have been significant improvements in Oregon's air quality during the past 15 years, with decreases in measured levels in ambient air of fine particles, ozone, sulfur and nitrogen dioxides, carbon monoxide and lead. Air quality moni-

toring shows all areas of the state in compliance with health-based National Ambient Air Quality Standards (NAAQS). The overall downward trends are in large part the result of reductions in wood stove use and open burning, and a higher proportion of newer and cleaner automobiles and trucks. However, population increases and higher vehicle miles traveled per person have the potential to reverse these favorable trends unless additional emission reductions are achieved, especially in some locations where pollutants accumulate, such as in the Columbia Gorge. Additional attention is also beginning to be paid to emissions and impacts of toxic air pollutants.

In 1998, Oregonians generated 4.3 million tons of municipal solid waste, of which 37% was recovered (recycled, composted or burned as fuel). The generation rate (disposal plus recovery) of municipal solid waste has risen 5.7% per year on average since 1992. Recovery rates have increased 11% per year on average, while disposal rates have increased 3.2% - twice the growth rate of Oregon's population. Most of Oregon's solid waste is generated in urban areas, though the large majority of disposal takes place in rural areas.

Urban regions include much of the state's contaminated land. The Portland metropolitan area contains approximately one-third of the known sites where land and affiliated groundwater are contaminated by spills and past practices (other than underground petroleum tanks). However, many of these urban sites are being restored and managed for beneficial reuse of the land. Key areas such as the lower Willamette River are receiving focused cleanup efforts.

There are no comprehensive data in Oregon from which to calculate the status of urban environments, although some cities collect these data. Therefore, indicators of urban health are not well developed, but might include the following:

- Amount of urban expansion into agricultural lands and other land cover types
- Amount of urban riparian area remaining intact and/or still providing hydrological and biological services
- Amount and configuration of habitat and green space remaining in the urban region

Indicators of ecosystem health

We assume that ecosystem health exists in urban areas when the urban ecosystem provides environmental goods and services that people desire and when requirements and overall goals of environmental laws are met. It is difficult to measure naturally functioning landscapes in urban areas because the density of development and landscape changes within urban growth boundaries have significantly reduced or eliminated much of the natural structure and functions.

Current indicators of environmental health focus on measures of water quality in the receiving streams, lakes and rivers. Other than in a few localities, data to evaluate these indicators are not available. In the future, urban health indicators could be expanded to address topics such as:

- Obstacles to free-flowing streams and rivers,
- Habitat quality of urban stream, lakes and rivers,
- Corridors among and configuration of urban habitats to allow movement of native plants and animals.

Water quality Good water quality is a basic environmental commodity, and fits the Science Panel's second perspective of ecological health. It is also essential to naturally functioning landscapes and meeting environmental laws. Poor water quality can have localized effects on drinking water, human health, recreational opportunities, aesthetics, biodiversity such as salmon, subsistence fishing by the poor, and economic development. Water quality problems generated within urban areas can also affect water bodies and biodiversity downstream. Similarly, problems created upstream may exacerbate water quality problems in low-lying urban areas. Typically, streams in Oregon's urban areas have water quality problems related to temperature and dissolved oxygen (warmer water contains less dissolved oxygen). Additionally, some streams are adversely affected by oxygen-demanding wastes (measured as BOD – biochemical oxygen demand) and by excess nutrients, usually phosphorous and forms of nitrogen. Some urban streams also have high levels of coliform bacteria that are indicative of contamination by sewage or animal wastes. Trends in statewide water quality are summarized in the Water Resources section of this Report.

Current water quality conditions for the six urban areas are summarized in Table 3.10-1. Based on four common sub-indices phosphorous (P), temperature, nitrogen (N) and dissolved oxygen (DO) and the use of three data sets, current water quality ranges from very poor to excellent. In general, nitrogen and dissolved oxygen levels were ranked good or better in the six urban areas while phosphorous and temperature were generally poor. On average, temperature ranked poor more frequently in Medford, Eugene, Bend, and La Grande; Coos Bay is incomplete. For Portland, temperature, nitrogen, and dissolved oxygen levels were ranked most frequently as good, while phosphorous was almost evenly split between poor and good rankings. It is noteworthy to mention that Fanno Creek in the Portland Urban Growth Boundary (UGB) reflects problems with phosphorus while temperature, nitrogen and dissolved oxygen rank good to fair, fair, and good to fair, respectively.

Convergence (C) and divergence (D) data are used to show compatibility among the different data sets in assessment of stream water quality for the six urban areas in Table 3.10-1. For example, if a majority of the agency-generated data sets agreed on the data reported then a C was assigned. An assign-

Table 3.10-1. Summary of Oregon's urban water quality based on the Oregon DEQ water quality index (WQI).

Table entries classify water quality based on the nutrients phosphorous (P), nitrogen (N), on temperature (T), and on dissolved oxygen (O); positive (+) or negative (-) signs indicate the trend in recent years (+ = improving, - = declining). Data concordnance is based on comparisons to EPA Basins data; "yes" means the data sets agree and "no" indicates differences in the data sets.

Table 3.10-1. Summary of Oregon's urban water quality based on the Oregon DEQ water quality index (WQI). Table entries indicate classify water quality based on the nutrients phosphorus (P), nitrogen (N), on temperature (T), and on dissolved oxygen((O); positive (+) or negative (-) signs indicate the trend recent years (+=improving, -=declining). Data condordance is based on comparisons to EPA Basins data; "yes" means the data sets agree and "no" indicates differences in the data sets.

City/site		Water quality good or better	Water quality fair or worse	Data Condordance
Portland				
	Willamette River	P N T O		No, temperature trend may be declining
	Columbia River	P N T O		Yes
	Sandy River	P N T O		Yes
	Clackamas River	T- N+ O-	P	No, temperature trend unclear
	Tualatin River	T+ N- O	P+	No, oxygen may be declining
Portland - East				
	Johnson Creek	T+ O	P N+	Yes
Portland - North				
	Columbia Slough	T	P N- O+	No, temperature, oxygen, nitrogren trends unclear
Portland - West				
	Beaverton Creek	P N T O		Yes
	Fanno Creek	O	P+ N T+	No, temperature trend unclear
Eugene				
	Willamette River	P N T O		No, phosphorus, temperature trends unclear
Medford				
	Bear Creek	N	P T- O	No, nitrogen, oxygen trends unclear
Coos Bay				
	South Fork Coos River	P N T O		Yes
Bend				
	Deschutes River	P N O	T	No, temperature trend unclear
LaGrande				
	Grand Ronde River	P N O	T	No, nitrogen may be poor