URBAN DWELLERS AND NEIGHBORHOOD NATURE: EXPLORING URBAN RESIDENTS' CONNECTION TO PLACE, COMMUNITY, AND ENVIRONMENT

by

SARAH P. CHURCH

BMUS, The University of Idaho, 1996
MUP, The University of Utah, 2007

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Abstract

Urban residents, in part due to issues of urban form and lifestyle choice, have become both physically and cognitively disconnected from the environment and natural processes – a disconnection that has contributed to decisions that have led to over consumption of natural resources and degradation of Earth. The form of the built environment has contributed to this separation, with city development embedded within infrastructures of concrete and pavement. Further, there is little attention paid to smaller scale integration of nature at the neighborhood level that might allow for frequent resident contact and activity.

Today, whether in growth or decline, cities are faced with regulatory obligations and crumbling infrastructure. These issues are compounded by the pressing need to address sustainable development and resilience in the face of uncertainty around climate change and the need for reduced oil use. Incremental urban restructuring of neighborhoods through planning and designing to the specifics of local ecology (place-based design) has the potential to restore a balance between urban areas and natural systems. I therefore studied how urban residents perceive and interact with these systems in order to answer the question: How does active involvement in Portland’s Tabor to the River watershed health program foster place-based awareness and environmental learning?

This dissertation is an exploratory qualitative case study undertaken in Portland, Oregon in which I conducted 42 semi-structured interviews of community members and 14 experts. I explored how urban nature and sustainable stormwater infrastructure in the city is seen, perceived, and experienced by urban residents, and how these perceptions influence a human connection to nature and local environmental knowledge. My analysis found that in order to address a human connection to nature and influence environmental learning, the following aspects of urban retrofit should be considered: 1) Integrate a foundation of nature in the city for everyday life; 2) Incorporate multiple scales and types of nature for multiple experiences; 3) Ensure access to nature through walking and cycling; 4) Provide opportunities for hands on work in nature and personal control of space.
Preface

This dissertation is original, unpublished, independent work by the author, Sarah P. Church. The study was approved by the University of British Columbia Behavioural Research Ethics Board, Certificate number H11-01204.
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<td>PWMP</td>
<td>Portland Watershed Management Plan</td>
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<td>T2R</td>
<td>Tabor to the River</td>
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Glossary

**Bureau of Environmental Services**
The Bureau of Environmental Services is responsible for protecting water quality, watershed planning, wastewater collection and treatment, and stormwater management in Portland, Oregon. This Bureau administers the Portland Watershed Management Plan and the Tabor to the River Program.

**“Big Pipe”**
The “Big Pipe” project refers to a six-mile long, 22-foot diameter tunnel that was constructed to collect sewage from the east side of Portland. Construction was completed in the summer of 2011.

**Bioregional urbanism**
Bioregional urbanism is an approach to planning that would contribute to a gradual transition to bioregional ideals in urban areas. This approach would incrementally change the built environment over time through the incorporation of urban nature and natural systems. These changes would occur with concurrent efforts that provide opportunities for active involvement of citizens in urban nature.

**Bioswale**
A bioswale is a stormwater management facility that uses soils and plants to filter pollution from stormwater runoff. See also, [Green Street](#).

**Ecological design**
In existing cities, ecological design would entail the restoration or reconstruction of natural systems based upon, and supplementing, local ecology. The retrofit of communities would be informed by the community’s bioregion and would incorporate ecological and resilient urban design principles that reflect the city as part of rather than separate from larger ecosystems. Urban form would be dictated by its relationship to the sun, the soil, and to water, and would, in turn, restore and then maintain the ecology of the city’s bioregion.

**Foot patrol**
See [Friends of Mount Tabor Park](#).

**Friends of Mount Tabor Park**
The Friends of Mount Tabor Park (FMTP) is a non-profit organization that helps maintain, improve, and monitor Mount Tabor Park. There are two regular groups associated with FMTP, the Foot Patrol (an authoritative-type presence in the park who picks up garbage and answers park users’ questions) and the Weed Warriors (volunteers who restore the park’s health through invasive plant removal).
French drain
A French drain is a trench that is either covered with gravel or rock or a trench that contains a perforated pipe. The trench redirects water from where it is unwanted.

Green Street
Green Streets are a term the City of Portland uses to label stormwater infiltration facilities that are incorporated as part of the streetscape. They are located between the sidewalk and the street. Green Streets are lined with planted edges that are deliberately designed to gather, filter and percolate water into the ground. In essence they are planters with design specifications that allow for the capture and infiltration of stormwater runoff.

Meaningful nature
I use the term “meaningful nature” to categorize places participants spoke of in a way that imparted emotion and feelings of attachment to particular natural areas. They used words such as “love”, “sacred”, “need”, “respite”, and “calm” to describe these places. Many also described natural areas in the context of meaningful activities such as family picnics, solitary walks, or as part of a daily routine, etc.

Nearby nature
Nearby nature is a term I use to describe nature that is close to homes and work; nature with which urban residents have the potential for daily interaction. Nearby nature could occur at any scale, but small-scale nature, integrated into the urban fabric, has more potential for daily interaction than neighborhood parks or large natural areas.

Life place
In a life-place, people would dwell and inhabit communities for the long-term in order to cultivate understanding, rootedness, and caring of the region, its people, and the environment.

Living well in place
Living well in place means to live with respect for the environment and all life. It would entail being a steward of, and participant in, one’s bioregion and community.

Place-based awareness
People who have place-based awareness would have a basic understanding of the local environment and ecology, and the human impact on the local environment.
Place-based cities
In a place-based city, urban form would be dictated by its relationship to the sun, the soil, and to water (see place-based planning and design). In turn a place-based city would restore, and then maintain, the ecology of the city’s bioregion. Moreover, place-based cities would cultivate opportunities for urban ecological stewardship, and maintain a context of environmental dialogue and education.

Place-based ethic
An understanding of local ecology and where basic resources come from, with subsequent behaviors that do not contribute to continued environmental degradation.

Place-based planning and design
This concept is related to ecological design, which would entail the restoration or reconstruction of natural systems based upon, and supplementing, local ecology. In place-based planning and design, local ecological processes would be brought to the forefront of community design priorities. Design solutions would tend be visible and a defining part of the urban landscape, rather than being buried or placed far away from the end use.

Portland lifestyle
This is largely a concept within in popular culture, but it has roots in the reality of the culture of the city. A “Portland” lifestyle could include a passion for things like, coffee, backyard chickens, organic and local food, cycling, outdoor recreation, light rail, streetcars, walkable neighborhoods, etc.

Rain garden
I define rain gardens as being larger in scale, with less concrete, than Green Streets. They are garden-like natural areas implemented on private and public property. Like Green Streets, they are designed to divert and infiltrate stormwater runoff from the streets and the stormwater system. Unlike Green Streets, they do not incorporate curbs into their design.

Reinhabitation
Citizens would learn (or relearn) the ecological relationships of their and participate in the social and culture life of the region.

Subwatershed
Subwatersheds are small watersheds within a larger watershed that eventually discharge into a single stream.
Sustainable stormwater management facility
A sustainable stormwater facility is a term used by the City of Portland to identify a stormwater management strategy that utilizes natural systems rather than pipes. The term encompasses infrastructure such as bioswales, rain gardens, and eco roofs.

Tabor to the River (T2R)
The Tabor to the River program addresses sewer pipe overcapacity in T2R neighborhoods. The program seeks to reduce basement sewer backups while also reducing combined sewer overflows that pollute the Willamette River. Guided by the Portland Watershed Management Plan, T2R uses an integrated stormwater management and watershed health approach that focuses on sustainable stormwater infrastructure. Moreover, it includes community partnerships as a key component of the overall program.

Watershed
“A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place” (EPA).

Weed Warriors
See Friends of Mount Tabor Park.
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Utopian thinking has always existed. It seems that each new generation puts forth an approach to planning and design that is believed to be the answer for the ills of society.\footnote{For example: Owen’s Communitarianism around 1825, Howard’s Garden City in 1898, the City Beautiful Movement in the 1890’s and 1900’s, Mumford’s Regionalism in the 1920’s, Le Corbusier’s Radiant City in 1924, Wright’s Broadacre City in 1932, urban renewal projects like those of Robert Moses in the mid-1900’s and the backlash of urban renewal championed by Jane Jacobs in the 1960’s, the back-to-the-land movement in the 1970’s, and New Urbanism and Smart Growth today.} The impetus for my work admittedly stems from such idealism, though it is an idealism that has been frustrated by continued environmental degradation of this earth, whose healing is stalled and rolling backward. The interconnectedness of humans and the ecology of the earth are inextricable, and yet many of us do not see or care to see these connections and how our very future is at stake. Through my studies, I began to see bioregional philosophy as one way of thinking that might readjust the human relationship to Earth. Bioregional thinking is utopian thinking. It began long ago as a solution to multiple ills from the filth of the 19th century city, to an answer for problems that come with globalism, peak oil, and climate change in the 20th and 21st centuries. Bioregional philosophy addresses the current consumptive ways of life exhibited in much of the developed world today. It attempts to refocus daily lives and livelihoods to concentrate on living well in place. It encompasses everything from political boundaries, to currency, and the food that is eaten, to the way citizens participate in democracy.

I found great appeal in this approach. Yet as something of a pragmatist, I felt that bioregionalism is such a radical concept that it really never could be implemented in its full ideal; at least not all at once. And so, with the help of my committee, I came to consider how a societal change in worldview might shift our culture into one that values the earth and the human place in this web of life, and act as individuals and policy makers, accordingly. Instead of focusing upon one perceived solution to resource consumption (e.g., decentralized energy production and distribution), or looking at the potential for implementing bioregionalism in its fullest form, I determined to explore a more incremental approach to bioregionalism, and one which might get to the root of consumptive behavior. I therefore sought to explore how humans might connect to nature through changes in urban form along with participation in nature and
community. I sought to explore how bioregionalism might incrementally contribute to a shift in worldview. How might humans become more connected to life sustaining processes? How might such connections be cultivated in urban design? How might stewardship of such processes cultivate an environmental ethic? Would an environmental, or place-based, ethic change attitudes toward consumption of resources and the value placed on resource extraction and the waste generated from resource consumption?

In the broadest sense, my research aspires to influence a transition to a sustainable and resilient society. My work focuses on scalar connections and human perceptions across scales, from the individual to the community and from the parcel to the globe. I explore incremental urban restructuring that would restore a balance between urban areas and natural systems by reconsidering current patterns of neighborhood development and the public’s relationship to urban greenspace that perpetuate the separation of human and natural systems. The methods and literature of the social sciences offer an avenue for the exploration of the complex relationships between the built environment, nature, and humans. The human dimensions of nature and natural resources and human experience in nature of multiple scales and levels of engagement are important considerations for the future of communities.

Ultimately, through this research, I seek to inform policy at the municipal or regional level. I would like to influence decision making and urban planning decisions that will shape the incremental changes necessary for creating livable, sustainable, and resilient cities while also influencing the broader public’s perceptions of nature, natural systems, and individual and societal consumption patterns. The results of my research inform the retrofit of urban areas toward softer infrastructure solutions, human dimensions of urban nature, and the implementation of opportunities that might foster neighborhood-oriented stewardship.
Chapter 1 Introduction

1.1 Problem statement

Urban residents in the developed world have become both physically and cognitively disconnected from the environment and natural processes, arising in part as a result of issues of urban form and lifestyle choice (Hester 2006; Orr 1992; Shove 2003). This physical separation of human and natural systems has sheltered urban residents from the consequences of their behavior on the environment, with a subsequent lack of general environmental knowledge and understanding of Earth’s life sustaining processes (Hester 2006; Hough 2004; Orr 1992). This disconnection has been put forth as a contributor to societal attitudes that have led to over consumption of natural resources and degradation of the Earth (Carr 2004; Rees and Wackernagel 1996; Speth 2004). The very form of the built environment has contributed to this separation. City development is embedded in infrastructures of concrete and pavement (Hough 2004; Shove 2003). There is little attention paid to smaller scale integration of nature and nature activities at the neighborhood and community level that might allow for frequent contact between humans and other species, and subsequent environmental learning and community building (Beatley 2011; Hough 2004; Newman and Dale 2009).

Today, whether in growth or decline, cities are faced with regulatory obligations and crumbling infrastructure. These issues are compounded by the pressing need to address sustainable development and resilience in the face of uncertainty around climate change and the need for reduced oil use. Incremental urban restructuring of neighborhoods through planning and designing to the specifics of local ecology (place-based design) has the potential to restore a balance between urban areas and natural systems. Such planning and design would reconsider current patterns of neighborhood development and the public’s relationship to urban greenspace that perpetuate the separation of human and natural systems.

Integrating nature and natural systems into the built environment while concurrently fostering active citizen participation in those and other natural systems has the potential to bring about environmental awareness and community identity. This in turn might
contribute to an overall environmental ethic, where people would understand local ecology and behave in ways that do not contribute to environmental degradation. Such an ethic might ultimately lead to sustainable and resilient patterns of urban living. A number of theoretical constructs provide frameworks for cultivating an environmental ethic, including environmental education (Orr 1992; Hester 2006; Wals 2007), experience in nature (Degenhardt 2002; Barlett 2005; Gobster and Hull 2000), active community engagement (Agyeman and Angus 2003; Brulle 2000; Light 2003), and ecological urban design (Newman and Jennings 2008; Beatley 2004; Hester 2006).

Ecological, or place-based, urban planning and design would entail the restoration or reconstruction of natural systems in urban areas. Such design would be based upon, and would supplement, local ecology. It would also entail the active engagement of citizens. For example, McGinnis et al. (1999), like others, write of restoring the human connection to natural systems (Light 2010; Jordan III 2000) but they emphasize the act of restoration as key to the restoration not only of the land but of a human-environment connection. Hands-on activity as a means for gaining local environmental knowledge plays an important part in the development of an environmental ethic (Thayer 2003; Hester 2006; Glasser 2007; Orr 1994). This is supported by experiential learning theory that emphasizes thinking and doing as a means to solidify learning (Kolb 1984; Schön 1984). Passive aspects of learning are also significant, such as the opportunity for reflection between observation and experience that may have a transformative effect on a person’s assumptions or worldviews (Loeber et al. 2007; Mezirow 2009), and the simple act of reading or attending a lecture (Glasser 2007). Further, the importance of the social aspects of daily life and the importance of community cohesion (Cantrill and Senecah 2001; Uzzell, Pol, and Badenas 2002) and public discourse should not be ignored when considering the development of sense-of-place. Thus, retrofitting cities through the integration of natural systems can be seen as a way to restore a balance between the urban and natural environment, which also has the potential to shape the broader public’s perceptions of nature, natural systems, and individual and societal consumption patterns (Thayer 2003; Hester 2006).
Some cities have attempted to restore balance to urban areas and natural systems through restoration of strategically located pieces of urban natural systems by way of projects such as habitat restoration and reestablishment (Rain Coast Applied Ecology; Tjallingii 2000; Coates and Regnier 2009; City of Vancouver 2010) and creek daylighting (Resh 2000; Rosenberg 1996). However, these projects have been undertaken primarily for reasons specific to habitat restoration goals or stormwater management strategies (Bolund and Hunhammar 1999; Moran 2007; Aronson, Milton, and Blignaut 2007; Dietz 2007), with little consideration to the potential benefits of the social aspects of restoration (Mozingo 2005). One such benefit of these types of projects may be found in environmental stewardship activities that contribute to building human connections with nature, which subsequently facilitate increased understanding of natural systems, environmental values, and environmentally responsible behavior (Light 2000; Hartig, Kaiser, and Bowler 2001; Jordan III 2003; Thayer 2003; Hester 2006). This literature on ecological stewardship also suggests that such activities can cultivate stronger place attachment and local environmental knowledge, both of which are cited as two key components in sustainable urban development (Orr 1992; Thayer 2003; Beatley 2004; Hester 2006).

Beyond the scope of capital improvements and regulations, retrofitting the pattern of neighborhood development through the implementation of “green infrastructure” like sustainable stormwater management facilities (e.g., bioswales) is a planning and design strategy that reflects local ecology. A “green infrastructure” strategy also addresses sustainability and resilience. This is achieved through a decentralized and local rather than centralized approach to urban planning and design (Novotny, Ahern, and Brown 2010; Newman and Jennings 2008), through increased biodiversity due to expanded habitat (Beatley 2011; Ignatieva 2010), through reduced stormwater runoff (NRDC 2011; City of Portland 2010), and through the contribution to groundwater recharge and the water cycle as a whole (Girling and Kellett 2005; WAS 2010). There are also potential added social benefits of these more visible and natural systems that may contribute to long-term societal sustainability (e.g., increased experience with nature and the cultivation of place-based awareness through visible natural systems). Thus it is important to study how urban residents perceive and interact with these systems in order
to determine the potential ways urban nature in multiple forms may provide for environmental learning as well as urban retrofit.

1.2 Literature gaps

The benefits of integrating urban and natural systems has been well documented (McHarg 1969; Beatley 2000; Hough 2004; Girling and Kellett 2005; Newman and Jennings 2008), as have the emotional and health benefits of passive and active experience in nature (Kaplan 1995; Kuo et al. 1998; Kaplan 2001; Chiesura 2004; Louv 2005; Thwaites, Helleur, and Simkins 2005; Beatley 2011). A modest body of research exists which delves into the benefits of environmental stewardship activities to individuals (Gobster and Hull 2000; Carr 2002; Kaplan and Kaplan 2005; Ryan 2005; Barlett 2005). There are a few studies that specifically analyze the effect of environmental stewardship activities on place attachment (Gooch 2003; Kaplan and Kaplan 2005; Ryan 2005). These studies are important in documenting the relationship between environmental stewardship and place attachment, as place attachment is seen to be one precursor for environmentally responsible behavior (Vaske and Kobrin 2001; Thayer 2003; Beatley 2004; Uhl 2004). In order to test this relationship, some researchers have investigated how place attachment affects the potential for environmentally responsible attitudes and behavior (Hartig, Kaiser, and Bowler 2001; Vaske and Kobrin 2001; Ryan 2005; Ryan and Grese 2005). Others have begun to look at human perceptions and feelings of connectedness with urban nature (Vining, Merrick, and Price 2008; Chiesura 2004) that might contribute to human health but also might ultimately contribute to place attachment and environmentally responsible behavior.

Less attention has been paid to the personal impact of experience in nature and environmental stewardship activities on environmental knowledge or lifestyle choice (Chawla 1998, 1999; Hartig, Kaiser, and Bowler 2001; Degenhardt 2002), or the process through which environmental stewardship activities constitute environmental learning. A review of the literature reveals that there is a deficit of empirical research documenting the mechanisms that encompass informal individual environmental learning processes. Although there is a body of research that examines the role of environmental stewardship activities in facilitating general environmental knowledge, beliefs, values, and
assumptions, this research largely ignores individual experiences, nuances of individual lives, and a deeper understanding of the transformative potential of experiential environmental learning.

Further, the context for much of the literature exploring issues of nature, place attachment, and environmental attitudes is situated in natural areas located outside of urban areas (Gobster and Hull 2000; Cantrill and Senecah 2001; Hartig, Kaiser, and Bowler 2001; Vaske and Kobrin 2001; Gilbert, Sandberg, and Wekerle 2009). The context of urban environmental stewardship research is insufficient in light of increased growth of cities. Research that has been undertaken in the urban context tends to investigate the benefits of environmental stewardship activities in urban community gardens (Kaplan and Kaplan 2005; Krasny and Tidball 2009) and larger urban ecological restoration projects (Cairns and Palmer 1995; Mozingo 2005; Ryan and Grese 2005). The predominance of the community garden context and large ecological restoration project research has left a significant gap in the literature. In addition, stormwater management in particular has been traditionally bounded by scientifically based goals like water quality and habitat restoration (Bolund and Hunhammar 1999; Moran 2007; Aronson, Milton, and Blignaut 2007; Dietz 2007). While there are some studies that look at the benefits (or challenges) of community watershed management and stewardship (Chanse 2011; Shandas and Messer 2008; Rhoads et al. 1999; Welsch and Heying 1999), the social benefits of urban sustainable stormwater management solutions like bioswales and rain gardens have had less study (Dill et al. 2010; Apostolaki, Jefferies, and Wild 2005; Shandas et al. 2010; Shandas, Steele, and Nelson 2012).

The human-dimensions of smaller instances of urban nature and a broader definition of environmental stewardship activities have thus far been ignored. These areas may represent opportunities for increasing access to the benefits of interactions with nature to a far greater number of urban residents than has been traditionally considered. This research project emerged from the issues laid out in the problem statement as well as the gaps identified in the literature.
1.3 Statement of purpose
The purpose of this study was to explore the relationship between community involvement in urban nature and sustainable stormwater infrastructure, and urban residents’ environmental awareness and perceptions of relationships to place, to community, and to the environment. I undertook this exploration through the investigation of neighborhood and community engagement in urban nature and sustainable stormwater infrastructure. These projects were integrated into the physical (natural and built) environment, and many were part of the City of Portland’s Tabor to the River watershed health program. I examined urban nature and sustainable stormwater infrastructure that ranged in spatial scale, and levels and types of involvement. I sought to discover individual environmental learning processes and whether involvement with small-scale urban environments contributed to general environmental knowledge, a stewardship ethic, and a broader sense of self in relationship to place, community, and environment. I asked how changes to the built environment might contribute to awareness of the connections between humans, nature, and the environment; and further, how active involvement in “nature activities” might deepen this connection. I sought to discover whether integrating nature and natural systems into the built environment while allowing for active participation in those and other natural systems, could influence urban residents’ environmental learning and awareness.

1.4 Research questions
This study was conducted with the following overarching research question as a foundation of inquiry:

How does active involvement in Portland’s Tabor to the River watershed health program foster place-based awareness and environmental learning?

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2 I use the term “nature activities” to encompass a broad range of activities in nature from sitting on a bench and looking at a tree, to pulling ivy in a forest. The term reflects the importance of experience in nature in cultivating an environmental, place-based ethic.
This study was guided by the following sub questions:

1. How does the scale of nature and natural systems influence place-based awareness and environmental learning?

2. How does proximity to nature and natural systems influence place-based awareness and environmental learning?

3. What contextual elements facilitate place-based awareness and environmental learning?

1.5 Defining the researcher bias

I come at this work with concern over environmental degradation, dwindling supplies of oil, and the implications and consequences of climate change. These concerns have prompted me to join many other scholars who seek to influence a transition to a sustainable and resilient society. I conducted interviews by asking open-ended, non-leading, and non-prompting questions in order to gather initial thoughts and opinions of research participants. By using inductive analysis in the initial examination of my data, my inquiry followed the same open and non-leading trajectory. My findings did not necessarily match my expectations, instead revealing the complexity and nuances of each person’s world view, actions, and interactions with the built environment. My project was successful in gathering rich, interesting, and informative data, with a research approach which will allow for subsequent studies in differing contexts and populations.

1.6 Structure of this dissertation

In Chapter 2, I describe the theoretical framework for this dissertation based upon bioregional philosophy, ecological urban design literature, and behavior and social change theories. In Chapter 3, I give the context of this study, Portland, Oregon and the Tabor to the River program and neighborhoods. Chapter 4 describes the research design, data collection methods and procedures, and research analysis and data validation procedures I used for this study. This chapter also includes a profile of the people who participated in this study, as their demographics were a major contextual element of the research findings. I also include a discussion on the limitations of the research and my own reflections on the process as a whole. I conclude this chapter by presenting two
versions of the bioregional urbanism model: one as conceptualized by theory and another that reflects the results of the research I present in this manuscript.

I then follow with two findings chapters. Each of these chapters follows a similar outline. I first explore general attitudes toward nature and natural systems. I delve into how nature might be defined, how scale and proximity influence perceptions of nature and local environmental awareness, and how level of engagement effects local environmental learning. I then look at the influence of proximity and level of engagement to perceptions of nature and natural systems. In Chapter 5, I present the first set of findings. I explore nature in the city in general, larger scale nature, and natural areas that participants described as nearby and meaningful. In Chapter 6, I look at bioswales and rain gardens as small-scale nature.

Lastly, in Chapter 7 I offer a discussion on the overarching findings found in Chapters 5 and 6, and specifically reflect upon multiple scales of nature and neighborhood-oriented stewardship. I conclude with implications for policy and future research.
Chapter 2 Theoretical framework

Bioregional urbanism
An incremental approach to sustainable urban retrofit

In this study, I use bioregional philosophy to develop a framework for examining Portland residents’ connection to nature, their development of place-based awareness, and their processes of environmental learning. Bioregional philosophy addresses both social and physical aspects of the human relationship to the environment. Behavioral change and ecological planning literatures complement this philosophy. I utilize bioregional philosophy and these related literatures to posit a place-based method of urban planning and design that would apply aspects of bioregionalism in urban areas. Bioregionalism aspires to reconnect humans and nature in order to ultimately advance a more sustainable and resilient society. I propose that an incremental approach to bioregionalism, which I term bioregional urbanism, can contribute to a gradual transition to bioregional ideals in urban areas. This transition would encompass a deep connection to urban residents’ local region through meaningful attachment, understanding, and identity with the local community, environment, and the larger systems in which the local sits. Bioregional urbanism would facilitate this transition through incremental changes to the built environment over time, with concurrent efforts that provide opportunities for active involvement of citizens in urban nature.

In this chapter I provide my synthesis of bioregional philosophy and supporting literatures. I then assemble these ideas into a model of bioregional urbanism which proposes an incremental approach toward a transition to a new way for people to live and connect with nature. In section 2.1, I offer my synthesis of bioregional philosophy as well as supporting literatures. In Section 2.1.1, I give an overview of the forerunners of the bioregional philosophy. Then, in Section 2.1.2, I transition from these forerunners to describe the current trajectory of the bioregional movement, beginning in the 1970’s. In Section 2.1.3, I discuss related literature that deals with sustainable land use and urban form based upon local ecology. These literatures focus on the integration of nature and natural systems into urban areas: ecological design and “greening” the city. In Section 2.1.4, I explain the importance of “place” and living well in place, in relation to
sustainable urban development. This concept of “place”, which encompasses both the physical and social realms, is a crucial aspect of bioregional philosophy. Next, in Section 2.2, I introduce literatures which deal with processes of change. In Section 2.3, I present principles of bioregional urbanism that I developed through a distillation of the literatures discussed in Sections 2.1 and 2.2. In Section 2.4, I revisit issues of boundaries and scale in bioregional philosophy in order to introduce one way of conceiving natural boundaries in urban areas. In Section 2.5, I introduce my bioregional urbanism model, which I have developed through the synthesis of the literatures described in this chapter. Then, in Section 2.6 I highlight key critiques on bioregional philosophy and describe alternatives to a bioregional approach to urban planning and design. In Section 2.7, I conclude with a discussion on how this model might be used in research and practice.

2.1 Bioregionalism

Bioregional philosophy is a multifaceted approach to human connection with the land, with other humans, and with non-human beings. It seeks to create and sustain communities of stewards that are intrinsically part of their local land. Bioregional philosophy entails a holistic view of complex systems that include aspects of social, political, economic, ecological, environmental, physical, spatial, and spiritual realms. It suggests that sustainability can be achieved through promoting active participation and collaboration in creating sense of place, the understanding of place, and the culture and politics of place. This would be accomplished through changes in urban form that respond, restore, and maintain local ecology, and through local residents committing holistically to the local environment and community (Beatley 2004; Carr 2004; Hester 2006; Newman and Jennings 2008; Thayer 2003). At its core, bioregional philosophy attempts to strengthen the human relationship to nature and the environment. An urban rendition of this philosophy includes the localization of human interactions to nature and the visible and functional celebration of those interactions. Food production, energy production, rain-water harvesting, waste water filtration, waste assimilation, and nutrient recycling would be integrated into local urban infrastructure.
2.1.1 Forerunners to bioregionalism

Bioregional philosophy of today is, in part, a reaction in opposition to globalization and capitalism which are thought to contribute to the creation of generic, highly consumptive human settlements, with a poor regard for environmental consequences. Industrialization and rapid urban growth caused similar concerns in the early 1900’s. Forerunners to bioregional philosophy worked toward alleviating the ills perceived to be caused by industrialization. Many of the ideas put forth by Patrick Geddes, Lewis Mumford, Benton MacKaye, and then advocated by the Regional Planning Association of America, can be seen in aspects of bioregional thinking today.

Regional planning in the 1920’s was a reaction to at least two concerns. One concern was the perceived transformation of rural based communities to generic and overcrowded cities cut off from the natural world (Weaver 1984; Mumford 1938, 1961; MacKay 1928). A related concern was the rapid urbanization of large metropolitan areas as urban residents sought housing away from the industrial core and rural residents relocated from the countryside in order to work in the city (Anderson 2002; MacKay 1928; Mumford 1938, 1961). Like we see today, cities spread into the countryside, building over the landscapes that had provided the city with the raw materials for sustenance as well as access to nature. Regionalists like Geddes and Mumford saw the city as connected to the countryside both physically and culturally. The landscape of the countryside surrounding the city was not simply a backdrop for life; it was integral to it. The landscape provided natural resources for production and consumption, provided both rural and urban people with meaningful work, and provided urban residents a way to connect with nature and the sources of their sustenance and with those who worked the land (McTavack 1993; Welter 2002; Mumford 1938, 1961; Luccarelli 1995; Geddes 1915).

Thus, urbanization was seen as instrumental in disconnecting urban dwellers from the local land and the larger regional community, while creating faceless cities that lacked character, regional distinctiveness, and opportunities for reprieve in nature. This is not to say that regionalists did not believe in cities. In fact, Geddes, Mumford, and MacKaye were city enthusiasts. They thought the city played a vital cultural role in the life of the regional community (Welter 2002; MacKaye 1928; Mumford 1961). However, they did
not agree with unbridled and uncontrolled urban expansion. Overall, their concern was 
over quality of life. Industrialization had created sprawling, dull cities, with citizens who 
had decreased access to and understanding of the surrounding working and wild 
landscapes (Mumford 1961; Geddes 1915). Therefore, regionalist visionaries of this time 
sought to replan regions in order to increase quality of life for the entire regional 
community, while also providing urban residents opportunities to connect with nature 
(MacKaye 1928).

The regionalist solution to industrial urban expansion was part regional restructuring\(^3\) 
and part civic education. Geddes and Mumford took care to write about the history of 
cities, noting that ancient cities were established in places that could supply everyday 
needs such as fresh water and food. They posited that these cities were successful because 
they had not grown past their natural boundaries (Geddes 1915; Mumford 1961; Welter 
2002); rather, new cities were developed to accommodate population growth (Mumford 
1961). Geddes, Mumford, and MacKaye saw merit in ancient ways, and thus, primarily in 
order to contain urban sprawl, each advocated for such naturally bounded regions 
(Anderson 2002; MacKaye 1928; Welter 2002). Mumford and MacKaye encouraged the 
preservation of working landscapes (e.g., farmland) and wild natural areas. They felt that 
by preserving the countryside, cities and their residents could rely upon continued 
sustenance from local raw materials and related jobs. At the same time, this would 
provide a larger cultural connection between settlements in the region and citizens’ easy 
access to the countryside (Mumford 1961; MacKaye 1928). In order to contain the spread 
of cities, MacKaye’s vision of regional restructuring relied on conservation and 
preservation of natural boundaries within locally managed watersheds (Anderson 2002; 
MacKaye 1928). Further, he saw the potential in preserving working and wild landscapes 
as corridors that would also serve as regional connectors (MacKaye 1928; Anderson 
2002).

\(^3\) Regionalist visions for regional restructuring were inspired by utopian ideals such as Kropotkin’s 
industrial village (1909) and Howard’s Garden City (1902). Kropotkin and Howard, in their different ways, 
avowed for decentralized and reasonably sized, self-sufficient, communities. In contrast to self-sufficient 
communities, Geddes’ vision for regional restructuring embraced the metropolitan core. He had a vision of 
region-city “conurbations”, which Welker (2002) states were likely inspired by Reclus (1895). A 
conurbation was a network of human settlements of various sizes within a naturally bounded region, yet 
with the original large metropolitan area as the cultural center of the region-city (Welter 2002; Geddes 
1915).
Rather than concern over regional boundaries, however, the decentralization of regional communities was a more prevalent theme in regional planning. New technology would be a means through which new towns could be developed that were in balance with the environment, yet still connected to the larger metropolis. Electricity generated in a central location could be transferred long distances to self-contained Garden Cities, while the automobile would provide a means to connect to the larger metropolitan area and beyond into the countryside (Anderson 2002; Mumford 1938). The Garden City would be a self-contained unit which provided housing, jobs, services, and schools, each surrounded by greenbelts and landscapes that provided food and other natural resources for production and consumption (Mumford 1961; Howard 1902). These greenbelts would limit the area of each new town and prevent uncoordinated and uncontrolled spread of the larger metropolitan area into the countryside (MacKaye 1928).

As I stated previously, regionalist solutions to industrial urban expansion also entailed civic education. Through Geddes’ and Mumford’s proposed regional surveys, citizens would learn about the region’s history, culture, environment, natural resources, jobs, and people (Geddes 1915; Mumford 1938). This understanding could lead to a regional community that was both physically and socially connected. Geddes utilized a survey approach of the region that necessitated citizens and planners to walk a city’s entire region (Meller 1993; Luccarelli 1995; Weaver 1984). He believed the general survey would cultivate deep personal knowledge of one’s local environment that would develop a “regional consciousness” (Weaver 1984). Moreover, the survey would influence the ability of cities and its citizens to plan for the renewal of urban areas in connection with their regions in an ecologically sound manner. In addition, Geddes felt that a regional survey, which included a survey of local ecology, should be the first step in the town planning process. Such a survey would bring out unique local aspects of each community, thereby also alleviating the dullness perceived to be prevalent in existing industrial cities of the time (Geddes 1915). Like Geddes, Mumford believed that the regional survey, being a hands-on, interactive, educative process, was vital to the success of regional planning. To Mumford, experiential education in this manner would create a new generation and new human narrative:
“These people will know in detail where they live and how they live: they will be united by a common feeling for their landscape, their literature and language, their local ways, and out of their own self-respect they will have a sympathetic understanding with other regions and different local peculiarities” (Mumford 1938).

Geddes’ and Mumford’s surveys as conceived were essentially a grassroots effort of environmental learning (and urban restructuring). However, more than just increasing knowledge of one’s environment, the general survey also embraced John Dewey’s concept of experiential learning that would see educated citizens acting as catalysts of change. This would subsequently influence the civic awareness of the public and allow for informed decision-making processes in the public realm (Weaver 1984).

2.1.2 Bioregional philosophy – 1970’s to today

Despite the efforts of voices like Mumford and the Regional Planning Association of America, urban sprawl and faceless urbanism due to industrialization did not end in the 1920’s. Although in the early 20th century technology was seen to be a way to slow urban growth through decentralization of cities, these technologies, particularly the automobile, actually enabled further urban growth into the countryside with little regard to regional or environmental context (Yaro 2011; Sheller and Urry 2000). Further, it was believed that a globalized, profit driven, economy that no longer reflected the culture of local communities and regions, contributed to mass production, over consumption, and continued environmental degradation (McGinnis 1999; Carr 2004). Therefore, as a reaction to the perceived ill effects of globalization, a grassroots social change movement, bioregionalism, emerged in the 1970’s in Northern California.4

4 The movement quickly spread to other parts of North America (e.g., the Pacific Northwest, Maine, and the Ozarks) (Dodge 1981; Aberley 1993). Since 1984, Bioregionalists from across North America take part in biannual North American bioregional congresses every two to four years (Bioregional Congress). In terms of bioregional policy, one seemingly successful example comes from New Zealand which, in the 1980’s, restructured its governance to a regional system based upon watershed boundaries. This restructuring created regional councils with responsibility for planning, infrastructure, and environmental resource decisions (Furseth and Cocklin 1995). Though this is an example of bioregional policy, because bioregional philosophy is rooted in Anarchism, bioregionalists might discount New Zealand’s efforts due to the top-down nature of implementation (Aberley 1999).
This new bioregional movement posited an alternative vision for humans and human settlements. People would live in balance with the environment, other people, and non-human life, within the carrying capacity of naturally or culturally bounded regions (bioregions) (Young 2000; Taylor 2000; Dodge 1981; Sale 2001). The term “bioregion” is significant. It is defined as a life-territory or life-place (Dodge 1981; Sale 1985). In a life-place, people would dwell and inhabit communities for the long-term in order to cultivate understanding and caring of the region, its people, and the environment (Carr 2004; Sale 1985; Parsons 1985; Young 2000; Taylor 2000; Aberley 1993; Thayer 2003). In Table 1, I highlight the key elements of bioregional philosophy.

5 These desires reflect Native American beliefs and customs. In their desire for a gentler relationship to the earth, early bioregionalists were inspired by Native American beliefs, particularly their beliefs of the interdependence of all life (Carr 2004). Maps of Native American settlements prior to treaties show that their territories were largely naturally bounded (Sale 2001). This and historical accounts, suggest that Native peoples patterned their lives according to those territories (Sale 2001). They subsequently had a deep understanding of their regions, lived according to the seasons, and adapted their lives to abundance and scarcity provided by the regions in which they lived (Aberley 1993; Carr 2004).
### Key elements of bioregional philosophy

**Carrying capacity and self-reliance:** Production and consumption would occur primarily within the carrying capacity of bioregions. Bioregional communities would be self-reliant within their bioregions.

**Rootedness:** Citizens would live in one community for the long-term, which in turn would cultivate understanding of the local region’s environment, local culture, and aboriginal history, as well as place attachment and increased social networks. Through detailed surveys and analysis of history, designing and planning for bioregional communities would reflect the bioregion’s ecology, history, and culture.

**Political decentralization:** A variety of communities, each with its own strength and culture, would be distributed throughout the bioregion. These communities would make their own governing decisions (rather than be beholden to Federal or other political jurisdictions), preferably through participatory democracy and face to face decision making.

**Spirituality:** Inspired by Native American beliefs, bioregionalists believe in an interconnected ecological and cultural system where humans and non-humans are one creation, and that each part of this system has intrinsic value that should be respected.

**Practice-oriented:** Bioregional philosophy entails the practice of bioregional principles through political activism, through learning about one’s own bioregion, and through projects geared toward “reinhabitation” (e.g. local food or energy production and distribution, or stream restoration).

**Designing with nature:** Bioregional communities would be designed with the ecology of place in mind. Because nature has intrinsic value, efforts to restore forgotten and buried land and waterscapes would be important factors in community design. Nature would be restored within human settlements, it would be preserved outside of human settlements, and it would serve as connective corridors between communities and regions.

Bioregional philosophy has its roots in ideas of political decentralization (Taylor 2000; Dodge 1981). It also links to the ideas of the regional planning movement of the early 1900’s. Bioregional communities would be distributed within the natural boundaries of a region. They would be governed by self-rule in self-reliant, decentralized, communities.

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6 There are many different conceptualizations of bioregional boundaries, including watersheds, land forms, aboriginal cultures, and elevation (Dodge 1981). Bioregionalists consider the notion of boundaries to be fluid because the bioregion encompasses both ecology and culture (Carr 2004; McGinnis 1999).

7 Political decentralization has its roots in Anarchism. Anarchists believe local citizens should be free to make their own decisions, rather than a centralized Nation-State dictating laws from far away. In an anarchist decentralized political system, bioregionalists contend that local citizens would make more informed, and thus better, decisions than a centralized Nation-State political system (Taylor 2000; Dodge 1981).
where production and consumption would occur primarily within that community’s bioregion (Gray 2007; Aberley 1993; Dodge 1981; Aberley 1999; Sale 1985; Taylor 2000; Carr 2004; Sale 2001). In this regard, bioregional communities also reflect the intent behind Garden Cities as self-contained communities reliant on the surrounding countryside (or bioregion) for jobs and sustenance. Further, bioregional communities would preserve both working landscapes and wilderness. They would utilize nature as a way to connect humans to the environment and natural processes while also physically connecting communities within the region (Aberley 1993; Sale 2001; Taylor 2000).

One key aspect of bioregional philosophy is the premise that citizens would have deep knowledge of the region in which they live. Much like the experience and knowledge that would be gained through Geddes’ and Mumford’s regional surveys, bioregionalists believe in the importance of experiential learning, mapping (or surveying) of the land, as well as aboriginal and cultural heritage. Such learning and knowledge would not only feed into the design and governance of bioregional communities, it would cultivate knowledgeable bioregional citizens who would participate in informed decision making about their communities (Taylor 2000; Parsons 1985; Sale 1985; Aberley 1993; Thayer 2003).

Today, a bioregional and bioregional-like response to globalization and environmental degradation persists. Although it may be labeled in different ways or arise from different disciplines (e.g., “bioregionalism”, “sustainability”, “resilience”), many scholars have reacted to the sense that communities are no longer conceived of by their residents as social and ecological networks. This concern is generally perceived to be a result of corporate globalization. Some scholars contend that cities lack regional uniqueness and instead reflect a globalized sameness and centralization of ideas and political power (Beatley 2004; Carr 2004; Hester 2006; Thayer 2003). Moreover, facilitated by the abundance of inexpensive oil, cities have continued to spread into the countryside (Beatley 2004; Kunstler 2005; Newman 2007). As occurred at the turn of the 20th century, this is not to say that bioregionalists do not understand that bioregional communities are linked to larger systems. For example, bioregional philosophy emphasizes the interconnectedness of the ecosystem at nested scales from the local to the global (Thomashow 1999; McCloskey 1993). Bioregionalists also recognize the importance of the connections between bioregional communities, including the export of excess goods to other bioregions and the recognition that bioregional communities would have political and economic interdependence (Aberley 1994).
century, globalization, high consumption, and processes of urbanization that disregard local ecology have subsequently continued a process of environmental degradation, resource extraction, loss of the “countryside”, and a human disconnection to the resources that sustain life.

Although the desire for bioregional communities still exists (Carr 2004; Thayer 2003), there are many other alternate visions that address consequences of globalization and urbanization. Some scholars see a solution, like regionalist and bioregional thinkers, in small, distributed, and regionally connected human settlements (Hester 2006; Kunstler 2005; Thayer 2003). Others are working toward the integration of ecology and nature into the existing urban fabric (Beatley 2000, 2011; Hester 2006; Newman and Jennings 2008; Register 2006), while still others focus primarily on the creation of more compact and denser cities (Wheeler 2004; Newman, Beatley, and Boyer 2008; Beatley and Manning 1997; Ewing et al. 2007; Newman and Kenworthy 1999).9

The impact of urban areas on the environment and on their inhabitants is one issue that bioregional philosophy seeks to address. Urban areas not only impact their own regions, they also have global reach in terms of resource consumption and varied wastes from resource extraction, production, and consumption. Thus, much of the current work that seeks to reduce these impacts focuses upon the retrofit of urban areas. In the next sections, I highlight areas of urban planning and design research that seek a transition to a more sustainable society, and which also correlate to bioregional philosophy: ecological design, greening the city, and the concept of sense of place.

2.1.3 Ecological design and “greening” the city
In an ecological design process, the underlying ecology, geography, and geology of a community would be studied prior to design and plan making. The results would be integrated into all subsequent plans and designs. This approach to urban planning and design links to the ideas of regional and bioregional planners; however, regional and

9 These planning “paradigms” are not mutually exclusive. Many scholars contend a combination of some or most of these solutions as viable and desirable for sustainable or resilient communities (Beatley 2000; Hester 2006; Newman and Jennings 2008; Beatley 2011; Carr 2004).
bioregional planners would also incorporate historical uses of the land into their plans and designs (Geddes 1915), including historical patterns of land use by aboriginal peoples (Aberley 1993). An ecological and historical approach to land development differs from an engineered approach to planning in that it works with local environmental conditions rather than attempt to control them or circumvent them.

Ian McHarg is a notable early figure in ecological planning whose work provides much of the foundation for this discipline (McHarg 1969; Hester 2006; Thayer 2003). In his work, he first studied how a city would work with and respond to local regional ecology. He did this through mapping analyses that documented the existing underlying regional environment, such as local geology and hydrology. McHarg’s contention was that by designing cities with nature, nature and natural processes would continue to function properly. At the same time, this analysis and subsequent plans would ensure that development occurred only in appropriate places in order that those places would stay out of harm’s way in case of catastrophe (e.g., flooding) and the highest functioning natural areas would be preserved.

This underlying premise (designing with nature) advocated by McHarg and others before him is a key aspect of ecological design. In existing cities, ecological design would entail the restoration or reconstruction of natural systems based upon, and supplementing, local ecology. The retrofit of communities would be informed by the community’s bioregion and would incorporate ecological and resilient urban design principles that reflect the city as part of rather than separate from larger ecosystems (Hough 2004; McHarg 1969; Newman and Jennings 2008; Register 2006). Urban form would be dictated by its relationship to the sun, the soil, and to water, and would, in turn, restore

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10 In bioregional philosophy, it is believed that studying the way in which aboriginal communities utilized the land would be instructive for how modern-day society now might use the land (Aberley 1993; Taylor 2000; Sale 1985, 2001; Dodge 1981).

11 Examples of engineered approaches to planning include burying creeks in pipes underground in order to allow for more building space, constructing levy systems in order to build and then protect settlements near waterways, or erecting retaining walls on steep slopes in order to reduce erosion or landslides for the purpose of home building.

12 This mapping approach is very much in line with Geddes and Mumford’s survey approach to town planning, and is an approach Aberley advocates in bioregional planning.
and then maintain the ecology of the city’s bioregion (Carr 2004). For example, aspects like the hydrology of the city, resource use like water, energy and food, and wildlife habitats and corridors that connect wildlife to their different habitats in nature would each be considered in community design (Hester 2006; Hough 2004; Thayer 2003). In a bioregional sense, designing cities in this manner is designing to the specifics of place. I therefore refer to this practice as place-based urban planning and design.

In placed-based planning and design, issues related to local ecological processes would be brought to the forefront of community design priorities. Ecological design solutions would tend be visible and a defining part of the urban landscape, rather than being buried or placed far away from the end use (e.g., visible stormwater systems, urban agriculture, or decentralized energy production). The visibility of resource infrastructure is considered to be an important component of sustainable urban design. This is due in part to the contention that such visibility enables human connections to those systems, which thereby facilitates environmental learning and awareness about local resources and ecology (Wheeler 2004; Newman and Jennings 2008; Mostafavi 2010; Hough 2004).

Many applications of ecological and place-based design solutions entail the integration of natural systems into the built environment (e.g. stormwater bioswales, urban tree canopy, green roofing systems). The “greening” of the built environment in these ways is generally seen as being both ecologically beneficial (De Ridder et al. 2004; Dietz 2007; Foster, Lowe, and Winkelman 2011) and beneficial to human health (Kaplan 1995; Kuo et al. 1998; Chiesura 2004; Louv 2005; Thwaites, Helleur, and Simkins 2005; Beatley 2011). In fact, E.O. Wilson contends that humans depend on nature not only for sustenance but also for physical and mental well being; he has termed this “biophilia” (Kellert and Wilson 1999).

There are numerous instances of ecological and place-based design in practice. For example, as part of the Olympic Village, the City of Vancouver reconstructed an “island” that mimics the British Columbia coastline, providing habitat for native plants, birds, insects, starfish, shellfish, etc. (City of Vancouver 2010). Many cities have begun to restore waterways and wetlands in order to improve habitat and water quality. For example, also in Vancouver, volunteers continue to work to restore Musqueam Creek, located in an urban area east of the University of British Columbia. By reconstructing habitat and removing culverts, the goal is to restore wild salmon populations, a fish which is an important part of British Columbian identity (Think Salmon 2008). Housing developments such as BedZED in London, utilize passive design (solar orientation), incorporate onsite energy and food production, and establish sustainable stormwater management solutions such as constructed wetlands (Newman and Jennings 2008).
1993; Wilson 1984). Timothy Beatley brings these ideas together in his concept of the biophilic city, which focuses upon the ecological and human benefits of nature, brought to the urban context:

“A biophilic city is a city abundant with nature, a city that looks for opportunities to repair and restore and creatively insert nature wherever it can... (where residents care about nature and work on its behalf locally and globally” (Beatley 2011).

This notion of creating a nature-filled city is another aspect of ecological design that scholars see as contributing to the cultivation of human connection to nature. In this literature, there is a contention that nature should be part of daily life rather than preserved beyond the city where it remains outside the human consciousness. Rather, nature as part of daily life has the potential to build awareness of nature and natural processes which might eventually translate to a love of nature and a sense of need to protect both the local and global environment (Platt 2004; Spirn 1988; Jordan III 2000; Light 2000).

Regional planning of the early 20th century was concerned with the growth of cities and the burgeoning disconnection between the city and the countryside. This disconnection was, and is, a concern for today’s bioregional thinkers. However, bioregional philosophy focuses more upon the processes and outcomes of planning and governance that brings the environment, nature, and ecology to the forefront of everyday life. Bringing ecology to the forefront of the human experience can, in part, be achieved through ecological design. In addition, bioregionalists believe in the importance of people “reinhabiting” their bioregions, whereby citizens learn (or relearn) the specifics of the region, or develop a sense of place. Designing to the specifics of place and the development of sense of place are important aspects of bioregional philosophy. I therefore explore ideas of place, in the bioregional sense, next.

2.1.4 Designing for place and living well in place
Bioregionalists use the term sense of place to refer to a deep understanding and knowledge of one’s lived environment. It is a concept that is key to bioregional thinking. Designing for place would entail the celebration of the environment and of the historical
and cultural aspects that make a community and (bio)region unique (Hough 1990; Newman and Jennings 2008; Mumford 1938; Young 2000). Ecological design is an important aspect of designing for place. As I discussed in Section 2.1.3, ecological design decisions would be based upon regional ecology and climate. Such design decisions might manifest through the restoration or reconstruction of lost local environments (e.g., restoring wetlands) or through the implementation of local environmental attributes that reflect the ecology, geography, and history of the local bioregion (e.g., building materials or native vegetation).

Citizens who are informed and knowledgeable of regional ecology, history, and culture, are integral to place-based urban planning and design. In bioregional philosophy, citizens would stay in one place for the long-term and would become rooted and knowledgeable citizens of their communities. Such understanding would include knowledge of the surrounding region’s culture, people, the environment, and non-human life (Young 2000; Sale 1985; Aberley 1993; Thayer 2003). Moreover, residents would know where their drinking water, food, and electricity originate (Hester 2006; Orr 1994).

Not only would people have deep knowledge of their place, they would also live well in place. Living well in place means living with respect for the environment and all life (Sale 1985; Taylor 2000; Dodge 1981) and being a steward of and participant in one’s bioregion and community (Thayer 2003; Dodge 1981; Carr 2004; Berg and Dasmann 1978). A bioregional citizen who lives well in place would act in an environmentally responsible manner so as not to increase environmental degradation. Some might participate in stewardship or restoration activities, which could take place on private property or public land. Furthermore, a bioregional citizen would entail being an active member of one’s community (e.g. volunteer work, stewardship, activism, voting). I refer to such citizens as having a place-based ethic. A place-based ethic is one in which residents understand their local ecology, understand where their basic resources come from, and behave in such a way so as not to contribute to continued environmental degradation. This ethic would be cultivated through opportunities for participation in civic life, through the design of communities that allow for socializing and community building, and through opportunities for engagement and activity in nature within the bioregion.
Developing a sense of place would be both a community and individual endeavor, and one that would involve active participation and hands-on activity (e.g. regional surveys, watershed tours, or active participation in community planning processes). Grounding individuals and communities in a place-based ethic would contribute to an informed citizenry, which is considered an important component of a sustainable society. This, in turn, would allow for informed decision-making processes in the public realm and would influence the ability of cities and citizens to plan for the retrofit of urban areas in an ecologically sound manner (Brulle 2000; Fung and Wright 2001; Hester 2006; Wals 2007). The social aspects of place-based planning are significant, as they can contribute to a sense of collective responsibility that may ultimately impact the function of urban areas, larger ecosystems, and in a cumulative way the global ecosystem.

I have discussed that an inherent ideal of bioregional philosophy is a changed relationship between humans and the environment, where humans live within the means of the local bioregion (Beatley 2004; Berg 2002). I have also discussed the bioregional notion of living well in place, which entails active engagement in community and an understanding of the history, culture, and ecology of the local region (Carr 2004; Newman and Jennings 2008; Thayer 2003). Overall, bioregional thinking necessitates a shift in worldview and values, constituting a transformation of the norms of society and the policies and institutions that shape daily life. The application of bioregional philosophy to planning and city building faces philosophical and practical challenges. Philosophically, bioregionalism applied to cities, or bioregional urbanism, would be a compromise to the full bioregional vision. Moreover, natural systems and ecological cycles cannot sustain the kind of population intensities that urban areas typically house. Practically, bioregional urbanism would require a transformation in the way planners design, build, and use urban infrastructure such as roads, sewers, power production and distribution, open spaces, and trees. Recognizing that professional and bureaucratic inertia makes change difficult, I turn to the literature on the processes of change to inform the discussion and ultimately my model of bioregional urbanism.

Environmental educators use the phrase “place-based” to describe environmental education that teaches local ecology in a hands-on manner. The concept of “place” is an established way of discussing environmental education. It encompasses how students come to understand local ecology and how human behavior fits into the larger ecological picture (Smith 2013).
2.2 The process of change

Many call for behavior change as a component of sustainable development (Flavin 2010; IPPC 2007; Rees 2008). However, in my work, I consider behavior change as a larger endeavor than one of simply convincing or legislating individuals to drive or consume less. Instead, I focus on literature that proposes an epistemological shift in the human relationship to the environment and to natural resources from the current condition; something which is inherent to bioregional philosophy. The following sections discuss the connections between individual behavior change, social change, transformative learning, and bioregional philosophy. At the conclusion of this chapter, I link each of these ideas to my proposed model of bioregional urbanism.

2.2.1 Behavior change

Central to the literature on individual behavior change are the formulation and reformulation of one’s values and worldviews, with much of the writing on environmentally responsible behavior suggesting a rewrite of the human narrative. This narrative is derived from individual experiences and cultural and social norms that have been integrated into daily life from birth (Kollmuss and Agyeman 2002; Rees 1995, 2008). In this literature, values and ideologies relative to the human-environment relationship are given different names, but the general idea is that ideology ranges from human-centered and utilitarian (anthropocentric), to technology oriented (technocentric), to a deeply integrated human-environment view (ecocentric) (Jepson 2004; Rees 1995; Stern and Dietz 1994). To compound the links between ideology and how one goes about daily life, humans develop “tacit narratives” (Cantrill and Senecah 2001) to make sense of life in general, or to simply use these narratives to ignore a new reality that may not fit within one’s worldview and personal narrative (Rees 2008). Most attempts at reducing the human impact on the environment have focused on individual behaviors (e.g., driving less). However, most behavior change theories contend that to move toward environmentally responsible behavior, individual value structures must change to be more in line with beliefs and attitudes that are partial to the environment.
In contrast to these traditional notions of behavior change, there is a group of behavior change theorists and researchers that see a method of changing behavior as a process of empowerment, motivation, and satisfaction. This is a people centered approach to behavior change in which the whole person and that person's intrinsic wellbeing is considered. Models like Kaplan’s *Reasonable Person Model* (Kaplan 2000; Kaplan and Kaplan 2009) and De Young’s (2000) model based on “*intrinsic satisfaction*” suggest that positive motivation toward environmentally responsible behavior can be achieved through policies that focus on personal motivation rather than targeting individual behaviors.

The Reasonable Person Model proposes that 1) people want to *understand*, 2) people want to *learn*, and 3) people want to be *actively involved* (meaningful action) in what impacts their lives; people want to feel they are part of a solution through working on a meaningful goal with other people (Kaplan 2000; Kaplan and Kaplan 2009). De Young proposes similar factors in a model of intrinsic satisfaction (De Young 2000): 1) people are satisfied when they feel *competent*, 2) people are satisfied when they do not spend a lot of money (“*frugality*” and “*thoughtful consumption*”), 3) people are satisfied when they are *involved* in their community, and 4) people are satisfied when they are part of a *flourishing* public. In terms of fostering environmentally responsible behavior, the value of interaction with nature is also apparent. For example, the importance of positive, restorative experiences in nature was found by Hartig et al. (2001) to have more potential for encouraging environmentally responsible behavior than behavior specific strategies.

I found that bioregional philosophy and behavior change research have similar themes: place attachment, sense of community, and ecological awareness and understanding. *Place attachment* has been shown to be achieved through involvement in nature activities. This concept coincides with the Reasonable Person Model’s call for meaningful action (through nature activities) (Kaplan 2000; Kaplan and Kaplan 2009), attachment to place through the restorative potential of experience in nature (Hartig,

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16 “Meaningful action” could include a multitude of efforts, from cleaning up an urban stream from invasive plants, to fighting for private property rights by actively protesting urban riparian protection laws.

17 Nature activities would include restoration, stewardship, and maintenance of natural areas. However, it could also include passive enjoyment of nature.
Kaiser, and Bowler 2001), and the broader notion of living well in place as put forth by bioregionalists (Carr 2004; Thayer 2003). Increased sense of community has been shown to increase through working in nature with other people. This idea is consistent with people-centered behavior change models that emphasize working with others, involvement in community, and the development of social relationships (De Young 2000; Kaplan and Kaplan 2009; Krasny and Tidball 2009). The development of sense of community also falls in line with the emphasis on community and culture inherent in bioregional philosophy (Aberley 1999; Berg 2002; Carr 2004; Thayer 2003) as well as research that show the importance of social cohesion in place attachment (Cantrill and Senecah 2001; Glynn 1986; Uzzell, Pol, and Badenas 2002). Finally, increased ecological awareness or understanding emphasizes the importance of seeing, working, and being in nature. This corresponds to the human need for competence, exploration, understanding, and learning as put forth by people-centered behavior change models (De Young 2000; Kaplan 2000). It is also an underlying premise behind bioregional philosophy (Mumford 1938; Orr 1992; Thayer 2003).

2.2.2 Transformative, experiential, and social learning theories
Transformative learning theory suggests the possibility of the transformation of a person’s worldview through critical reflection of underlying values and assumptions that influences behaviors (Mezirow 1997). Critical reflection, through dialogue, is one component of transformational learning (Clark 1993; Freire 1970; Mezirow 1997). Indeed, the social aspects of learning, such as working in groups, has been shown to enable generative learning through collaborative and cooperative problem solving. For example, individuals work through different experiences and conflicts with others while simultaneously (and subconsciously) reflecting and questioning their own beliefs (Dunlap and Grabinger 1996; O'Donnell and King 1999). Experiential and social learning theories offer approaches to transformational learning through experience with others that allow for observation, interaction and dialogue, reflection, and action through problem solving activities (Kolb 1984; Schön 1984).

I draw two principal ingredients for influencing behavior change from the above literature. The first ingredient is the importance of shifting someone’s worldview to one in
which a person is seen to be part of the environment rather than separate from or dominating the environment. The second ingredient that is relevant to my research is that of meaningful action. This idea is two-fold – humans want to learn, understand, and contribute to their community in meaningful ways (De Young 2000; Kaplan 2000), and learning can be better internalized when it involves hands-on activities (Dewey 1938; Kolb 1984; Orr 1992). These behavioral change strategies align with transformative learning theory. In other words, working with others while in the act of doing meaningful work can foster a change in values and assumptions.

Moreover, behavior change literature reveals that one way in which sense of place, sense of community, and ecological awareness or understanding can be fostered is through repeated experience in nature, and preferably through active engagement in nature activities (Chawla 1998; Ryan 2005; Vaske and Kobrin 2001). This finding is consistent with some learning theorists’ contention that direct and repeated experience is transformative (Jarvis 2009; Kolb 1984; Mezirow 1997). This also resonates in people-centered behavior change models (De Young 2000; Hartig, Kaiser, and Bowler 2001; Kaplan 2000). In addition, direct experience is a tenet of more utopian ideals inherent in bioregional and resiliency literature (Hester 2006; Mumford 1938; Thayer 2003; Walker and Salt 2006) and in ecological restoration literature that explores the social connections to ecology (Gobster and Hull 2000; Jordan III 2003; Krasny and Tidball 2009). The potential of this approach seems also to speak to general behavior change theories and models that center around values and ideology by addressing barriers to change (access to nearby nature, participation, habit, routines, norms) while also contributing to a new narrative of a place-based ethic.

2.2.3 Social change

Elizabeth Shove (2010, 2003) presents a contrary view to the idea that if someone’s values change, then their behavior will change. Using social practice theory as a framework, Shove posits that behavior change theories (based on individual attitudes, behavior, and choice) externalize context as barriers to behavior change (e.g., social norms regarding recycling, or the availability of a recycling program). Instead, Shove contends, contextual elements should be placed within behavior rather than external to it
(context is a part of behavior). Social practice theory situates behavior as *practices* of daily life which co-evolve and intersect with realms of daily life. These realms include institutional and municipal decision making (policies that support sustainable *ways of life* rather than making a *sustainable* option one of many other *unsustainable* options), infrastructure, and the physical environment (infrastructure supports *less consumption* in general, not as a choice or a more efficient version of an unsustainable action) (Reckwitz 2002; Shove 2010). Social change theorists contend that these “practices” are “...a routinized type of behaviour which consists of several elements, interconnected to one another “(Reckwitz 2002). Set within their context, these elements make up practices of daily life.

Shove’s research and theoretical premise (Shove 2003, 2010; Shove and Pantzar 2005) shows that in order to move toward sustainability, a fundamental shift in the existing condition of society needs to occur:

“...*relevant societal innovation is that in which contemporary rules of the game are eroded; in which the status quo is called into question and in which more sustainable regimes of technologies, routines, forms of knowhow, conventions, markets and expectations take hold across all domains of daily life*” (Shove 2010).

Thus, Shove calls for policy interventions that influence and shape daily life. In essence, this is what bioregional philosophy calls for: a fundamental shift in the relationship between people and nature that entails a shift in societal norms supported by policy, governance, and infrastructure.

Behavior change theory that focuses on changing the human narrative, and transformative learning theory which describes a process of transformation through critical reflection, corresponds to social practice theory as Shove puts forth. She says that the “rules of the game” (Shove 2010) should be transformed in order to raise new understandings and expectations about how to live...where a sustainable lifestyle becomes the only choice for daily life (the new norm). This is essentially what bioregional philosophy puts forth and is perhaps why bioregionalism tends to resist the seeming
compromise of incremental implementation. An all-encompassing radical shift in governance boundaries, governance structures, sources of economic activity and cultural vitality, all based on a deep connection to place, would provide the kind of paradigmatic shift for which Shove calls. There is no question that a pure bioregionalist vision would create new norms. The question for us is whether incremental steps toward a milder version of bioregionalism, such as bioregional urbanism, could cause a significant shift in behavior? The theory suggests yes. A place-based policy framework could provide a setting in which people can understand, can learn, and can be actively involved in meaningful action. This would in turn contribute to transformative learning and to a shift in the social practices that make up daily life.

2.3 Principles of bioregional urbanism

I draw on bioregional philosophy, ecological design, learning, behavior change, and social practice theories, to propose the following principles of bioregional urbanism (Figure 1). I subsequently use these principles to inform my bioregional urbanism model, which will be discussed in Section 2.5. These principles address physical and social realms of the city. They connect humans, nature, and cities to their bioregions through changes to the physical form of the city. Further, they provide opportunities for social engagement and environmental learning. I argue that use of these principles has the potential to influence a shift in worldview that would ultimately lead to a new way of living and connecting with nature.

![Figure 1 Principles of bioregional urbanism](image)

Principles of bioregional urbanism must be seen as interacting together, with each principle touching both the physical and social realms. In order to influence an epistemological shift in worldview to one that embraces rather than dominates nature,
decision makers should consider policies consistent with bioregional urbanism. Outcomes of such policies would influence the design of cities to reflect the ecology of the urban bioregion; embracing and working with nature and natural systems rather than hiding or sheltering them. Bioregional urbanism would lead to a shift in routines and practices of daily life, while cultivating a behavioral shift in society and contributing to the whole person’s intrinsic well being. Routines and practices of daily life occur in places and communities, as does learning about the local environment, history, and culture. Discussions of governance boundaries abound in bioregional thinking. Moreover, the scale and human perceptions of the bioregion are also of concern. At what scale would bioregional urbanism best function? In the next section, I propose one idea for what scale that might be.

2.4 Boundaries and scale

Central to current bioregional thinking is a discussion of appropriate boundaries of governance (Aberley 1993; Carr 2004; McGinnis 1999) or more specifically, scale (Sale 1985; Thayer 2003). Bioregionalists argue that boundaries should be conceived more holistically than typical governance dictated by political boundaries that often arbitrarily separate countries, states, or congressional districts on a map. Such boundaries many times also ignore social and ecological realities on the ground. Rather, bioregionalists argue that bioregional communities should be shaped into other, more geographically meaningful delineations that reflect the uniqueness, ecology, and culture of local regions (e.g., defining boundaries of culture, language, flora and fauna, climatic regions, or watersheds) (Carr 2004; Marshall 1993; Dodge 1981). A shift in the concept of meaningful boundaries, in the bioregional sense, is a shift to a more naturally rooted understanding of home and place, “…a spatial framework in which people live as rooted, active, participating members of a reasonably scaled, naturally bounded, ecologically designed territory” (Thayer 2003).

Beyond the framework of shifting borders, boundaries, and governance structure, a more fundamental consideration for my work is how bioregional philosophy encompasses a shift to a deeper knowledge, caring, and stewardship of place through meaningful connections to community and environment. Thus, scale, connections between scales,
and the cultivation of an understanding of how a person fits within social and ecological systems, rather than boundaries, becomes a key part of this discussion. Place-based planning would entail an ecologically literate citizenry who understand the importance of scalar connections from the individual to the community level, and from the parcel to the globe.

Because of the importance of daily activities in shaping people’s experiences, bioregional urbanism is meant to focus upon the scale of the local, the neighborhood, the community – the places of urban daily life. I contend that it is at this local scale that incremental change to urban form could most effectively aid in the reconnection of the relationship between urban residents and natural processes, and in the cultivation of a stronger community identity. If we were to bound the local scale (communities of neighborhoods), in an ecological sense the watershed is of a scale that can be perceived by humans, and can be imagined, seen, and potentially visited (McGinnis, House, and Jordan III 1999). In urban areas, subwatersheds\(^{18}\) are often a more appropriate scale for perception and visibility of a natural resource. This scale could also provide a more localized focus for community identity, community participation, and understanding and attachment to place (Light 2003) while providing a means to connect to one’s larger bioregion.

Communities of neighborhoods exist within these subwatershed boundaries; this is where experiences of daily life take place. Bioregional philosophy addresses sustainable development by connecting people to their place within nature and ecology. It would change urban form to respond, restore, and maintain local and regional ecology. Bioregional urbanism is a way to influence daily experiences of the physical and social realms; incrementally implementing bioregionalism and fostering social change. This incremental change would be achieved through connection with community and environment within cities that work with and embrace nature.

\(^{18}\) The watershed or subwatershed may not be relevant for all communities. Bioregionalists generally prefer not to create specific bioregional boundaries, as they believe a bioregion is also a product of culture.
2.5 Bioregional urbanism – a model

Bioregional urbanism is a model of incremental change synthesized from my integration of bioregional philosophy with behavioral change and ecological planning literatures. It is intended to introduce principles of bioregionalism into existing cities. The model is dynamic, an iterative process of activities and change where each component interacts and influences the other (Figure 2).

The model integrates three overarching realms, 1) the democratic process, 2) public discourse, and 3) the physical environment of the city; as well as three factors that influence incremental change toward bioregional urbanism, 1) municipal policies, 2) neighborhood-oriented stewardship, and 3) individual actions. The model is intended to show an iterative process for incremental change toward a transformed relationship between humans and nature through new ways of living and connecting with nature. Through changes to the physical environment of the city, through social practices of neighborhood-oriented stewardship that take place in the physical realm, and through the actions of individuals, bioregional urbanism implements and fosters bioregional ideals of sense of place and community, ecological awareness, active participation, stewardship, visible natural systems, and nature in cities.
The model illustrates that public discourse can influence both individual perceptions and the democratic process. The latter, in turn, influences local municipal policies, plans, and programs that impact the physical environment and activities that take place in the physical realm.

**Municipal policies**
Municipal policies, plans, and programs are put in place in order to apply principles of bioregional urbanism. Policies, plans, and programs can also ensure allocation of resources for bioregional policies, plans, and programs, which might further enable continued legislation and implementation of bioregional urbanism over time. It is policies such as these that shape the incremental changes necessary for creating sustainable and resilient cities. In this model, specific policies are centered on principles of place-based
urban planning and design consistent with local ecology and climate (e.g., creek daylighting).

Bioregional urbanism policies would provide opportunities for nature activities through the support or implementation of municipal programs and partnerships (community gardens, backyard habitats, tree planting, ongoing nature maintenance and restoration). Municipal policies may be those that implement specific bioregional-like projects, but would also influence the internal workings and planning goals of the municipality as a whole (e.g., integrating watershed health goals into city-wide decision making).

**Physical environment**

Policies, plans, and programs that incorporate ecological design principles influence the physical environment and form of the city. For example, policies that daylight creeks or implements bioswale technology within the infrastructure of streets, shape the form of the city by uncovering natural processes previously hidden by engineering-based solutions. Moreover, in another example, the implementation of habitat connections, greenways, and neighborhood proximity to parks and natural areas could shift the function and perception of the city to one shaped by networks of nature. Building codes would also require architectural responses that substitute mechanical systems with more passive systems (e.g., solar orientation) and ecologically driven wastewater treatment and rainwater harvesting. Everything from composting food and yard waste, water conservation, harvesting, and filtration, and the creation of micro-climates and habitat corridors can be prioritized to heighten residents’ connection to local and regional nature and natural systems. Over time, such incremental changes have the potential for a cumulative impact to the physical shape of the city, regional and ecological connections, and urban residents’ perceptions of how their own personal choices influence the broader environment and ecosystem.

**Neighborhood-oriented stewardship**

The physical realm of the local environment is the backdrop for lived experiences. This is where neighborhood-oriented stewardship takes place. Neighborhood-oriented stewardship can vary, for example, from the restoration of a beloved park by a group of
people, to people stewarding their own backyards through the cultivation of wildlife habitat or food for personal consumption. It is through the social practices of neighborhood-oriented stewardship that community identity and place and community attachment can be fostered. The physical environment at the local scale is where active participation and stewardship occur, daily experience in nature occurs, and regular experience with others occurs. Through these experiences, it is also where social and environmental learning occurs.

**Individual actions**

Individual actions can be influenced through reflective and transformative learning processes during or following neighborhood-oriented stewardship activities. Individual actions can also be influenced by public discourse. Community members can then also influence public discourse when someone decides to teach others what they have learned through personal activity (e.g., teaching others how to grow their own food). The bioregional urbanism model is not linear. For example, it includes a two-way arrow to show a relationship between neighborhood-oriented stewardship and individual actions. It could be that through listening to others speak about (or reading about) declining biodiversity, for example, a person might decide to cultivate a backyard habitat for birds in order to increase the amount of nearby bird habitat. Or, perhaps someone volunteered to pull invasive ivy in a park one day due to an obligation at work, and then kept coming back to help – perhaps they then decided to tell others about the value of pulling ivy for the health of the park, or decided to pull ivy in their own backyard. Such actions contribute to the environmental learning of others while influencing personal behaviors within their own daily lives.

### 2.6 Variants and critiques

Place-based urban planning is only one community and regional vision among many. Currently, the dominant planning model is one of the status quo which continues to build housing subdivisions on farmland or forestland. This thereby increases the land area of a given jurisdiction as well as perceived housing choice and affordability. Even this type of urban form can be built in a more ecological manner (Milder 2007; Odell, Theobald, and Knight 2003), regardless of whether ecologically sensitive design built on the periphery of
a city is an appropriate use of land. Beyond the status quo, within the realm of “sustainability”, the planning and design of some cities has shifted toward a conversation that speaks to livability while simultaneously reducing greenhouse gas emissions, and planning for change in existing cities within existing infrastructures. This more progressive, yet mainstream, means of planning is put forth as “sustainability planning”. It focuses primarily upon reducing automobile use through land use and transportation changes utilizing a higher density and compact development approach (Wheeler 2004; Newman, Beatley, and Boyer 2008; Beatley and Manning 1997; Ewing et al. 2007; Newman and Kenworthy 1999).

As I described in Section 2.1.3, ecological design and the integration of nature and natural systems into urban areas is another approach to “sustainable” or “resilient” planning. The greening of cities has long been a part of different utopian visions of the city, such as the integration of large parks like New York’s Central Park in the heart of the city, Corbusier’s “towers in the park”, or Howard’s Garden City which would have developed new towns surrounded by a hinterland of agriculture, forest, and waterways. Some scholars still advocate for such development; that is, communities surrounded by swaths of green corridors (Register 2006; Hester 2006). More than simply bringing increased vegetation into the cities or subjugating nature to the hinterland, ecological design focuses on planning cities on a foundation of nature and that city’s particular ecology of place, emphasizing a city infrastructure modeled on natural systems (Capra 2007; Newman and Jennings 2008; Van Der Ryn and Cowan 1996; Mostafavi 2010; Girling and Kellett 2005; Dekay and O'Brien 2001; McHarg 1969). However, some write of concern that, in this type of planning, the environment takes precedence over the social aspects of the city (Beatley and Manning 1997; Talen 2010). This concern could also be attributed to bioregional philosophy due to its emphasis on carrying capacity, designing with nature, and bioregionalists’ belief in the intrinsic value of nature.19

Indeed, themes of environmental protection are prevalent in literature that discusses bioregionalism. Many scholars describe bioregionalism as a potential sustainable or

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19 Though the environment and natural systems may be the foundation for urban planning and design, one does not need to be a barrier to the other if both are taken into consideration. Indeed, social equity and empowerment is a concern of bioregional philosophy (Dodge 1981; Aberley 1993).
resilient alternative to urban and regional planning; particularly as a concept of living within the carrying capacity of the local land and living well in place (Beatley 2011; Rees 2010; Hester 2006; Newman and Jennings 2008). However, as I have discussed, there is much more to bioregional philosophy in its entire vision, and the whole of the philosophy also has its critics.

In general, critiques of bioregional philosophy revolve around its all encompassing and radical vision for societal transformation, which ignores power dynamics, equitable distribution of natural resources within bioregions, and the reality of globalization as an economic and powerful contemporary force (Taylor 2000; McGinnis 1999; Hahnel 2007). Of further concern is the assumption that decentralized, self-ruled communities would be altruistic (e.g. collaborative rather than competitive, or living within carrying capacity rather than degrading the local environment) (Taylor 2000; Alexander 1990). My model, on the other hand, focuses upon a subset of the full bioregional vision and accepts the viability of “bioregional” policy from above in addition to policy conceived by citizens themselves. Therefore, the model is intended to be flexible and to adapt to the unpredictable outcomes of democratic processes and human relationships.

2.7 Conclusion

Urban residents in the developed world are disconnected from the environment and natural processes. This has contributed to societal attitudes that have led to overconsumption of natural resources and degradation of the earth. In this chapter, I proposed a theoretical framework for a place-based reconnection to nature that addresses the relationship between the built environment, nature, and urban dwellers. Bioregionalism provides one way in which to address new ways of living and connecting with nature. However, bioregionalism has perhaps been too uncompromising in its ideals to be implemented holistically, particularly in urban areas. Bioregional urbanism, as I propose it, seeks to address a reconnection between urban dwellers and natural processes. The bioregional urbanism model situates research within the dialogue of sustainable transformation and provides a framework for data analysis. It also has potential to influence the shape of municipal and regional policy decisions that may lead
to an incremental adoption of bioregional ideals in urban areas and to the cultivation of a placed-based ethic in planning, design, and daily life.

In the face of decisions regarding crumbling infrastructure and regulatory obligations in cities in growth or decline, researchers and policy makers can utilize this model when contemplating changes to urban form and the development of municipal programs. In the end, policies that shape urban life should utilize place-based urban planning and design. Such policy outcomes would influence the design of cities to more closely reflect the ecology of the city’s bioregion. They would embrace and work with nature and natural systems rather than hiding or sheltering them, and they would enable easy and daily access to nature. They would cultivate opportunities for interactions with other people and nature in order to foster place-based awareness that would include culture, history, and ecology, leaving space for that critical reflection that can lead to individual transformation. Ultimately this may contribute to sustainable and resilient practices and patterns of urban living. My work explores the specific case of “Tabor to the River” in Portland, Oregon through the lens of bioregional urbanism.20 This case context is described next.

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20 As I will describe in Chapter 4, I utilized the bioregional urbanism model as a framework through which to analyze interview data using deductive coding such as “nearby nature”, “stewardship”, “environmental learning”, and “environmental awareness”. I also used the model to test relationships between policy, infrastructure, nature, and people. My findings led me to adjust the model, for example, to reflect the influence of public discourse on peoples’ understanding of local environmental issues, as well as how some people passed on their knowledge to others, which further contributed to dialogue around place and environment. In future research, this model could be used to test the applicability of model attributes and test model relationships in different contexts.
Chapter 3 Context

Portland: place, policies, people

The City of Portland is widely regarded as a livable, hip, and progressive city by outsiders and its own residents. Popular wisdom has it that Portlanders love their city, and people who do not live in Portland often mention that it has a reputation as a wonderful place to live; further, people often move to the city without a job in hand (Renn 2010). Portland is often looked to as a model city for many reasons including its urban planning practices and public involvement processes (Abbott 1997; Beatley 2004; Gibson and Abbott 2002; Putnam, Feldstein, and Cohen 2003; Berry and Portney 1993).

Despite Portland’s many accolades, the city has its critics, especially those with concern over private property and development rights (Layzer 2006; O’Toole 2007; Walker and Hurley 2011; Robbins 2004) and those who contest the purported benefits of Oregon’s urban growth boundary or other integrated land use and transportation policies (Parker 2008; Lewyn 2002; O’Toole 2007). There are some in rural parts of Oregon who feel the urbanites of the Willamette Valley have unfairly dictated the statewide land use planning system (Walker and Hurley 2011; Robbins 2004). Some residents in the suburban areas of Portland do not agree with Portland’s or the regional government’s land use policies (Abbott 2001; Giegerich 2011; Provo 2009). Moreover, there are those within the city who would like less change and growth (Witt 2004; Layzer 2006) and a more equitable distribution of services (or affordable housing) throughout the city and the region (Abbott 2001; Schmidt 2012; Robbins 2004; Provo 2009). Critics or claims of exceptionalism notwithstanding, Portland offers insights for other jurisdictions that seek to introduce what Portland appears to have done so well; integrated transportation and land use planning, a regional networked trail system, extensive cycling infrastructure, etc. Portland

21 From the outside, Portlanders can appear to be smug about their city and its particular “Portland” lifestyle and culture, of which Portlanders also enjoy making fun. For an example of Portland’s perceived smugness about itself, see the blog Bike Snob NYC, “Virtual Reality: Smugness is a State of Mind” (Bike Snob NYC 2011). A “Portland” lifestyle could include a passion for things like, coffee, backyard chickens, organic and local food, cycling, outdoor recreation, light rail, streetcars, walkable neighborhoods, etc. For examples in popular culture that make fun of this very culture, see the television show Portlandia (IFC), particularly the show’s song “The Dream of the 90’s is alive in Portland” (Portlandia 2011), or the YouTube video Sh*t Portlanders Say (Kveton and Toral 2012).
also offers lessons for other cities that, like Portland, must address Federal regulatory obligations such as the Clean Water Act.

In this chapter, I provide an overall context of Portland, its residents, and Portland's policies that relate to my study. In section 3.1, I describe the context of Portland, including its geography, its people, and its weather. In section 3.2, I discuss some of the regulatory structures and policies through which Portland implements its progressive urban planning strategies, and I touch upon the culture and demographics of Portland’s residents. In Section 3.3, I focus on the context of my research case more specifically and discuss the policies that are pertinent to the case at hand. I conclude by describing the geography and location of the neighborhoods under study.

Although Portland may appear to be a particularly unique place, I will show that compared to cities of similar size in the western United States, Portland does not stand out as overly unique from a demographic standpoint. The neighborhoods in the study area appear to be slightly more disadvantaged than the Portland region and are therefore not uniquely privileged by U.S. standards. In Chapter 4, I will provide demographic details on the research participants. For the most part, they are highly educated and well-informed on local and environmental issues. My chosen study area is particularly relevant for this research because it includes varying scales of urban nature, and because most participants had opportunity to experience nature in their neighborhoods in different ways. Moreover, they appear to be predisposed to appreciating and understanding urban nature. Their experiences offer insights to jurisdictions who are dealing with growth or water quality problems, or who are considering the implementation of urban nature and natural systems and the larger social benefits of such land use strategies. Rather than seeking representativeness in the study area and in the pool of participants, I was seeking to understand the behavior of what could be termed “early adopters” so that we may learn of the potential influence of urban nature on a more general set of urban residents. As I will show, Portland and the Tabor to the River program offer a context of innovation highly suited for an exploration of participant experiences with urban nature and bioregional urbanism.
3.1 Portland – geography, precipitation, nature, and demographics

Portland is located in the northwestern portion of Oregon approximately eighty miles east of the Pacific Ocean and just across the border from the State of Washington to the north (Map 1). Portland is the northernmost city in the Willamette Valley and is situated at the confluence of the Columbia and Willamette rivers. These rivers played a vital part of the establishment of Portland and continue to be an important resource for the region (Abbott 2011, 2001; Robbins 2004). The Willamette Valley is large, flat, and fertile, and spans from Portland in the north to approximately Eugene, Oregon 120 miles to the south (ODFW 2006) (Map 1). The Valley is a significant agricultural producer for the region and thus also a significant aspect of its economy and identity. The geography of the Willamette Valley and the Willamette River watershed comprise the larger regional landscape in which Portland sits. The Willamette river is within the even larger Cascadia Bioregion, encompassing an area from the Pacific Ocean to Yellowstone, and from California to Alaska (Henkel 1993; McCloskey 1988).

Map 1 Contextual map of Portland with an insert of the Willamette Valley

Base map: (Google Earth 2012) Willamette Valley insert: (Wikimedia Commons 2012)

22 Major crops include grass, wine grapes, nuts, Christmas trees, hops, etc. (ODFW 2006).

23 When viewed through an economic lens, Cascadia is seen to encompass the metropolitan areas from Eugene to Vancouver, BC (Cold-Ravnkilde, Singh, and Less 2004; Clarke 2000).
The Portland Metropolitan area is comprised of three counties in Oregon (Clackamas, Multnomah, and Washington) (Map 2) which also makes up the elected regional government for the Portland Metropolitan area, Metro.

**Map 2 Contextual map of Portland with counties and surrounding cities**
Base map: (Google Earth 2012)

The City of Portland had a population of 583,776 in 2010 (U.S. Census Bureau 2012), and is projected to grow to approximately 715,000 by 2035 (City of Portland 2012). In 2010, its total land area was 133 square miles with a population density of 4,375 people per square mile (U.S. Census Bureau 2012). Shown in Table 2, Portland falls into the middle of the pack in terms of density for cities of comparable size. Portland’s population density is higher than many of the comparable cities in Table 2 yet still below cities like Seattle and Vancouver, BC with which Portland is frequently compared. Portlanders feel

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24 These particular cities were chosen due to their size and their mainly western locations. San Francisco and Vancouver were included in Table 1 because they are well known and recognizable cities. San Francisco in particular is an interesting comparison as a highly dense city located on the West Coast. Austin, like Portland, has a reputation for its hip culture, and though higher in population than Portland, its density is strikingly low as a result of its expansive land area.

25 Articles by academics and newspapers have compared Portland and Seattle (and Vancouver) on a variety of attributes such as city economics and political culture (Abbott 1992), freeway proximity and air quality (Chang-Hee Christine Bae, Sandlin, and Bassok 2007), city vibrancy and innovation (Dietrich 2003), and residential preference and the ecological footprint of the built environment (Jarvis 2001), etc. In addition, a
concern over growth pressure in their neighborhoods, even with residents’ understanding that certain environmental and quality of life benefits can emerge as a result of increased density (visionPDX). Although Portland’s population density may seem laughably low compared to Vancouver, BC, for instance, perhaps it is the pace of change and the character of the developments that bring such concerns to the forefront for Portland residents. For example, Portland’s land area appears to have declined by 1 square mile from 2000 to 2010 (to 133 from 134 square miles), yet its population increased approximately 9.4 percent by 2010 (from 529,121), and population density increased almost 10 percent (from 3,939 people per square mile) (U.S. Census Bureau 2000).

Table 2 Comparison by city: population, land area, and population density

<table>
<thead>
<tr>
<th>City</th>
<th>Total Population 2010</th>
<th>Total Area 2010 (square miles, rounded)</th>
<th>Population Density per Square Mile 2010 (rounded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tucson, AZ</td>
<td>520,116</td>
<td>227</td>
<td>2,294</td>
</tr>
<tr>
<td>Austin, TX</td>
<td>790,390</td>
<td>298</td>
<td>2,653</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>600,158</td>
<td>153</td>
<td>3,923</td>
</tr>
<tr>
<td><strong>Portland, OR</strong></td>
<td><strong>583,776</strong></td>
<td><strong>133</strong></td>
<td><strong>4,375</strong></td>
</tr>
<tr>
<td>Sacramento, CA</td>
<td>466,488</td>
<td>98</td>
<td>4,764</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>608,660</td>
<td>84</td>
<td>7,251</td>
</tr>
<tr>
<td>Vancouver, BC</td>
<td>603,502</td>
<td>44</td>
<td>8,448</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>805,235</td>
<td>47</td>
<td>17,179</td>
</tr>
</tbody>
</table>

Source: (Statistics Canada 2012; U.S. Census Bureau 2012)

Portland is a fairly “white” and highly educated community whose median household income is lower, and poverty rate higher, than the rest of Oregon and the United States as a whole. Table 3 shows details of Portland’s 2010 United States Census demographic profile as compared with Oregon and the United States. Portland’s racial demographic is majority “white”, yet its proportion of “white” individuals to other races was similar to the State of Oregon and the United States in 2010. According to the 2010 U.S. Census, multitude of internet sites and blogs also compare the livability and sustainability claims of each city, for example: “Vancouver Is Cascadia’s Greenest City, Who Is Second? Guess which takes the silver medal, Seattle or Portland? You might be surprised” (Durning 2010); “Portland vs. Seattle food fight, Two Northwest titans duke it out for the title of best food city” (Manning and Thomson); “Seattle Forum: Seattle Versus Portland Living?” (tripadvisor), and “Transit Smackdown: Seattle vs. Portland vs. Vancouver” (Williams-Derry 2012).
Portland had less “Black”, more “Asian”, and less “Hispanic” residents as compared with the United States. In contrast to Oregon and the United States, Portland has a more highly educated population; in 2010 41.1 percent of Portlanders ages 25 and above had a Bachelor’s degree or higher as compared with 28.6 percent of people in Oregon and 27.9 percent in the United States. Despite this high educational attainment, the median household income of Portlanders was lower, and poverty rate higher, than both Oregon and the United States.

Table 3 Portland’s demographics compared with Oregon and the United States

<table>
<thead>
<tr>
<th>Comparative Demographic Data, 2010 United States Census</th>
<th>Portland, OR</th>
<th>Oregon</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population, 2011 estimate</td>
<td>593,820</td>
<td>3,871,859</td>
<td>311,591,917</td>
</tr>
<tr>
<td>Population, 2010</td>
<td>583,776</td>
<td>3,831,074</td>
<td>308,745,538</td>
</tr>
<tr>
<td>Persons 65 years and over</td>
<td>10.4%</td>
<td>13.9%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female persons</td>
<td>50.5%</td>
<td>50.5%</td>
<td>50.8%</td>
</tr>
<tr>
<td>Male persons</td>
<td>49.5%</td>
<td>49.5%</td>
<td>49.2%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White persons</td>
<td>76.1%</td>
<td>83.6%</td>
<td>78.1%</td>
</tr>
<tr>
<td>Black persons</td>
<td>6.3%</td>
<td>1.8%</td>
<td>13.1%</td>
</tr>
<tr>
<td>American Indian and Alaska Native persons</td>
<td>1.0%</td>
<td>1.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Asian persons</td>
<td>7.1%</td>
<td>3.7%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Native Hawaiian and Other Pacific Islander</td>
<td>0.5%</td>
<td>0.3%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Persons reporting two or more races</td>
<td>4.7%</td>
<td>3.8%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Persons of Hispanic or Latino origin</td>
<td>9.4%</td>
<td>11.7%</td>
<td>16.7%</td>
</tr>
<tr>
<td>White persons not Hispanic</td>
<td>72.2%</td>
<td>78.5%</td>
<td>63.4%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduates, age 25+, 2006-2010</td>
<td>89.5%</td>
<td>88.6%</td>
<td>85.0%</td>
</tr>
<tr>
<td>Bachelor’s degree or higher, age 25+, 2006-2010</td>
<td>41.1%</td>
<td>28.6%</td>
<td>27.9%</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median household income 2006-2010</td>
<td>$48,831</td>
<td>$49,260</td>
<td>$51,914</td>
</tr>
<tr>
<td>Persons below poverty level 2006-2010</td>
<td>16.3%</td>
<td>14.0%</td>
<td>13.8%</td>
</tr>
</tbody>
</table>

Source: (U.S. Census Bureau 2012)

26 The State of Oregon, in contrast, is dominated by “white” individuals and has a lower percentage of individuals in almost every racial category as compared to the city of Portland and the United States as a whole.
If we look at comparative U.S. cities (Figure 3), Portland ranks third highest in educational attainment (Bachelor's degree and above) for those 25 years old and above (41.1%); in line with Austin (44.1%) and Denver (40.1%), with Seattle leading at 55.1%. Yet, in terms of median household income (Figure 4), Portland ranked third lowest in this particular city comparison. However, the annual salary range between Portland ($48,883) and the top income cities in this comparison (barring Seattle at $60,665) does not vary significantly; a range of around $3,000 per year from $51,914 (United States) to $45,501 (Denver). That Portland’s educational attainment is high yet median income low may give some credence to the notion of Portland as a place on the forefront of progressive politics, yet with its citizens balancing this with their desires for a high quality of life, a work-life balance, and a propensity for recreation.

Figure 3 Individuals with a bachelor's degree or higher by comparative city, the United States, and Oregon (age 25+)

<table>
<thead>
<tr>
<th>Geographical Area</th>
<th>Percentage of individuals with Bachelor's degree or higher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seattle, WA</td>
<td>55.1%</td>
</tr>
<tr>
<td>Austin, TX</td>
<td>44.1%</td>
</tr>
<tr>
<td>Portland, OR</td>
<td>41.1%</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>40.1%</td>
</tr>
<tr>
<td>Sacramento, CA</td>
<td>29.6%</td>
</tr>
<tr>
<td>Oregon</td>
<td>28.6%</td>
</tr>
<tr>
<td>United States</td>
<td>27.9%</td>
</tr>
<tr>
<td>Tucson, AZ</td>
<td>25.1%</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau (2012)
Politically, voters in Multnomah County vote overwhelmingly Democrat with a steady transition toward Republican the further one moves away from the city core. In Multnomah County, where Portland is located, constituents voted 70.5 percent for Democrat John Kitzhaber over Republican Chris Dudley in Oregon’s 2010 Governor Election (OregonLive.com 2010). In contrast, Oregon as a whole voted 49 percent Kitzhaber (OregonLive.com 2010). In the 2012 Presidential election, Multnomah County went 75.4 percent for Barack Obama over Mitt Romney (Multnomah County 2012), whereas 54 percent voted for Obama in Oregon as a whole (Oregon Live 2012).

Portland’s rainy climate is an important part of its identity and is a catalyst behind the City’s implementation of sustainable stormwater infrastructure. As illustrated in Figure 5, Portland’s driest months are July and August, while June and September have relatively less precipitation than the rest of the year. November, December, and January are by far the wettest months in Portland. Table 4 shows Portland’s annual mean precipitation in comparison with the relative cities introduced in Table 1. As an interesting note, Austin
and Portland have similar average annual precipitation; however, Austin’s precipitation is more consistent throughout the year (NWS SRH 2011) and typically comes down in heavier storms rather than as an ongoing drizzle.

Figure 5 Portland's normal precipitation by month (inches)

![Normal monthly precipitation in inches from 1871 - 2011 (downtown Portland)](image)

Source: NWS Portland (2011)

Table 4 Annual mean precipitation by comparative cities (inches)

<table>
<thead>
<tr>
<th>Annual mean precipitation by comparative cities</th>
<th>Annual Mean Precipitation 1949 - 2006 (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>City</td>
<td></td>
</tr>
<tr>
<td>Tucson, AZ</td>
<td>11.42</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>15.50</td>
</tr>
<tr>
<td>Sacramento, CA</td>
<td>17.63</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>21.59</td>
</tr>
<tr>
<td>Austin, TX</td>
<td>32.86</td>
</tr>
<tr>
<td><strong>Portland, OR</strong></td>
<td><strong>37.58</strong></td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>38.17</td>
</tr>
<tr>
<td>Vancouver, BC</td>
<td>50.28</td>
</tr>
</tbody>
</table>

Sources: Vancouver, BC Precipitation data from UBC station (Environment Canada, 1971 - 2000)
U.S. Precipitation data (WRCC 1949 - 2006)
The rainfall in Portland contributes greatly to its culture. Carl Abbott, urban historian at Portland State University, writes eloquently of Portland’s climate and its effect on its residents, “...the most common understanding of Portland’s climate is grayness...The winter weather can nourish deep depression. But the gray months can also be soothing, muffling, twilight weather, thinking weather” (Abbott 2001). There is a saying that is particularly apt for Portland: there is no bad weather, there is just inappropriate clothing. Whether it is a debate over umbrellas versus raincoats,27 Portlanders love having easy access to the outdoors afforded by the location of the city28 (Abbott 2001), and appropriate rain gear allows length to this pleasure into the rainy season. Abbott contends that the backdrop of the magnificent outdoors and Portland’s natural resource history, combined with the desire and fortitude to develop an “urban” city has made Portland a unique combination of the country and the city which is quite desirable yet wrought with tension (Abbott 2001).

3.2 Progressive Portland – urban planning and culture
Portland is viewed as a leader and innovator in planning practice, policy, and community involvement, and therefore it is considered as a model city in this regard (Abbott 1997; Gibson and Abbott 2002; Putnam, Feldstein, and Cohen 2003; Beatley 2004). It has a reputation for progressive urban planning practices such as integrated transportation and land use planning, an emphasis on density and infill, a robust public transit system, a touted culture of walkability and cycling, attention to pedestrian oriented urban design, the conservation of parks and natural areas inside the city (Ozawa 2004; Abbott 2011; Lansing 2003), and a progressive attitude toward planning for global climate change as is exemplified by the City as the first in the United States to adopt a climate action plan (Linstroth and Bell 2007). There are controversies over such actions listed above; however, the culture of Portland allows for such planning decisions to have become the norm. Perpetuating this progressive reputation, the City has a multitude of high “green” and “sustainable” rankings (Bruns 2011; Business Courier 2010; Business Wire 2008;

27 For example, see “Umbrella VS Raincoat!” (Yelp), “Umbrellas? Not for locals!” (virtualtourist), or the Climate description on Wikitravel (Wikitravel).

28 Portland is located in the fertile Willamette Valley and within about an hour and half drive to the ocean, to Mount Hood, or to the Columbia River Gorge.
Svoboda, Mika, and Berhie 2008; Stockdale 2011). The methods behind many of these rankings can be questioned, but nevertheless Portland consistently receives top scores and both residents and planners have come to see their city as one of sustainability excellence.

Land use and transportation policies are just one part of this standing, as Portland also has a reputation for a progressive culture in other ways as well; the popularity of urban chickens, the many farmers markets, an active cycling culture, abundant food carts and micro-breweries – these are just some examples. Although there is a diversity of people with differing lifestyles in Portland, Portlanders are seen to be “hip”, environmental advocates who are involved in their city. Therefore, the culture of Portland and its people allows for continued innovation on multiple fronts, innovations that will inevitably be controversial yet will perpetuate its progressive reputation.

### 3.2.1 Progressive urban planning policies

Although Portland had begun some innovative urban planning policies prior to statewide legislation, the land use decisions made by the City of Portland are tied to statewide and regional planning policies and goals (Abbott 2011; Seltzer 2004; Abbott 2001). Overarching statewide law through Oregon Senate Bill 100 adopted in 1973 requires that all cities and counties implement a comprehensive plan tied to zoning ordinances that implement the plan (State of Oregon 1973). Oregon’s Land Conservation and Development Commission conducts comprehensive reviews of plans for consistency with statewide planning goals (ODLCD 2010). In particular, the urban growth boundary is a land use tool that has given Portland a progressive reputation and which has received much attention (Layzer 2006; Abbott and Margheim 2008; Walker and Hurley 2011; Adler 2012). Urban growth boundaries throughout Oregon were instituted as part of the

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29 Further, in urban planning circles Portland is also consistently in the news. For instance, as I was writing this very section, an article from Planetizen popped up on my newsfeed, “Will Portland-Style Apartments Catch on in San Francisco?” (Dawid 2012). Portland in the urban planning news is not uncommon, ranging from odd, to good, to critical, for example: “Addition of the Day: Portland Installs Nation’s First Bike Counter” (Grabar 2012); “Regeneration through an Urban Food Factory” (Macht 2012); “Failure to support Fair Housing Act leads to subsidized segregation: Locked Out, Part 1” (Schmidt 2012).

30 The Urban Growth Boundary is also reviled for its seeming attack on private property rights (Adler 2012; Walker and Hurley 2011) as well as perceived unintended consequences of higher land values and thus higher housing prices within the Portland Metro area (Howe 2004; Phillips and Goodstein 2000).
implementation of Senate Bill 100 and continue to be one tool for implementation of the State’s Goal 14: Urbanization. Metro, the elected regional government for Portland’s three county metropolitan area, manages the area’s urban growth boundary. Regional policies put into place by Metro, particularly the Regional Vision: 2040 Growth Concept (Metro 1997), have contributed to the feasibility of implementing Portland’s progressive policy actions such as increased mass transit and low parking ratios.

3.2.2 Parks, open space, and nature

The protection of open space and natural areas is also a significant part of the history and current planning for the City of Portland. Although the city has a long history of park and open space preservation (Orloff 2004; Abbott 2011; Lansing 2003), statewide and regional policies also offer an important policy framework for the City of Portland. Oregon’s Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces seeks “to protect natural resources and conserve scenic and historic areas and open spaces” (State of Oregon 1996). Both Metro and the City of Portland have multiple plans that to some extent address the goals and guidelines laid out in Goal 5. For example, Metro’s 1992 Metropolitan Greenspaces Master Plan aims to protect and restore natural areas and wildlife habitat. It also seeks to provide natural recreation within the region in order for residents to enjoy natural areas locally rather than traveling to do so (Metro b). The City of Portland’s Parks 2020 Vision Plan, adopted in 2001, echoes some of the goals set out in Metro’s plan such as protecting and restoring urban nature, creating an interconnected trail system within the city and into the region, and ensuring access to nature for all Portland residents (City of Portland c). The Portland Plan, discussed later in this chapter, also covers these goals.

Portlanders have a long history of interacting with nature and natural resources. Carl Abbott links this history to contemporary Portlanders’ love of urban nature and the wilder

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31 The purpose of Goal 14 is, “To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities” (State of Oregon 2006). The placement of the urban growth boundary should accommodate a forecasted 20-year population and should ensure that housing, employment, and uses of public facilities are met within the boundary (expansion of the boundary can only occur if needs are demonstrated not to be met inside the boundary) (State of Oregon 2006). The goal also specifies that the location of an urban growth boundary should consider “comparative environmental, energy, economic and social consequences” (State of Oregon 2006) and that urban uses should be compatible with agricultural and forestry uses outside of the boundary (State of Oregon 2006).
places located both inside and close to the City (Abbott 2001). The proximity of Portland’s rivers is one example. Some historians point to the importance of both the Columbia and Willamette rivers in the development and identity of the city, beginning with Portland’s establishment and subsequent regional prominence in part as a result of its location close to ocean shipping and agricultural exports (Abbott 2011, 2001; Lang 2010; Lansing 2003). These rivers have had industrial and commercial importance to Portland and the region, and subsequently also have a history of neglect and contamination. The degradation of the rivers is now being addressed, in part, as a result of Federal regulatory measures such as the Clean Water and Endangered Species Acts (Lang 2010; City of Portland 2006). Today these rivers still have an industrial and commercial role; however, a desire for outdoor recreation and a concern for a healthy watershed have become important aspects of planning in Portland (Abbott 2001; Lang 2010).

Also of importance to Portland’s identity and to Portland residents are the large expanses of forest land and parks gifted to or acquired by the City of Portland as long ago as the early 1850’s (Orloff 2004; Lansing 2003). A visit by John Charles Olmsted in 1903 and his subsequent Report to the Park Board (Olmsted Brothers 1903)\(^{32}\), as well as a visit by Lewis Mumford in 1938, are frequently cited as key events in Portland’s continued efforts to preserve and conserve natural areas and open spaces in the city (Abbott 2001; Orloff 2004; Stephenson 1999). Today there are 12,591 acres of public parks and open space\(^{33}\) in Portland and 220 miles of trails (City of Portland). The city also manages 236,000 street trees and 1.2 million park trees (City of Portland). As of 2010, Portland’s citywide tree canopy coverage was 29.9 percent, with 33.1 percent of that in residential zones (City of Portland 2012); City goals would increase overall tree canopy coverage to 33 percent, and 35 to 40 percent in residential zones (City of Portland 2012).

Although Portland has a large supply of parks, open space, and trees, they are not dispersed equitably throughout the city. For example, findings from the Coalition for a Livable Future’s Equity Atlas show that the central and inner southeast and northeast neighborhoods of the city have nature deficits as a result of early and intense urban

\(^{32}\) This report laid out a comprehensive 50-year system of parks and greenways.

\(^{33}\) Parks and open space include neighborhood, urban, and regional parks, community and public gardens, wetlands and rivers, and golf courses.
development. Further, the atlas illustrates that access to public parks and natural areas is worse in poorer neighborhoods and neighborhoods with significant non-white populations than in more affluent and white neighborhoods (CLF 2007). The Portland Plan’s 2035 objectives offer remedies for deficiencies in equitable access to nature and evenly distributed tree canopy coverage (City of Portland 2012). The protection of open space and natural areas through the land use policies and plans described in this section show a propensity for decision making that preserves existing undeveloped land. The history of Portland, along with the policies, plans, and land use actions of the City, indicates strong citizen environmental awareness and concern that has translated into support of policies that are sympathetic toward the protection and conservation of the environment.

3.2.3 Citizen engagement

Complementing the city’s efforts toward protection and conservation of green and open space is Portland’s culture of active citizenry (Berry and Portney 1993; Putnam, Feldstein, and Cohen 2003; Abbott 2001; Layzer 2006). Several key points in Portland’s history serve as an indication of the activist culture of Portland and subsequent implementation of progressive land use policies. For example, in the late 1960’s and early 1970’s, neighborhood groups began to protest urban renewal and highway construction. Successful initiatives included the removal of the Harbor Freeway after protests in 1969 and the cancellation of the Mount Hood Freeway in 1975 (Abbott 2011; Lansing 2003). In the case of the Mount Hood Freeway, federal highway funding was diverted from that project to Interstate 84 improvements and to the installation of light rail (Lansing 2003). The establishment of Portland’s Office of Neighborhood Associations in 1974 was also significant. This office institutionalized a mechanism for meaningful public participation in policy decision making in the city. Portland continues to incorporate public

34 Tree canopy coverage, which is not part of the Equity Atlas methodology, has increased in these neighborhoods over the last 30 years as a result of the growth of existing trees and trees that were planted by the city and groups like Friends of Trees (CLF 2007; Poracsy and Lackner 2004).

35 Conservation and preservation of undeveloped land can contribute to sustainable development planning goals that typically include elements like compact urban form, higher average housing densities centered upon transit centers and corridors, and efficient use of land (Ewing et al. 2007; Beatley and Manning 1997; Newman, Beatley, and Boyer 2008; Newman and Kenworthy 1999). Further, for those who advocate an ecosystem or bioregional approach to urban planning and design, the incorporation of natural systems into the built environment and an emphasis on human connection to nature and natural systems is important (Newman and Jennings 2008; Beatley 2011; Register 2006; Hester 2006; Beatley 2004).
participation to varying degrees in their own bureau processes, as well as through the neighborhood system as a whole. For instance, Portland has multiple citizen advisory committees such as Pedestrian, Bicycle, and Budget advisory committees and extensive public processes for overarching policy development like the 2012 Portland Plan (City of Portland e). Further, a statute has institutionalized language that requires city bureaus to notify and include neighborhoods in planning for decisions that might affect them, and likewise, neighborhood associations have the authority to make recommendations on such matters (City of Portland 2005).

Despite the accolades Portland’s neighborhood association and public involvement system has received, there has been conflict within the system in the past and a shift in attitude toward NIMBYism (“Not In My Backyard”). Moreover, it has been suggested that a cohesive and collective vision will be difficult to achieve with increased diversity of the population as well as increased divisiveness that special interest groups bring to the table (Johnson 2004; Witt 2004; Abbott 2011). Further, as a result of distrust of the City and particular bureaus (Shandas and Messer 2008), continued public acceptance of progressive policies might be at risk.

A 2011 report by Civic Life in America confirms that Portlanders are civically engaged. I looked at two civic engagement indicators, volunteer rate and self-reported voting behavior, to discover how Portland compared to other cities in these particular categories. Shown in Figure 6, the Portland Metropolitan Statistical Area (MSA) had the 5th highest volunteer rate (30%) in this particular city comparison, was first in terms of self-reported voting behavior (“voted in local elections often”), and was above the national average for both categories (Civic Life in America). When looking at “large cities” (over 1 million inhabitants), the Portland MSA ranked 16th of 51 cities for volunteerism, and 3rd of 51 cities for frequent voting in local elections (Civic Life in America).
### 3.3 The case – “Tabor to the River” in Inner Southeast Portland

Within this larger context of Portland, its culture, and its citywide programs, there are also neighborhood and watershed specific programs in Portland. The Tabor to the River (T2R) program is an example of a subwatershed specific program. It encompasses six neighborhoods in Inner Southeast Portland. I framed my exploration of this project’s research questions through this program.

T2R incorporates multiple scales and types of nature, which subsequently enables multiple ways for residents to be actively involved in stewardship and nature activities. Such activities include those explicit to the program (sustainable stormwater infrastructure, natural area restoration) and those that might occur in any neighborhood (tree planting, gardening, spending time in a park). I explored human interactions and
stewardship activities with urban nature\textsuperscript{36} and sustainable stormwater infrastructure. I sought to discover how these interactions and activities contributed to participants’ understanding and perceptions of local ecological systems, natural processes, and urban nature. In order to provide an overall context of this case, in the next pages I will describe pertinent city policies and plans for my research, including the area under study.

\subsection*{3.3.1 Portland Plan}

Adopted in April of 2012, the City of Portland took a unique approach to policy planning in its overarching policy document, the Portland Plan, by structuring all policy strategies and goals through an equity framework. The plan states, “Greater equity in the city as a whole is essential to our long-term success. Equity is both a means to a healthy, resilient community and an end from which we all benefit” (City of Portland 2012). The language of the plan incorporates concerns surrounding resilience and the ability for the city and its residents to cope with multiple uncertainties surrounding the economy, resources, climate change and earthquakes, and to adapt to changes as they arise.

Although the plan aims for economic, infrastructural, and jobs resilience, there is also an emphasis on social resilience through strengthened community relationships. Achieving resilience is covered in part through the incorporation of goals toward human and environmental health within the plan’s Healthy Connected City strategy (City of Portland 2012). Community and environmental resilience would be achieved through goals that would institute 20-minute communities,\textsuperscript{37} where Portlanders live within a 20-minute

\footnotetext[36]{There are of course debates surrounding “what is nature” (and the human relationship to nature) (Descola and Palsson 1996; Vining, Merrick, and Price 2008; Gobster and Hull 2000; Greider and Garkovich 1994). I do not attempt to constrain this study by defining nature. Instead, I use the word “nature” in a very broad sense to encompass aspects of the environment that are not built by humans, and which contributes to the local and global ecosystem. The Coalition for a Livable Future’s definition of “access to nature” is one that fits this broader conception of nature, and one with which I agree: “…the chance to encounter the region’s native fish and wildlife and explore the natural areas that sustain them” (CLF 2007). To me this might include rain, insects, and both native and manicured nature, etc. I do not attempt to place a value on the authenticity of different types of “nature”. Later chapters will show how I left the idea of “what is nature” open, so as to gather open opinions and stories from research participants.}

\footnotetext[37]{Portland created a 20-minute neighborhood index to indicate the degree to which residents live in “complete” communities, or within a 20-minute walk of schools, amenities, retail, and services, etc. (City of Portland 2012). Vancouver, BC’s Greenest City 2020 Action Plan also highlights planning for “complete communities”; it is a key strategy in Goal #4, Green Transportation. Key actions toward this strategy include planning for neighborhoods that have public spaces, goods, and services within a 10-minute walk from homes (City of Vancouver 2012).}
walk of what is needed to carry out daily life. The Healthy Connected City strategy also outlines policies that place value on Portland’s watersheds and environment, and emphasize Portlanders’ access to the Willamette and Columbia rivers and other urban nature.

Goals related to my work found within this strategy include linking “complete neighborhood centers by a network of city greenways” (City of Portland 2012) and integrating “nature into neighborhoods” (City of Portland 2012). The Portland Plan states that in 2012, 76 percent of Portland’s residents already lived within a half-mile, or 10 minute, walk to a park or natural area (City of Portland 2012). The plan sets a goal to achieve this same proximity for 100 percent of Portlanders by 2035 (City of Portland 2012). This target would be achieved through the expansion of networked greenspaces of habitat corridors and neighborhood greenways (City of Portland 2012). Further objectives include improvements to the Willamette River watershed, increased and evenly distributed tree canopy, protection and connection of a diversity of critical habitats, and preservation of “high quality trees”38 (City of Portland 2012).

The Portland Plan lays out guiding policies and goals that require coordinated planning and investment with multiple city departments and partners. This integrated strategy is seen to provide multiple benefits to the environment, to Portlanders, and to the city’s infrastructure and capital investments (City of Portland 2012). The plan attempts to institutionalize strategies for maintaining the health and vitality of local watersheds into city-wide decision making through a variety of policies that include metrics through which to measure success (City of Portland 2012). In the process, there is potential for these policies to establish more nearby nature and add subsequent opportunities for experience and activity in nature.

### 3.3.2 Portland Watershed Management Plan

The Portland Watershed Management Plan, adopted prior to the Portland Plan, addresses watershed health through goals, targets, and policies specific to each subwatershed located in Portland. The Bureau of Environmental Services developed the 2005 Portland

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38 “High quality trees” were not defined in the Portland Plan.
Watershed Management Plan (PWMP) in part to address Federal environmental regulations such as the Clean Water Act, Endangered Species Act, and Safe Water Drinking Act (City of Portland, 2006a), as well as other State and regional regulatory obligations. The PWMP uses what the city calls an “integrated framework” (City of Portland 2006) to undertake solutions to address root causes of declining watershed health. In this way, watersheds would be restored holistically rather than by addressing each regulation, or each symptom of poor watershed health, individually. The PWMP is an example of bioregional thinking in its recognition of the watershed as a system. It acknowledges that there are relationships between development patterns, human actions, and watershed health in Portland and its region. For example, the PWMP recognizes the interconnectedness of watershed systems, acknowledging the down and upstream effects of Portland’s and Portlanders’ actions on the (bio)region (City of Portland 2006).

The PWMP utilizes policies that monitor, preserve, restore and enhance water systems, and it emphasizes cooperation between city departments in its implementation. In addition, the PWMP recommends the application of watershed health goals into city-wide decision making (City of Portland 2006); something that is now being done in the Portland Plan. Further, the PWMP includes actions to build community through opportunities for residents’ active participation in improving watershed health (City of Portland 2006). This investment in community education and outreach can be seen as an investment in local environmental knowledge that has the potential to cultivate communities of stewards; an important aspect of the bioregional urbanism model. The city recognizes that involving the public in a dialogue of watershed health, through education and participation in restoration activities, can contribute to the watersheds’ long-term health (City of Portland 2006; Nelson 2011; Shandas et al. 2010).

The Bureau of Environmental Services (BES) has primary responsibility for the implementation of the PWMP (City of Portland 2006). Reflecting the structure of the PWMP, BES has broken up the responsibility for implementation of the plan into separate watersheds (Map 3). The watershed as an operational unit is one example of a bioregional approach to planning that would address watersheds as a regulatory unit. In
this study, I focus on one program of the Willamette River watershed, “Tabor to the River”.

Map 3 Portland, Oregon’s watersheds
Base map: (Google Earth 2012) Watershed data: (CivicApps 1994) T2R boundary reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011)

3.3.3 Tabor to the River
The T2R program addresses sewer pipe overcapacity in T2R neighborhoods. The program seeks to reduce basement sewer backups while also reducing combined sewer overflows that pollute the Willamette River. Guided by the PWMP, T2R evolved from a solution based solely on pipe repair and replacement to an integrated stormwater management and watershed health approach that focuses on sustainable stormwater infrastructure. Moreover, it includes community partnerships as a key component of the overall program. Indeed, a cornerstone of T2R is the program’s efforts to cultivate community involvement around watershed health. These efforts were built from a foundation of public support for and awareness of the health of the Willamette River that began with
Portland’s downspout disconnect program (Nelson 2011). In effect, the efforts of the downspout disconnect program began a placed-based planning effort to build community and community identity around watershed health and the health of the Willamette River.

Map 4 Context: Tabor to the River, Green Streets, and research participant locations

Base map: (Google Earth 2013) Green Street data reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011) T2R boundary reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011) Participant data from the author.

Portland’s T2R program is a local scale and a localized solution to better management of stormwater runoff. It is situated within Portland’s Willamette River watershed, bounded by the Brooklyn Creek Basin in the Taggart subwatershed, or more accurately the Taggart D sewershed or sewer basin, in Inner Southeast Portland (Map 4). T2R stormwater management and watershed health projects increase and restore natural habitat, decrease stormwater flows and basement and street flooding, and reduce nonpoint source water pollution. T2R was developed as a multi-faceted approach to stormwater management by combining infrastructural and increased vegetation solutions within a framework of

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39 The downspout disconnect program entailed an intensive door-to-door outreach campaign. This program saw 56,000 households disconnect their downspouts, removing approximately 1.2 billion gallons of stormwater from the City’s stormwater system per year (City of Portland, b).
community engagement and education (City of Portland 2011; Nelson 2011; Shandas et al. 2010).

T2R relies primarily on incorporating bioswales (Green Streets) into existing streets and sidewalks. Green Streets are lined with planted edges that are deliberately designed to gather, filter and percolate water into the ground. The planted edges are typically in the form of planters with design specifications that allow the capture of stormwater runoff. This runoff is then filtered through native and water tolerant plants and several layers of soil material, and is retained until it soaks into the ground to recharge the groundwater supply (City of Portland h).

This natural systems approach is combined with the planned repair or replacement of 81,000 feet of aging sewer pipes (City of Portland 2009). In addition to Green Streets, which infiltrate stormwater and also provide new natural habitats, T2R subprograms focus on the incorporation and reintegration of vegetation and natural habitat into the urban environment. This is done through private property rain gardens and ecoroofs, increased urban tree canopy, and the restoration of existing natural areas like Mount Tabor Park (City of Portland 2009).

Image 1 Green Streets
Photos taken by the author.

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40 I will discuss the importance of rain gardens in subsequent chapters. They are larger, garden-like natural areas implemented on private and public property. They are designed to divert and infiltrate stormwater runoff from the streets and the stormwater system. They generally have a less engineered appearance and tend to incorporate greater quantity and variety of vegetation than Green Streets.

41 Mount Tabor Park is a large 190-acre park located at the pinnacle of the Tabor to the River program area. It includes varied programming, including a play structure, paved walking paths, a road, several trails, and drinking water reservoirs. The park is full of large trees, includes open fields, and offers wonderful views of the City of Portland on one side and Mount Hood on the other.
Portland’s policies, and the projects administered through T2R, incorporate both social and physical elements found in the bioregional urbanism model. For example, the retrofit of urban neighborhoods that integrate natural systems (bioswales and rain gardens), the restoration of existing natural systems and habitat, and the emphasis on community involvement in such programs, combined with opportunities for environmental learning. The bioregional urbanism model provides a means for nesting individuals within a broader ecological context of the neighborhood, community, city, bioregion, and world. The T2R program shows promise in providing people with similar connections through experiences in a neighborhood that are linked to a larger water system.

### 3.3.4 Tabor to the River neighborhoods – urban form, nature, and demographics

The T2R program is located in Inner Southeast Portland. Portions of six neighborhoods comprise the program area: Brooklyn, Hosford-Abernethy, Richmond, South Tabor, Sunnyside, and Mount Tabor (Map 5). The inner neighborhoods of the City (Map 6) developed during the Streetcar Era (Thompson ; City of Portland 2012; CLF 2007). Because of this, these neighborhoods are made up of rectilinear blocks with an interconnected street system. Residential areas have small lots, and buildings are oriented toward the street. Further, as a result of the early influence of the streetcar, there is a comprehensive system of main street commercial districts throughout Inner Portland. Parks are dispersed throughout Portland’s inner neighborhoods and are rectilinear in shape in order to fit into the existing grid pattern (City of Portland 2012).

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42 A very small portion of the South Tabor neighborhood is located in the T2R program area. Several research participants lived in this neighborhood.

43 From horse-drawn streetcars in the late 1800’s, to cable cars and electric streetcars in the 1890’s, streetcar ridership peaked in 1922. By 1950 all streetcar lines in Portland had been converted to bus use (Thompson).
Map 5 Tabor to the River neighborhoods
Base map: (Google Earth 2013) Neighborhood boundaries: (CivicApps 1997) T2R boundary reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011)

Map 6 Map of Portland neighborhoods categorized by geography
(City of Portland 2012)
The Central City and inner neighborhoods of Portland developed first (late 1800’s). The intensity of this early urban development precluded the incorporation of natural habitat, and because of this, these areas have a deficit of natural habitat (CLF 2007). Figure 7 illustrates residents’ access to nature for the neighborhoods in the T2R program area. Each of the neighborhoods in this study has less access to natural habitat than the Portland region as a whole. Residents’ access to parks in these neighborhoods is more in line with that of the region. The neighborhoods of Hosford-Abernethy (84%) and Brooklyn (82%) stand out for the remarkably high percentage of their populations that live within a ¼ mile of a park.

The tree canopy coverage in these neighborhoods is quite varied. As compared to Portland as a whole, four neighborhoods have less tree canopy while two have more, including the Mount Tabor neighborhood. Although the tree canopy coverage appears to be low, and is less than the city’s goals for the future (35 – 40% for residential zones), the tree canopy increased in Portland’s inner neighborhoods between 1972 and 2002. In their 2002 tree canopy inventory, Poracsky and Lackner (2004) contend that this increase was a result of the growth of existing trees and extensive tree planting programs sponsored by the city. In 2010, tree canopy coverage was almost 30 percent in Portland as a whole, and approximately 33 percent in residential zones (City of Portland 2012).

Overall, these data show that there is not universal access to natural habitat, parks, and trees in the neighborhoods analyzed in this study. There is variety to these neighborhoods, particularly those with more access to “natural habitat” and tree canopy. Finally, the majority of the neighborhoods in this study had less access to “nature” than Portland as a whole.

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44 The determination of “natural habitat” locations for the Equity Atlas was based on Metro’s 2002 Goal 5 inventory of the region (CLF 2007). The inventory identified wildlife and fish habitat locations and then ranked their health as they relate to the benefits the areas provide to fish and wildlife (Metro a).

45 The Brooklyn and Mount Tabor neighborhoods have a higher percentage of residents who live within ¼ mile of natural habitat, as compared with the other neighborhoods in the Tabor to the River program area. This is because the Brooklyn neighborhood is located near the Oaks Bottom Wildlife Refuge (adjacent to the Willamette River), and the Mount Tabor neighborhood is close to Mount Tabor Park.

46 The Coalition for a Livable Future’s Equity Atlas reports that 49% of residents in the region live within ¼ mile of a park (CLF 2007). According to the Portland Plan, 76% of Portland residents lived within a ½ mile of a park or natural area (City of Portland 2012).
Shown in Figure 8, the T2R neighborhoods have a similar percentage of people in poverty as compared to the Portland region (13%) and, except for the Mount Tabor neighborhood, have a lower proportion of higher income households. Although South Tabor has the highest percentage of “people of color”\(^47\) in the neighborhood in this comparison, in general the neighborhoods in this study have lower proportions of people of color than

\(^{47}\)“People of color” is a phrase used in the Coalition for a Livable Future’s Equity Atlas. It refers to the data retrieved from the 2000 Census for those individuals who did not indicate their race as “white” or “not Hispanic in origin” in the census (CLF 2007).
the region. Three of the neighborhoods in this study have higher percentages of people who are 65 years old and older as compared to the region, while two are about equal, and one is lower. Overall, Figure 8 shows that the residents of the neighborhoods in this study are highly “white” and “not Hispanic in origin”, and a middle income population.\footnote{According to a Pew Research Center study on the middle class (Pew 2012), the middle class is calculated as income that is 2/3 to double that of the overall size-adjusted median household income. Using this definition, the Pew study reported a very wide range in household income in the United States: $39,418 to $118,255 (size adjusted to a 3-person household from the U.S. Census’ 2011 Current Population Survey). This Pew study also conducted a general public survey with 2,508 adults. These participants reported that their perception of a middle-class household income for urban areas in the western United States was $70,000 per year.}

Figure 8 Study area, neighborhood demographics in 2000

<table>
<thead>
<tr>
<th>Study area neighborhoods: demographics in 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
</tr>
<tr>
<td>% in poverty</td>
</tr>
<tr>
<td>% people of color</td>
</tr>
<tr>
<td>% 65 years and older</td>
</tr>
<tr>
<td>% household income $125,000 and above</td>
</tr>
</tbody>
</table>

Source: CLF (2007a)
Notes: Percents were rounded up.
3.4 Conclusion

In this chapter, I have described the context of this study from Portland as a whole to the study area. The City of Portland has implemented policies and programs which exemplify elements of place-based urban planning and design as articulated in the bioregional urbanism model. For example, the Portland Plan includes goals, that are consistent with bioregional urbanism in its intent to influence city-wide decision making, that affect the health of the environment (e.g. increased localized watershed health). The plan also emphasizes human connection to nature through policy goals that would increase resident access and proximity to urban nature. The Portland Watershed Management Plan addresses bioregional thinking in its recognition of the watershed as a holistic system by acknowledging the relationships between development patterns, human actions, and watershed health in Portland and the region. The plan also reflects elements of the bioregional urbanism model with its emphasis on community education and outreach toward place-based knowledge. The T2R program incorporates elements of social and physical aspects of the bioregional urbanism model through changes to existing infrastructure (e.g., Green Streets) and environmental education and outreach, and opportunities for stewardship.

Portland may on the surface appear to be a particularly unique place, especially if viewed through popular culture (e.g., backyard chickens, microbreweries, cycling culture). This could lead to questions of applicability of this research to other jurisdictions. Demographically, however, compared to cities of similar size in the western United States, Portland does not stand out as unique. Although Portlanders are more highly educated than the rest of Oregon and the United States, educational attainment is similar to other cities like Austin and Denver. Moreover, Portland’s median income was lower than Oregon, the United States, and three other cities in this comparison. Furthermore, the neighborhoods in the study area appear to be slightly more disadvantaged than the Portland region; although poverty levels were similar, the proportion of high income households was lower, and the area in general had less access to natural habitat.

Portland is often looked to as a model city for urban planning and public involvement, and Portland’s stormwater policies and goals regarding urban nature contribute to the
dialogue of “innovative Portland”. Beyond being a model city, and beyond demographics, the lessons that can be learned from Portland and the people who participated in my study offers insights for other jurisdictions who are dealing with growth and water quality problems, or who want to implement similar progressive land use policies. By selecting Portland and the T2R program as the context for my research, I was able to explore innovative ideas regarding stormwater management, environmental education, and stewardship as one program of study. Rather than replicating or generalizing study findings, I was looking to understand the details of participants’ experiences with nature and natural systems and what we might learn from those experiences to inform thinking in other areas.
Chapter 4 Research methods and procedures

In this chapter, I report on the various aspects of my research methods and detail the appropriateness of my research approach. In Section 4.1, I explain how I designed this research and selected the case to study. In Section 4.2, I detail the procedures I used for community member interviews, which are my primary data source. In Section 4.3, I outline the procedures I used for expert interviews of city staff and partner organizations. In Sections 4.4 and 4.5, I describe my document analysis and direct observation procedures, respectively. In Section 4.6, I discuss my process of data validation and interpretation of findings. Section 4.7 provides the demographic profile for the study. In Section 4.8, I discuss the potential limitations of the research design and procedures. I conclude in Section 4.9 with reflections on the experience of my field work.

4.1 Research design and case selection

I designed this research as an exploratory qualitative case study of Portland’s T2R program. Through this research, I explored human interactions and stewardship activities with urban nature and sustainable stormwater infrastructure. I sought to discover how these interactions and activities contributed to participants’ understanding and perceptions of local ecological systems, natural processes, and urban nature. My intent was to gather descriptive accounts of participants’ experiences with nature and watershed health projects. I anticipated interviewing a number of people with a diversity of experiences with the projects that were part of the T2R program. The participants in this study can be considered early adopters of environmental stewardship behavior and therefore appropriate subjects for my research question. Finding a cross-sectional representation of local, regional or national demographics was not my intent. My research question dictated an exploratory, qualitative approach to research design: How does active involvement in Portland’s Tabor to the River watershed health program foster place-based awareness and environmental learning?

An exploratory research design is appropriate when the phenomenon under study has previously had little detailed analysis and is undertaken in order to gain new insights
In this case, an analysis of the social impacts of sustainable stormwater management facilities and studies on urban and neighborhood-oriented restoration projects were not prevalent in the literature. Moreover, there was a lack of qualitative interview-based research on this topic generally and on the Tabor to the River program specifically.

The case study is an appropriate approach to research design when, 1) the intent of the study is an in-depth focus on a specific phenomenon which necessitates a small sample size (VanWy nsberghe and Khan 2007; Yin 2009) [this project focused on urban residents’ nature experiences through 42 semi-structured interviews]; 2) the case study research will be undertaken in a natural setting where there is little control over the phenomenon being studied (VanWynsberghe and Khan 2007; Yin 2009); 3) the case under investigation can be bounded in space and time (Yin 2009; Stake 1995); 4) the case study researcher utilizes several data sources in order to triangulate and validate findings and interpretations (Stake 1995; Patton 2002; VanWy nsberghe and Khan 2007; Creswell 2009; Yin 2009).

Qualitative methods are appropriate when the research attempts to answer “how”, “why”, and “what” questions, and for research that seeks to discover processes rather than outcomes (Marshall & Rossman 1989; Denzin & Lincoln 2005; Creswell 2009). My own research sought to ask how and why questions and sought to discover processes of learning and interaction with urban nature. Complementary to case study design, qualitative research places the researcher in a natural setting in order to observe and interact with people or objects in a particular context. It also employs multiple data collection methods in order to interpret meaning and gain understanding of the people or phenomenon under study (Marshall and Rossman 1989; Stake 1995; Denzin and Lincoln 2005; Yin 2009). Qualitative interviews were therefore the most appropriate data collection method for this project and formed the core of my inquiry. I performed 42 semi-structured participant interviews, 14 interviews with officials, and additionally undertook document analysis and personal observations of stewardship activities.
In the interviews, I asked participants to reflect on their perceptions of urban nature and natural systems and the various nature activities with which each person was involved. The exploratory, qualitative research design required my interviews to be open-ended, flexible, and to be guided by the participants’ own responses.

I selected Portland’s T2R watershed health program as an umbrella case study through which to explore my research questions on the basis of the following four characteristics as identified in the literatures reviewed in Chapters 1 and 2:

1. **Facilitation of the possibility of daily experience of nature through the integration of natural habitat and natural systems into urban neighborhoods.** An emphasis of T2R was the integration of natural habitat and natural systems into the existing urban fabric, the scale of which could enable daily interaction with nature. There were multiple forms of urban nature as part of this program, including public Green Street facilities, private property rain gardens, tree planting, and habitat restoration in Mount Tabor Park.

2. **Participation of the community and neighbors in intentional watershed health projects of varying scales and degrees of participation (habitat planting, maintenance and restoration, observation).** The T2R program was based on the belief that community involvement and education are crucial for improving and maintaining watershed health (City of Portland 2006; Nelson 2011; Shandas et al. 2010). The implementation of sustainable stormwater management facilities (Green Streets and rain gardens) were a central component of T2R. The program emphasized community involvement from the pre-design of new Green Street sustainable stormwater management facilities, through their completion, and into their subsequent maintenance. Moreover, volunteer work was a key part of the implementation and maintenance of rain gardens installed on private property. In this study, Green Streets and rain gardens represented a small-scale application of urban natural habitats connected to a larger stormwater and habitat system. These projects also incorporated a variety of community and personal involvement and learning opportunities, both passive and active. In addition, community volunteer work was a key factor in the maintenance and restoration of existing natural habitats through the Mount Tabor
Park Invasive Plant Control and Revegetation Project and the Mount Tabor Weed Warriors restoration program. In this study, the restoration of Mount Tabor Park represented a large-scale natural area within easy access of neighborhoods. Further, Mount Tabor Park offered a range of participation opportunities from passive observation to active involvement in restoration efforts.

3. Exploration of aspects of bioregional urbanism. The projects administered as part of T2R reflected many of the attributes found in the model of bioregional urbanism, such as the incremental integration of natural systems into urban neighborhoods and the restoration of existing natural systems and habitat. Further, the T2R program, as a whole, incorporated many different opportunities for active community participation and environmental learning. Like bioregional philosophy, the T2R program illustrates a nesting of scales that embeds people in the ecological context of neighborhood, community, city, bioregion, and the world (e.g., from rainfall to a roof, followed by its flow to a road, then to a Green Street, to the stormwater system or the Willamette River). The program showed promise to provide the context through which people might observe, learn, and appreciate these connections; a supposition this study sought to explore.

4. Applicability in practice. The Tabor to the River program has the potential to have strategic importance because of Portland’s reputation as a leader and innovator in planning practice, policy, and community involvement (Abbott 1997; Beatley 2004; Gibson and Abbott 2002; Putnam, Feldstein, and Cohen 2003; Berry and Portney 1993). Moreover, Portland’s stormwater management planning has begun to be recognized as a successful experiment with sustainable stormwater solutions and community-based stewardship49 (Shandas and Messer 2008; Wise 2008; Roth 2009; Shandas et al. 2010; Berkooz 2011). Further, Portland’s infrastructure and Federal regulatory framework is similar to other cities in the United States. Portland has a combined sewer system, which is a prevalent system across the country (Moser 2001; EPA 2011). Moreover, Federal environmental regulations such as the Clean Water Act, Endangered Species Act, and Safe Water Drinking Act (EPA 2010), which the Portland

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49 There are other cities also on the forefront of sustainable stormwater infrastructure such as Milwaukie (MMSD 2009), Seattle (City of Seattle.), Philadelphia (Philadelphia), and Chicago (Chicago).
Watershed Management Plan and Tabor to the River address, are enforced nationwide. How Portland addresses watershed health and community environmental stewardship, therefore has the potential to influence the decisions of other cities as they grapple with issues of regulation, growth, and change.

Through this research, I have explored the effects of active community involvement in the T2R program. I designed this research to study a range of participation and scales of urban nature. The recruitment strategy for the study entailed a broad call for participation by people living or working in the neighborhoods found within the T2R project area (see section 4.2.1), although there was participation from some outside of the T2R boundary. Because of this broad recruitment strategy, I engaged people with a variety of experiences with different types of watershed health projects. Specifically, it was my intent to explore Green Street sustainable stormwater management facilities and restoration efforts on Mount Tabor Park. However, due to the exploratory nature of this research, participants shared other experiences and their own ideas of urban nature such as different parks, trees and tree planting, rain gardens, and the cultivation of backyard habitats. Therefore, I was able to address the degree to which the scale of the natural area and the level of participation within those areas influenced participants’ environmental learning and their connections and perceptions of relationships across different scales of urban nature.

I embedded this study within Portland’s larger context which included its people, culture, and policies (Figure 9). The T2R program was the umbrella for the case of study. T2R provided the bounded area for participant recruitment and analysis of pertinent watershed health programs and policies. I explored two units of analysis: 1) planning and policy context of the T2R program through interviews and document analysis; and 2) experiential evidence, through semi-structured interviews of individuals living or working in the neighborhoods in, or proximate to, the Tabor to the River boundary, and personal observations of projects and activities.
4.2 Semi-structured interviews – community members

Experiential evidence, through community member interviews, was my primary data source. Interviews are a key component of qualitative research which explores human behavior (Yin 2009). They give the researcher access to others’ observations, experiences, and perceptions (Weiss 1994; Stake 1995). In the following sections, I describe the procedures I used to collect this evidence, from recruitment through to analysis.

4.2.1 Recruitment

I made a broad call for participation in this study, using a non-probability purposive sampling approach (Weiss 1994; Brewerton and Millward 2001; Blaxter, Hughes, and Tight 2006). Purposive sampling is an appropriate method when selecting research participants with an underlying commonality or interest (Brewerton and Millward 2001). In this study, the underlying commonality was primarily location based. I recruited participants who were 19 years of age and older within neighborhoods in or abutting the Tabor to the River program area.

I recruited research participants throughout the summer of 2011, using a multifaceted recruitment approach. I began first by asking the City of Portland’s BES staff for assistance. Although BES would not disseminate my project information, they provided
me with names of a few key informants who were either highly involved in the community or who had a Green Street facility installed in front of their home. Further, I printed color posters advertising my project and posted them in strategic places throughout Tabor to the River neighborhoods, such as the library, several grocery stores, and various retail establishments. I also wrote recruitment articles for inclusion in two neighborhood newspapers; The Southeast Examiner and The Bee. I used social media by establishing a personal website that included an online signup sheet. I also joined the Facebook pages of several neighborhood associations in the study area, and posted short research recruitment blurbs with a link to my online signup sheet.

In addition to this more broad sweeping approach, I followed up with a more personal method for recruitment. I met with staff from the Southeast Uplift Neighborhood Coalition, who then posted a poster at their main office and included a research recruitment announcement in their monthly newsletter. I met with staff of two churches, Colonial Heights Presbyterian and St. Philip Neri parish. Both churches posted posters and included my research announcement in their newsletters. Moreover, I contacted each neighborhood association that had a portion of their neighborhood boundary in the T2R project area. I then spoke at their monthly neighborhood meetings and included my research recruitment message in their monthly newsletters. I did this for five neighborhoods: Brooklyn, Hosford-Abernethy, Richmond, Sunnyside, and Mount Tabor.

Despite my blanket recruitment approach, over a third of the research participants signed up at neighborhood meetings. Face to face encounters were a tremendously successful recruitment tool. The downside of this approach was the self-selecting nature of those who go to neighborhood meetings, not to mention the self-selection of people who would be willing to sit down for a one-hour interview.

I also attended one Friends of Mount Tabor Foot Patrol meeting, participated in one Weed Warrior restoration event at Mount Tabor Park and one community garden workday. I attended a church service and luncheon, and attended one Division/Clinton Business Association meeting, one Transition Portland meeting, one rain garden workshop, and one BES sponsored Green Street Open House. At these events and
meetings, I helped with restoration work (when applicable), observed what was communicated about the purpose of the activities or meeting, and spoke with participants about their motivations for participation. Furthermore, I passed around interview signup sheets in order to increase study participation. After each event or meeting, I made entries into a field journal about my experiences.

Another fruitful avenue for recruitment was word of mouth recommendations. These either resulted in like-minded individuals or people who were referred purposefully because they were perceived to have different environmental or political values than those doing the referral.

<table>
<thead>
<tr>
<th>Successful Recruitment Method</th>
<th>Number of Participants</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neighborhood Association meeting</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>Recommendation/Word of Mouth</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Weed Warrior Ivy Pull</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>SE Examiner article</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Church luncheon</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Division/Clinton Business Association meeting</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Mount Tabor Foot Patrol meeting</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Transition Portland meeting</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Website</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total Participants Interviewed</td>
<td>42</td>
<td>100</td>
</tr>
</tbody>
</table>

In the end, I interviewed 42 community members (7 couples), comprising 35 households (Table 5 and Appendix 1 Research participants, community members. Although I had several more people interested in participating in this project, I stopped conducting interviews when I reached a data saturation point and was beginning to hear similar stories and opinions. At that point, I had 42 full interviews and deemed it appropriate to move on to analysis.
Although I attempted to recruit participants from within the T2R project boundary, it quickly became apparent that it was a difficult restriction to enforce; nature, urban nature, Green Streets, and Mount Tabor Park, intersect with peoples’ daily lives whether or not they live in one particular bounded area. Although 52 percent of participants lived outside of the T2R project area, they in general did not live further than a half of a mile from the edge of the boundary. Moreover, several people who volunteered on Mount Tabor Park lived outside of the boundary and yet were quite involved in its stewardship.

4.2.2 Interview procedures and process

After recruitment, I scheduled and conducted interviews. I carried out this research according to the University of British Columbia Behavioural Research Ethics Board (BREB) protocol under a certificate of approval for minimal risk.

I used a semi-structured interview approach for data collection rather than a depth-interview method which would be more appropriate for an in-depth exploration of one particularly powerful experience (Miller and Crabtree 2004; Holloway and Todres 2007). A semi-structured interview inquiry allowed for depth of conversation while at the same time allowing me to guide the discussion toward specific elements of the research. Because environmental knowledge and learning processes were not on the forefront of conscious thought for most participants, it was necessary for me to guide the conversation toward these ideas in order to pull out such themes. Therefore, although I used a semi-structured approach while conducting the interviews, the interview process provided the opportunity for in-depth participant reflections.

I began the first few interviews with an interview protocol in hand, meaning to cover each question in turn. However, this approach did not foster the nuanced conversation needed to tease out the depth of exploration on topics like the meaning of nature, attachment to nature, and other environmental attitudes. Methods scholars liken qualitative interviewing as a conversation with a purpose, flowing naturally between interviewer and interviewee, but with deliberate and careful listening and questioning on the part of the interviewer (Packer 2010; Warren 2001; Kvale and Svend 2009). Adhering to an interview protocol did not allow for such careful listening that could foster a natural, yet
purposeful conversation. Therefore, I quickly “threw out” the protocol in favor of grand tour categories that enabled me to explore the topics needed to answer my research questions. Table 6 lists the grand tour categories I attempted to cover in each interview. This table also includes coded theory categories to illustrate the link between data collection questions and the bioregional urbanism model, both of which tie into my research questions.

As with any conversation, interviews followed their own trajectories; therefore, I did not cover all topics in every interview. I used the grand tour categories as a guide to determine which areas I had covered in the interview and which categories I would pursue further if time allowed. I began each interview with questions about living in Portland, quickly following with a discussion on nature and urban nature. If a participant had a particular interest or was involved in a particular nature activity, we would spend more time delving into that particular topic (e.g., gardening or Weed Warrior restoration). At the end of each interview, participants filled out a demographic questionnaire which was open-ended in nature (Appendix 4) so as to not pigeon-hole answers to questions such as political party.50 While participants filled out this form, I would look over my notes and grand tour checklist to determine what, if any, questions to pursue further.

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50 When I asked participants to fill out the demographic profile, I told them that the information would be used for an overall look at the people who participated in the research and that the data would not be linked to specific individuals.
Table 6 Grand tour interview categories and related bioregional urbanism components

<table>
<thead>
<tr>
<th>Grand tour interview categories and related bioregional urbanism components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introductory questioning</strong> [PD]</td>
</tr>
<tr>
<td><strong>Meaning of nature</strong> [EL, ExN]</td>
</tr>
<tr>
<td><strong>Role of urban nature</strong> [EL, ExN, PE]</td>
</tr>
<tr>
<td><strong>Favorite urban nature places</strong> [ExN, NA, NN, PE]</td>
</tr>
<tr>
<td><strong>Connections</strong> [EL, IA, PD]</td>
</tr>
<tr>
<td><strong>Tabor to the River and Green Streets</strong> [DP, EL, IA, MP, PD, PE]</td>
</tr>
<tr>
<td><strong>Stewardship</strong> [EL, ExN, IA, PD, PE, SL, SP]</td>
</tr>
<tr>
<td><strong>Beliefs, Actions, and Behaviors</strong> [DP, EL, IA, PD]</td>
</tr>
<tr>
<td><strong>Interview wrap up</strong></td>
</tr>
</tbody>
</table>

| DP: Democratic Process | EL: Environmental Learning (knowledge) | ExN: Experience in Nature |
| SL: Social Learning | SP: Social Practices |

The interview process was instrumental in gathering data that spoke to connections and perceptions regarding different aspects of place-based understanding (specifically sustainable stormwater management facilities and urban nature). I therefore first asked general questions such as “what is nature” and “can you tell me about the purpose of Green Street facilities”. Answers to such questions were nuanced, but allowed me to gauge participants’ frame of reference. I also included a question for each participant regarding their general attitude toward environmental problems in the world today. This general question about environmental problems provided a baseline of each person’s environmental understanding and concern. I conducted the interview by introducing each new idea (grand tour category) as a general, open-ended question. I did this because I was looking for the response that came first to participants’ minds, for I did not want to generate preconceived ideas of what I was intending to learn. If the participant had trouble understanding my question or drew a blank, I would give more specific prompts.
4.2.3 Research analysis

I began the analysis process after all interviews were complete, beginning by transcribing recorded interviews word-for-word. I completed approximately half of these transcriptions myself, and two assistants transcribed the remaining half. I used Qualitative Data Analysis software, Atlas.ti, to support my organization of the data and my data analysis process. I began analysis while I transcribed, as ideas and themes began to emerge. I documented these ideas as memos as I proceeded through each transcription. I then used qualitative content analysis to interpret and analyze the transcribed interview data. This type of analysis is used to classify texts into meaningful categories (codes) for later interpretation and analysis (Dan and Kalof 2008), where the researcher focuses on the meaning of words and language rather than simply quantifying the number of times a theme or code occurs within a given text (Brewerton and Millward 2001; Hsieh and Shannon 2005).

I used both inductive and deductive analysis in interpreting interview data, what Deming and Swaffield (2011) call a “reflexive” approach to analysis. I first used inductive analysis to determine emergent themes, letting the data tell the story rather than fitting my own theoretical framework to participants’ voices. I coded in this way for several interviews, deriving new codes as I read each transcription. I then took stock of the codes and determined if some were related, redundant, or too unique, and then I combined or deleted codes as appropriate. After a cleanup of the codes, I continued with the same coding process for another set of transcriptions. I repeated this process until I deemed all codes and themes relevant and complete; this occurred when no new codes were needed to categorize the ideas covered in each subsequent transcription.

I then developed code themes from the qualitative content analysis of transcript text, including the question asked, how it was asked (e.g., how much prompting was needed), and the language and context of the answer (e.g., “expert” language, length of pause before answering). For example, coding for important nature places was simply a matter of assigning a code to what was being discussed, like “Nature: Mount Tabor Park”. However, determining the applicability of a theme like “Knowledge: Environmental Scales and Connections” entailed the analysis of much more nuanced language in order to
interpret how (or if) what participants were saying connected to different code themes. For instance, in the following quotation a participant discussed knowledge of global interconnectedness in answer to a question about whether they thought about environmental problems globally or locally, “(the world) doesn't seem nearly as big as it used to seem. We really are all in this together, whether it’s Portland, regardless of geopolitical boundaries or languages or anything. I feel as a U.S. citizen I’ve got a bigger role in creating the problems than most people in the world”. This person clearly understood that the world is interconnected and that actions taken on the part of Americans affect Earth and the global population as a whole; thus I attributed the code “Knowledge: Environmental Scales and Connections” to this quotation. In another example, which was coded with the same theme, a participant expressed knowledge of pollution discharging into the Willamette River. This quotation also illustrated knowledge of environmental scales and connections, but at a more local, less global scale, “everything’s going to end up in the river”. Overall, I attributed code themes to entire ideas expressed in answer to questions covered in my grand tour categories.

In many cases, a particular interview passage would encompass more than one theme. For instance, I coded the following quote as “Knowledge: Environmental Scales and Connections” and “Individual Actions”: “...looking at all of the different systems that are impacted by the choices that I make, like where I get groceries, how those are produced and the(ir) environmental impacts... (I’m) aware of the connections that I have and also the impacts that those create”. I coded in this way because of the participant’s understanding of the environmental impact of, and connections between, food production and distribution (environmental scales and connections), as well as the implicit statement (also explicitly discussed prior to this quote) that such knowledge impacted what decisions this person made in terms of food choices (individual actions).

After this initial inductive analysis of emergent themes, I began to see patterns that corresponded to my literature review. It was at this point that I developed a theoretical framework based upon both the inductive code themes and the literature covered in Chapter 2. I then proceeded with a second round of analysis, using deductive analysis through analytic categories (Miles and Huberman 1984) developed through my
theoretical framework, bioregional urbanism. Although many of the themes that emerged from my inductive analysis were represented by these analytic categories, I felt it was important to capture whether these theoretical themes were, or were not, present in the interview data. For example, because my literature review revealed the importance of nearby nature in developing a human-environment connection, I wanted to ensure that I captured that theme in order to analyze how participants expressed that particular idea. However, because I had preceded the deductive process with inductive analysis, it also became apparent that another theme, “meaningful nature”, was a significant part of how participants spoke about nature. By using both inductive and deductive analysis, I found that participants attributed different experiences and meanings for “nearby” and “meaningful” nature. These experiences then contributed to their personal understanding of the importance of nature in the city. Thus, by using both analytical techniques I was able to tease out intricacies of the interview data that otherwise may have been overlooked.

Following code analysis, I cross-checked the coded data with participants’ proximity to parks, community gardens, and sustainable stormwater management facilities, level and type of engagement, and discussions on the scale of nature. I then added one more layer to this analysis by analyzing participants’ time spent living in Portland.

For those code themes that stood out as being particularly common between all participants, I cross-checked interview transcripts once again by utilizing an Atlas.ti search function for keywords and phrases. I was therefore also able to quantify my interpretation of participant responses to grand tour questions. For example, when discussing ideas of sustainability and sustainable behavior, invariably participants mentioned either not owning a car or trying not to drive. Because this theme appeared to be so common, I went back to count the number of individuals who categorized themselves in this way in order to get a more accurate picture of the prevalence of this idea.
I followed this analytical procedure for the entire data set. In the following sections (4.2.3.1 and 4.2.3.2), I describe my assumptions for my analysis of the scale of nature and levels of engagement.

4.2.3.1 Scale
As part of this research, I explored the influence of the scale of nature and the visibility of natural systems on participants’ understanding and perceptions of local ecological systems, natural processes, and urban nature. This research was guided by two scales of “nature” as determined by attributes of the T2R program. I determined that Green Streets and private property rain gardens would represent the smaller scale integration of nature at the local neighborhood level. I decided that Mount Tabor Park would represent the larger scale due to its scale and prominence in the T2R program.

I will show in Chapters 5 and 6 that these scales were an important starting point to discuss nature and the role of nature in the city, while also exploring participants’ environmental awareness. However, the interview process revealed that participants perceived nature in many other scales. These perceptions influenced what they considered to be urban nature in general, and nature that was close to their homes and work. The interview process also revealed that participants felt that wilder and larger natural areas outside of Portland were an important part of feeling connected to nature. Thus, although the research was guided by the T2R program, the interview process led to new understandings of scale and perceptions of nature. I used these differing scales in my analysis of participants’ connections, meaning making, local environmental knowledge, and perceptions of nature and urban nature.

4.2.3.2 Proximity and level of engagement
4.2.3.2.1 Green Streets and rain gardens
One aspect of this research was the exploration of how differing levels of engagement with sustainable stormwater infrastructure contributed to participants’ understanding of local ecological systems and natural processes. For Green Streets and rain gardens, I determined that levels of engagement would encompass a range of opportunities for
engagement from walking by, to planting, weeding, or maintaining the projects either alone or in groups of people. In addition, the interview processes revealed other avenues of learning, such as reading newsletters or community newspapers, visiting a Green Street demonstration at a street fair, going on a rain garden tour, or participating in workshops or work parties. Further, I categorized participants in terms of their general community engagement, such as participation in neighborhood associations. I used each of these avenues of engagement in my data analysis in order to explore how and what type of environmental learning may have occurred.

I also considered proximity to sustainable stormwater facilities in my understanding of their experiences with natural systems (Table 7). These categories included participants with a Green Street facility in front of their property (received mailings, were heavily involved with the siting, design, and planting choices of the facilities, and now demonstrate various levels of stewardship), those with a Green Street across the street (received mailings and invited to open houses), participants who were involved with the implementation of private property rain gardens (varied involvement from grant applications to work parties), and participants who had only passive, or zero, interactions.

I utilized a Geographic Information System (GIS) (Map 7) to determine participant proximity by locating and categorizing participants who lived within 400 feet of a Green Street (less than two blocks or very short walk), between 400 feet and ¼ mile or 5 minute walk of a Green Street, and within a ¼ mile or 5 minute walk of a rain garden. I created buffers of these direct distances using participants as the center point of analysis. I created buffers of these direct distances using participants as the center point of analysis. I visually analyzed the resulting maps in order to apply general proximity measures. Categorizing participants in this way allowed me to analyze participant responses in relation to proximity and level of engagement. I was then able to determine how active

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51 I chose to analyze the rain gardens located at New Seasons, St. Philip Neri Parish, and Café au Play due to the level of engagement with these rain gardens as indicated by interviewees. I chose to analyze the rain gardens at Colonial Heights Presbyterian Church because the church engaged with me in my attempts at recruiting research participants. The Colonial Heights rain garden was not mentioned by name by research participants, except those expressly recruited from the church.

52 I used direct distance rather than street distance in this analysis. Except for a few streets in this area, the street blocks in Portland are short (between 200 and 400 feet) and connected through a grid pattern that allows for easy access to a desired location.
involvement in T2R or other activities, as well as the influence of proximity to Green Streets or rain gardens, fostered place-based awareness and understanding.

Table 7 Research participant proximity to a Green Street or rain garden

<table>
<thead>
<tr>
<th>Number of research participants who live in proximity of a Green Street or rain garden, summer 2011</th>
<th>Individuals</th>
<th>Percent of Total Individual Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total individual participants (non staff)</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Green Street in front of property</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>Green Street across the street from property</td>
<td>3</td>
<td>7.1</td>
</tr>
<tr>
<td>Live between 400 feet and 1/4 mile of a Green Street</td>
<td>10</td>
<td>23.8</td>
</tr>
<tr>
<td>Live within 400 feet of a Green Street</td>
<td>13</td>
<td>31.0</td>
</tr>
<tr>
<td>Live within 1/4 mile of a rain garden</td>
<td>7</td>
<td>16.7</td>
</tr>
<tr>
<td>Live within 1/4 mile of a Green Street or a rain garden</td>
<td>27</td>
<td>64.3</td>
</tr>
<tr>
<td>Live within 1/4 mile of a Green Street and rain garden</td>
<td>3</td>
<td>7.1</td>
</tr>
</tbody>
</table>
Map 7 Research participant proximity to Green Streets and significant rain gardens, summer 2011

Map analysis by the author, including rain garden locations.
Base map: (Google Earth 2013) Green Street data reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011) T2R boundary reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011) Participant data from the author.
4.2.3.2 Nature in the City

I considered level of engagement with nature to include active participation in the stewardship or maintenance of the public realm (e.g. pulling ivy in a park or planting trees as part of a community-wide effort) as well as active engagement in the stewardship or maintenance of the private realm (e.g. gardening in one’s yard). Moreover, I analyzed general categorizations of engagement including activities such as participating in a neighborhood association, patrolling Mount Tabor Park, or joining a cause such as Friends of the Reservoirs.

I used GIS (Map 8) to determine participants’ proximity to parks and community gardens in Portland. I included the following distances in this analysis: between 200 feet and 400 feet (less than two blocks or a very short walk), between 400 feet and a quarter-mile (within a 5 minute walk), and between a quarter-mile mile and a half-mile (within a 10 minute walk) (Table 8). I created buffers of these direct distances using parks and community gardens as the center point of analysis. I visually analyzed the resulting maps in order to apply general proximity measures. I describe the results of these maps in more depth in Chapter 5.

Table 8 Research participant proximity to a public park or community garden

<table>
<thead>
<tr>
<th>Number of research participants who live in proximity of a public park or community garden, summer 2011</th>
<th>Individuals</th>
<th>Percent of Total Individual Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Individual Participants (non staff)</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Live between 200 feet and 400 feet of a park or garden</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>Live between 400 feet and 1/4 mile of a park or garden</td>
<td>16</td>
<td>38.1</td>
</tr>
<tr>
<td>Live between 1/4 mile and 1/2 mile of a park or garden</td>
<td>15</td>
<td>35.7</td>
</tr>
<tr>
<td>Live within 1/2 mile of a park or community garden</td>
<td>40</td>
<td>95.2</td>
</tr>
<tr>
<td>Live within 1/2 mile of a community garden only</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td>Live in Ladd's Addition</td>
<td>4</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Note: Not all individuals’ proximity categories are mutually exclusive.

Categorizing participants in this way allowed me to explore the influences of stewardship activities, general volunteer activities, and proximity to urban nature, on participants’
understanding and perceptions of local ecological systems, natural processes, and urban nature.
Map 8 Research participant proximity to public parks and gardens

Map analysis by the author. Base map: (Google Earth 2013) Arterial roads: (Metro 2011) Parks: (CivicApps 2002) T2R boundary reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011)
4.3 Direct observation

My direct observations made up the remaining experiential evidence. I observed Tabor to the River neighborhoods in order to become familiar with the program area. I surveyed a variety of Green Street types with differing stages of plant growth, several popular rain gardens and neighborhood parks, and Mount Tabor Park. While walking through the neighborhoods, I looked at and photographed Green Streets and rain gardens, and noted how their appearance differed depending upon their age, and how they integrated into the streetscape. In this way, I had a basis of understanding of the physical landscape when I discussed specific places in Tabor to the River neighborhoods.

In addition to neighborhood observations, I attended work parties and learning workshops. In part, I did this to talk with participants about their work and about their motivations for either volunteering or for attending workshops. This information added to and validated interview findings. For example, as part of a work party on Mount Tabor Park I learned from others about invasive species and park health while also getting to better know some of the volunteers. These interactions were fruitful in gaining participants for my research. It was also useful in that I began to see the park through the eyes of the volunteers, particularly their views on the health of the park. This experience brought credence to the notion that hands-on stewardship fosters a deeper understanding of place. This became an important validation technique during interviews when participants would speak of such understanding; because if I, a person with little restoration experience, could begin to understand the connections between invasive species and park health, then other inexperienced volunteers have the same potential for learning. It is easy to see that seasoned volunteers would have even more knowledge and a deeper understanding of local ecology than those with less experience. In addition, as a result of these experiences, I could validate some interview discussions. For example, many participants told me that when they work in Mount Tabor Park, people will walk by and say “thank you”. This is something that I actually experienced while volunteering in the park.

In addition to this hands-on work, I attended several different meetings in order to observe a portion of the Green Street implementation process in person, to learn about
neighborhood and business association issues, as well as for recruitment. Overall, through these experiences, I began to understand some concerns of neighborhood residents and the processes behind the Tabor to the River program. Furthermore, by attending meetings, I began to get to know some of the residents and, in some ways, also build their trust. I documented these interactions in reflective summary field notes to which I referred during data analysis.

4.4 Semi-structured interviews – city staff and partner organizations
City staff and partner organization staff interviews provided much of the evidence for the planning and policy unit of analysis of this study. Interviewing key staff from the BES T2R program helped me to more fully understand the history, policy context, purpose, and goals of the program. In order to gain insight of other watershed health programs, as well as to understand the policy and organizational structure of the Bureau, I also interviewed non-T2R BES staff. In addition, I interviewed staff from partner organizations in order to understand their programs’ perspectives on watershed health and community education in relation to Tabor to the River. Each of these interviews contributed to my understanding of the context of T2R and overarching policies, and served as a way to correlate interview data gathered from community members. I describe the procedures I used to collect this evidence in the next section.

4.4.1 Recruitment, interview procedures, and analysis
I interviewed city and partner organization staff in accordance with the University of British Columbia Behavioural Research Ethics Board (BREB) protocol under a certificate of approval for minimal risk. My initial contact with the City of Portland Bureau of Environmental Services staff was through an email request for assistance with my doctoral research project. As part of this email, I included a letter of introduction that specified the intent of the research project and anticipated interview procedures. Participants gave verbal permission to be interviewed and recorded at the interview. As interviews progressed, City Staff recommended other City Staff and partner organization staff as potential interviewees. I then followed up with these recruits using the same email introduction and meeting request method. I conducted most interview meetings in city offices. I conducted a few at Mount Tabor Park, Café au Play, or while driving around
looking at Green Streets and rain gardens. Appendix 2 lists city and partner organization staff interviewed for this project.

I used a semi-structured interview approach for data collection. This approach allowed for a conversational structure to the interviews. Table 9 outlines the types of questions I sought to cover in each interview.

**Table 9 Sample interview questions: city staff and partner organization interviews**

1. Describe your program and a bit about its history.
2. Describe your role in the program.
3. Describe certain program aspects, what it means to the vision of the program, the process by which it occurs, how success is measured:
   - Community involvement
   - Environmental/ecological education
   - Hands-on involvement
4. How has the community responded to the program?
5. Is community involvement or education a necessary component of this program?
6. How are volunteers recruited?
7. What has your program achieved? (e.g., for watershed health, environmental education, or community building)

I employed two approaches in my analysis of city and partner staff interviews. First, content gathering informed policy context and program history. Second, using deductive analysis, I employed analytic categories that had emerged from my analysis of community member interviews. In effect, I used expert interviews to provide contextual information and data-checking for community member interviews (and vice versa). As a result of my interviews with officials, I better understood the process and intent of the Tabor to the River and Mount Tabor Park restoration programs. This knowledge was crucial in understanding the context through which research participants viewed the programs, and in understanding potential disconnects between the intent of the programs and participants’ perceptions of the programs.
4.5 Policy and document review

Policy and document review made up the remaining planning and policy evidence. The review of policy and program documents solidified my contextual understanding of the Tabor to the River program and its supporting policy framework. In addition, these documents contributed to the validation of statements given to me during interviews. I analyzed documents for content in order to inform policy context and program history. I also employed deductive analysis with the same analytic categories I used to analyze community and expert interviews. Key documents used for this research are listed in Appendix 3.

Each of these documents was available and accessed through the City of Portland and Metro websites. I gathered additional information not included in Appendix 3 from the City’s website, including information on specific watershed health programs, and City code and binding city policy documentation.

4.6 Validation of findings

The strength of qualitative research is in the descriptive nature of the work. Rather than providing generalizability across a broad spectrum, qualitative research gives a deeper look into a unique case by providing thick description through multiple viewpoints and multiple voices (Hays 2004; Stake 2003). A qualitative case study is one in which emergent generalizations can be made for that particular case (Stebbins 2008), whereby the transferability of the case can be determined by the reader due to the detailed context and description provided (Stake 2003). Credibility of the data and the interpretation of that data, however, are important. I validated the findings for this study primarily through data triangulation. Data triangulation can clarify meaning by providing multiple ways in which the data can be interpreted (Stake 2003). Through the collection of information from multiple sources, the process of data triangulation seeks to confirm and check the consistency of facts or phenomenon (Patton 2002; Yin 2009). Some degree of triangulation was embedded in my use of multiple data sources including numerous interviews, document analysis, and direct observation. The more personal and experiential reflections gathered in each interview are by definition unique. In order to
triangulate each person’s interview, more extensive household ethnographic field-work would be required.

I did achieve interview data triangulation through the multiplicity of interviews I conducted. Even as I carried out interviews, participants raised similar themes and experiences time and again. I confirmed these observations during data analysis, at which time consistent themes across interviews were revealed. That is not to say that every interviewee had the same attitudes and opinions; in fact some were divergent (e.g., opinions regarding wild versus manicured nature). However, multiple participants held similar views, which therefore provided a degree of consistency. The analysis process itself was also a form of validation due to the back and forth nature of coding for themes. I checked and double checked meaning and consistency of the codes and scrutinized theme categories for relevance, similarities, and differences. Further validation occurred once I attributed theoretically derived analytic categories to the data. In this case, theory supported much of the data, however some surprising findings arose; in essence these occurrences consisted of negative evidence that opposed preliminary assumptions and interpretations (Miles and Huberman 1984) and is elaborated in Chapter 6.

Interviews with city and partner organization staff provided another layer of validation, albeit of a different, many times rosier viewpoint than that of community members. Review of policy and program documentation confirmed much of what I gleaned from expert interviews, although the documents provided more accurate numbers and dates, for example. Examination of secondary research also provided a means for confirming some of the themes that emerged from my own study, as did the analysis of theoretical work, although my findings had more variation and nuance than theory might suggest. Direct observation rounded out and filled in the findings I interpreted from interview data.

Finally, the findings I suggest throughout this dissertation resonate with ideas expressed in the literature and theory that has explored these ideas in different contexts; therefore my work provides a “credible” explanation (Stake 2003). In testing my own biases and expectations, some of what I found was surprising to me and did not fit neatly into some
theoretical assumptions. This was in some ways disappointing, but I report it here because it is true to the themes that emerged from my analysis.

4.7 The study group – demographic profile

In section 3.3.4, I introduced the context of the study neighborhoods and their residents. In this section, I provide a continuation of the context I laid out in Chapter 3 by describing the general demographics of the research participants. Map 9 below, shows the neighborhoods in this study and the general home or work locations of the majority of the research participants.

**Map 9 Study neighborhoods and research participant locations**

Base map: (Google Earth 2013) Neighborhood boundaries: (CivicApps 1997)
T2R boundary reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011) Participant data from the author

Table 10 shows a snapshot of the demographics of the people I interviewed. The majority of research participants were “white” (96%) and female (62%). Over 80 percent of participants had a Bachelor’s degree or higher, which was much higher than Portland as a whole in 2010 (41% of those 25 and older) (U.S. Census Bureau 2012). Almost half of participants were aged 65 and older (45%), which was also significantly higher than
Portland as a whole in 2010 (10%) (U.S. Census Bureau 2012) and Tabor to the River neighborhoods in 2000 (a range from 6% to 15%) (CLF 2007). Full-time workers and retired people made up approximately ⅓, each, of the participants as a whole.

Table 10 Demographic profile of research participants

<table>
<thead>
<tr>
<th>Research Participant Demographic Snapshot</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Income $25,000 and below</td>
<td>14.3%</td>
</tr>
<tr>
<td>Income $25,000 - $49,999</td>
<td>19.0%</td>
</tr>
<tr>
<td>Income $50,000 - $74,999</td>
<td>26.2%</td>
</tr>
<tr>
<td>Income $75,000 - $124,999</td>
<td>23.8%</td>
</tr>
<tr>
<td>Income $125,000 and above</td>
<td>7.1%</td>
</tr>
<tr>
<td>Bachelor's degree and higher</td>
<td>80.9%</td>
</tr>
<tr>
<td>Employed Full-Time</td>
<td>33.3%</td>
</tr>
<tr>
<td>Retired</td>
<td>35.7%</td>
</tr>
<tr>
<td>Aged 18 - 44</td>
<td>17.0%</td>
</tr>
<tr>
<td>Aged 45 - 64</td>
<td>35.7%</td>
</tr>
<tr>
<td>Aged 65 and over</td>
<td>45.3%</td>
</tr>
<tr>
<td>Female</td>
<td>61.9%</td>
</tr>
<tr>
<td>Male</td>
<td>38.1%</td>
</tr>
</tbody>
</table>

Source: Interview Data (2011)

Recall that in Chapter 3, I reported that Portland’s median income in 2010 was $48,831 (U.S. Census Bureau 2012). Approximately 57 percent of participants in my study had higher incomes than Portland’s median income. “People in poverty” is considered to be those with household income at or below the federal poverty line (CLF 2007), which for 2012 was $13,891 for 2 person households 65 years of age and older and $15,452 for 2 person households aged 65 and under (U.S. Census Bureau 2012). Using this threshold, around 14 percent of the participants in this study could be considered people in poverty. This is in line with data from 2000 for the population in poverty in the Portland region (13%) and Tabor to the River neighborhoods (a range from 7% to 13%) (CLF 2007). In terms of high income households, the Coalition for a Livable Future’s Equity Atlas determined their threshold to be a household income of $125,000 or more. This
threshold equaled 7 percent of households in the region and a range of 2 to 7 percent in Tabor to the River neighborhoods (CLF 2007). These data coincide with the participants in this research, about 7 percent of whom had household incomes over $125,000. Overall, the research participants had similar poverty and upper-class household income rates as Portland and Tabor to the River neighborhoods. Although 45 percent of participants could be considered middle-class, the research participants as a group, were more affluent than Portland’s household median income.

As I discussed in Chapter 3, the geographical area for this study was located in Inner Southeast Portland. The majority of the research participants described themselves as politically progressive. For example, a minority of participants defined themselves as “Democrats”, preferring instead to describe themselves as “left of center”, “liberal”, or “progressive”. Shown in Table 11, 57 percent of participants described themselves in a progressive vein while only 19 percent labeled themselves as a Democrat.

<table>
<thead>
<tr>
<th>Political Category</th>
<th>Individuals</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progressive/Left/Liberal/Green</td>
<td>24</td>
<td>57.1</td>
</tr>
<tr>
<td>Democrat</td>
<td>8</td>
<td>19.0</td>
</tr>
<tr>
<td>no answer</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>Moderate</td>
<td>2</td>
<td>4.8</td>
</tr>
<tr>
<td>Working Families Party</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Fiscal Conservative/Social Liberal</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Republican</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>not affiliated</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

Source: Interview Data (2011)

In general, the research participants were also civically engaged. This is indicated by their work in various volunteer activities and participation in their neighborhoods. In addition, they were well informed on current events both locally and globally. For many, volunteer efforts were an effort toward public service and what was perceived to be the “greater good” for their neighborhoods, although fighting for one’s neighborhood or one’s beliefs in effect also contributes toward individual gain. As shown in Figure 10, almost 86
percent of the research participants identified themselves as people who volunteered in the community in some form or another;\textsuperscript{53} degree of involvement, however, did vary between individuals.

\textbf{Figure 10 Percentage of participants who volunteer in the community}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{percentage_of_volunteers.png}
\caption{Percentage of research participants who volunteer, summer 2011}
\end{figure}

This is a much higher percentage of volunteerism in comparison with the Portland Metropolitan Statistical Area, where 36 percent of individuals indicated that they “volunteered with an organization” (Civic Life in America 2010). However, the data used for the Civic Life in America study appears not to have covered the amount of time spent volunteering (ICPSR 2010); therefore, like my own study, there is likely high variability between individuals on amount of time actually spent in volunteer activities.

\textsuperscript{53} This is a much higher percentage of volunteerism in comparison with the Portland Metropolitan Statistical Area, where 36 percent of individuals indicated that they “volunteered with an organization” (Civic Life in America 2010). However, the data used for the Civic Life in America study appears not to have covered the amount of time spent volunteering (ICPSR 2010); therefore, like my own study, there is likely high variability between individuals on amount of time actually spent in volunteer activities.
Table 12 disaggregates participants’ volunteer efforts into specific categories that range from involvement in neighborhood associations to stewardship efforts in the public and private realms. In general, research participants spent time working on projects that had personal meaning like habitat restoration or neighborhood specific activities.

### Table 12 Percentage of participants who volunteer, by category

<table>
<thead>
<tr>
<th>Number of research participants with regular engagement in the community or urban nature, summer 2011</th>
<th>Participants</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Individual Participants (non staff)</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Regular Gardener (private realm)</td>
<td>23</td>
<td>54.8</td>
</tr>
<tr>
<td>Friends of Mount Tabor Park Volunteer</td>
<td>12</td>
<td>28.6</td>
</tr>
<tr>
<td>Regular Restoration/Stewardship Volunteer (public realm)</td>
<td>10</td>
<td>23.8</td>
</tr>
<tr>
<td>Neighborhood/Community Leader</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>Neighborhood Association Board Member Volunteer</td>
<td>7</td>
<td>16.7</td>
</tr>
<tr>
<td>Transition Portland Volunteer</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>Friends of the Reservoirs Volunteer</td>
<td>3</td>
<td>7.1</td>
</tr>
<tr>
<td>No Volunteering</td>
<td>4</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Note: Individuals' volunteer categories are not mutually exclusive.

Source: Interview Data (2011)

Many of the research participants trusted that the government was doing good work. However, my interviews revealed that participants held quite a bit of skepticism and a sense of vigilance directed towards developers and sometimes the city, to protect their neighborhoods’ needs. This sense of awareness and sense of obligation towards the public realm can move people quickly into action. This was demonstrated by the proportion of participants involved in specific organizations such as Friends of Mount Tabor and neighborhood associations.

Inner Southeast Portland has a value set which one participant referred to in this way, “*...this is sort of like the People’s Republic of Southeast Portland*,” due to its left leaning, progressive politics. My interviews confirmed these progressive views in multiple ways, from the truly informed nature of the majority of participants (environmental skeptics...
included), to self-declared liberal viewpoints. The people in this study are for the most part an environmentally savvy group who identify with Southeast Portland. This area is decidedly a place of identity, and the participants who lived or worked there expressed a sense of pride in their neighborhoods. Identity and pride revolved around elements such as the walkability and livability of the area, the proximity to parks, and the proactive nature of residents to stand up for what they think is good for their neighborhoods. The majority of the research participants exemplify a more typical idea of Portlanders conveyed in popular culture; residents who are environmentally conscious and politically informed if not politically active.

To this end, the demographic profile of the research participants looks significantly different from that of Portland as a whole (Table 13). Overall, the research participants were more highly educated, had somewhat higher incomes (57% above Portland’s median household income), were older, and tended to identify themselves as “white” or “Caucasian”.

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54 I heard many examples of such vigilance during my interviews, including successfully saving from development a parcel of land near Mount Tabor currently used as the city’s maintenance yard and nursery, protesting the development of a very large grocery store that was deemed to be out of scale with the neighborhood’s needs and desires (unsuccessful), rallying for new bikeways in “appropriate” locations, and attempting to save the Mount Tabor Park reservoirs from being covered (on June 3, 2013 the Portland City Council announced their compliance with a Federal water treatment rule to cover the reservoirs, however Friends of the Reservoirs has not given up the fight).
Table 13 Demographic comparison, Portland and research participants

<table>
<thead>
<tr>
<th>Demographic Category</th>
<th>Portland 2010 U.S. Census</th>
<th>Research Participant 2011 Demographic Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population / research participants</td>
<td>583,776</td>
<td>42</td>
</tr>
<tr>
<td>Bachelor’s degree or higher, age 25+, 2006-2010 / Bachelor’s degree or higher, all ages</td>
<td>41.1%</td>
<td>81.0%</td>
</tr>
<tr>
<td>Median household income 2006-2010 / Median household income range 2011</td>
<td>$48,831</td>
<td>$50,000 - 74,999</td>
</tr>
<tr>
<td>Persons 65 years and over</td>
<td>10.4%</td>
<td>45.3%</td>
</tr>
<tr>
<td>White persons</td>
<td>76.1%</td>
<td>96.4%</td>
</tr>
<tr>
<td>Asian persons</td>
<td>7.1%</td>
<td>2.4%</td>
</tr>
<tr>
<td>American Indian and Alaska Native persons</td>
<td>1.0%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Persons reporting two or more races</td>
<td>4.7%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>

Sources: U.S. Census Bureau (2012) and Interview Data (2011)
I interviewed 42 people total. Of these, I interviewed 35 alone, and 14 as couples (7 couples). Sixty-two percent of participants were female, and 38 percent were male. Shown in Figure 11, the majority of participants were between the ages of 45 and 74 (75%) with five people (12%) between the ages of 25 and 44. On either end of the age spectrum, I interviewed two people nearing completion of their college education, and two people aged 75 and over.

**Figure 11 Research participants age range**

![Research Participant Age Range, Summer 2011](image)

Source: Interview Data (2011)
During the interview process, I asked participants how long they had lived in Portland. Figure 12 shows that of 42 people, eight were born in Portland. The number of years participants had lived in Portland was split fairly evenly between the first three categories (less than 10 years, 10 to 19 years, and 20 to 39 years), which gives a range through which to compare environmental attitudes and knowledge for this research. For the most part, people who had moved to Portland within the last nine years had done so purposefully; rather than as a job transfer, for example.

![Figure 12 Research participant time spent living in Portland](image)

### Research participant years lived in Portland and Portland natives, summer 2011

<table>
<thead>
<tr>
<th>Category</th>
<th>Portland Native</th>
<th>Years in Portland</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 years</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>10 - 19 years</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>20 to 39 years</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>40 to 59 years</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>&gt; 60 years</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Interview Data (2011)
The participants in this study also have a high level of education. Eighty-one percent had a Bachelors degree or higher (Figure 13). Like age range and household income, there were also participants on either side of this majority, with 19 percent who either had a High School education or had completed some college courses, and almost 12 percent who had earned a PhD.

**Figure 13 Research participant level of education**

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD</td>
<td>12%</td>
</tr>
<tr>
<td>Masters or Professional</td>
<td>33%</td>
</tr>
<tr>
<td>High School</td>
<td>9%</td>
</tr>
<tr>
<td>Some College</td>
<td>10%</td>
</tr>
<tr>
<td>Bachelors Degree</td>
<td>36%</td>
</tr>
</tbody>
</table>

Source: Interview Data (2011)
Median household income coincided somewhat with employment status, as some retired people, students, and those who were unemployed or working part-time increased the number of participants with lower incomes. Shown in Figure 14, there were a large proportion of retired people (36% or 15 participants) which was all but equal to those who were employed full-time at the time of the interview (33% or 14 participants). There were also people on the margins including the unemployed (7%), students (7%), and part-time workers (9.5%), which contributed to the employment diversity of the research participants.

![Figure 14 Research participant employment status](image)

The people interviewed for this study were, for the most part, a highly educated and civically active group, with a higher household income level than Portland as a whole. Although their demographic profile looks different than that of the city in its entirety, there was internal variation within this group of community members in multiple areas like income, education, age, working status, and years spent living in Portland. I will show in upcoming chapters that, even with that diversity, the research participants were for the most part environmentally and civically aware, and the majority seemed to live up to Portland’s progressive reputation. In my interviews, participants discussed their own efforts toward good stewardship of the environment, from personal behaviors like driving
less, to cultivating backyard habitat for the benefit of birds or removing invasive plant species for the health of the local ecosystem. The research participants tended to not accept city policy blindly and were often well informed on current issues. One key benefit of researching a group of people like this is the information their perceptions can provide to planners and policy makers. Looking at urban nature and natural systems through the eyes of people with high environmental awareness and concern would be an instructive exercise in informing decision making toward place-based urban planning and design. Moreover, by exploring their perceptions and attitudes regarding urban nature and natural systems, planners can learn what policies and programs might support such attitudes and behaviors, and what the potential influence of urban nature could be for the general population.

4.8 Limitations
There are two primary limitations to my research design: Portland, Oregon as a site and my recruitment strategy and resulting data set. As I discussed in Chapter 3, Portland, particularly Inner Southeast Portland, is a progressive city with progressive residents. Further, Portland is located in a lush environment surrounded by nature and open space. Questions of transferability of the case could be raised. In fact, I’ve been asked this precise question – what do you think people would say about nature in the city in a place like Phoenix? Do desert landscapes evoke the same feelings of meaning for individuals? How would differences in urban form and differing culture affect the outcomes of this research? These are relevant and pertinent questions for which I have answers. First, as stated earlier, because of the details of context and description by multiple voices, the transferability of the case, in part or in whole, can be determined by the reader as to how it might fit into one’s own jurisdiction. Second, Portland is continually looked to as being on the forefront of urban planning policy, a phenomenon to which this project can contribute greater understanding. Third, Portland’s efforts toward watershed health are not unique to Portland alone. Many jurisdictions, large and small, are under regulatory obligation to clean up their waterways. This research can therefore provide additional information for those undergoing similar regulatory processes. Fourth, this project can serve as a basis for further study in differing climatic, economic, demographic, or political contexts, which may or may not provide contrasting findings.
In terms of recruitment, my strategy entailed voluntary sampling (Blaxter, Hughes, and Tight 2006), as ultimately the participants self-selected themselves for participation. This therefore could be considered another possible limitation of the research. Moreover, many participants attempted to weed themselves out of my study because they felt they did not know enough about nature in the city or bioswales or rain gardens. These were the people I tried to convince were the perfect candidates for my study, and many agreed. Word of mouth recommendations and one accidental volunteer gave more variation to this group of participants.

When conducting interviews, there is inevitably going to be an issue of self-selection through the voluntary nature of agreeing to be interviewed (Seidman 2006). However, the purpose of interview research is to bring out a picture of participant experiences, thus “...surface consideration of representativeness and generalizability are replaced by a compelling evocation of an individual’s experience” (Seidman 2006). In this light, the details and depth of interview data is much more critical to the success of this case than a strictly representative sample. Indeed, the notion of self-selection would have been true in the case of filling out surveys or even taking the time to talk with me on the street. In qualitative research, representativeness is not necessarily the goal. Rather, it is to gather descriptive facts on a common phenomenon. In this case, these commonalities revolved around nature in the city, watershed health, and environmental awareness.

The potential limitation of this research due to self-selection is that the research participants are not necessarily representative, demographically, of Portland’s population. However representativeness was not intended in the design of this research. The study examines the thoughts, feelings and actions of 42 people and does not claim that others will feel the same. Understanding their motivations, aspirations, and experiences might help policy makers to both better cater to this group and to potentially develop strategies to increase its numbers. In this chapter, I have indicated that the people who participated in this study were environmentally aware and actively engaged in “sustainable” behaviors. The stories and ideas conveyed by these participants give a good indication of the perceptions of people with a high degree of environmental concern toward living with urban nature and their acceptance of place-based policies.
4.9 Personal reflections

When I began recruitment for this project I had two warnings from city staff. The first was that I should be sure to distance myself from the city. Staff thought it was possible that residents would either not want to talk to me or would provide entirely negative experiences with the city in general, and Green Street implementation in particular. The second warning was that the neighborhoods within the Tabor to the River boundary, particularly Hosford-Abernethy, were over researched and therefore people would be hesitant to be interviewed. Although I did distance myself from the city, I found that, for the most part, people were eager to help and enjoyed the research topic. I discovered that part of my success was my dual-identity as both a Portlander and an outsider. Because I had lived in Portland for seven years, even though it had been over decade, participants saw me as a local. However, because I was a PhD Candidate at a university outside of Portland, participants thought I might bring new ideas to the table. I was surprised yet pleased by this reaction. Because of this and because of my interview manner, I was able to build trust with most participants. This, in turn, allowed me to gather wonderful data and stories that provided a depth of information to dig into for this dissertation.

As a final reflection, during my interviews, several people discussed how they had purposefully moved to Portland in part for its reputed walkability and livability, and in part because of its proximity to recreational opportunities in “wild” public lands. Even with prior knowledge of the urban planning practices of the city, they were surprised by Portland and that daily life could be accomplished through walking rather than driving and that within Portland they could get the sense of being in the “wild” simply by going to a large natural area like Forest or Mount Tabor Parks. It is not wise to blindly replicate policies in other places (context is key), but it is worth considering how carefully crafted place-based policies might affect citizens’ sense of place, and their sense of how one might live with nature in the city. My work gives insights into these meaningful themes, which can inform future policy making, especially those geared toward incorporating nature and natural systems into urban areas. In the following chapters I will explore the ideas expressed by this group of community members and their perceptions of, nature, nature in the city, and place-based policies in Portland, Oregon.
4.10 Bioregional urbanism model – before and after
In Chapter 2, I laid out a conceptual theoretical framework based upon the literature of multiple disciplines. This diagram, which I titled “bioregional urbanism”, was my visual conceptualization of these literatures. In my mind, the theory and research of these various disciplines pointed to very similar ideas, which I then coalesced into several key interconnecting themes (Figure 15).

Figure 15 Bioregional urbanism model – theoretical conceptualization

The raw interview data I collected included a rich tapestry of information. Through data analysis, interpretation, and writing, I had many decisions to make – Which stories should I tell? Which research themes would fit into a coherent document? What information should be included? What information could wait to be written up in subsequent years? The stories and themes I chose to present in this manuscript, therefore reflect most, but not all, of my model as originally conceptualized. In this manuscript, I focus upon the physical environment and the policies, programs, and actions that occur in that space. I further discuss processes of learning and change, which I found were
influenced in large part by public discourse and the actions of individual community members as part of that discourse. In this manuscript, I did not choose to focus upon the processes that might bring about change through the democratic process. I therefore present a second model that reflects the evidence I present in the following chapters (Figure 16).

**Figure 16 Bioregional urbanism model as reflected in this dissertation**

In the following chapters, I use the model as represented in Figure 16 to inform my analysis, discussions, and recommendations. In Chapter 5, I examine participants’ reflections and perceptions of “nature” in a broad sense, the meanings participants attach to nature, and how those meanings translate to nature in the city. In Chapter 6, I then look at some of the same themes discussed in Chapter 5, but investigate participants’ experiences with small-scale urban nature in the form of sustainable stormwater infrastructure.
“(Nature is) being out in my yard, it’s just being out and being in touch with the planet itself. Not on the sidewalk, not on the board path that winds through the park...I just like the grand design of it. Everything’s so perfect. It’s so wonderful from macro to micro. It’s so amazing!...You know sometimes you go outside in the morning and the dew is falling and you look at these beautiful roses and there’s little beads of water lined up on them like glass beads...it makes me just stop and hold my breath...That’s nature to me” [P41].

In this chapter, I explore urban nature and the role of stewardship in fostering connection to nature and environmental learning. I will show that the presence of nature at multiple scales, from small to large, is important to the people who participated in this study. This presence of and proximity to nature found in local neighborhoods throughout the city, for most participants, provides a connection to nature. However, by itself, it does not foster environmental understanding. While the majority of research participants clearly had global environmental concerns and exhibited environmentally responsible behaviors, those who actively participated in their community and stewardship activities conveyed stronger local knowledge than those who were less engaged.

Because of the inherent importance put forward by scholars on the value of urban nature in establishing a human-nature connection, I sought to understand how research participants regarded nature in general and urban nature specifically. Further, because part of this research entailed an analysis of the effects of active involvement in nature activities such as park restoration on local environmental knowledge and environmentally responsible behaviors, I also sought to determine a baseline meaning for “nature” and how participants perceived the role of nature in urban areas. During conversations with participants about nature and urban nature, important characteristics of scales of nature were revealed, which are relevant to this research; for example, how large does urban nature need to be in order for urban dwellers to feel connected? Looking at Mount Tabor Park as part of the T2R program offered a way to explore large-scale nature. However,
discussing “nature” in more general terms led me to recognize that nature participants described as meaningful comes in many forms, large and small.

Throughout this chapter, I will answer research questions on environmental and social connections and environmental learning. I will examine whether proximity to parks and community gardens, hands-on engagement in ecological restoration or gardening, and the ways that nature is integrated into the built environment influence these connections. In section 5.1, informed by both the neighborhood-oriented stewardship and the physical realms of my bioregional urbanism model, I examine whether proximity and hands-on stewardship contribute to participants’ perceptions of nature that is nearby and nature that is meaningful to them. I also look at how differing levels of engagement with nature influences these perceptions.

In section 5.2, I analyze participant perceptions of urban nature. I first examine their general attitudes and knowledge of “nature” and the role nature has in urban areas. This section also informs the areas of public discourse and the municipal policies. It shows that Portland’s attention to the preservation of large urban natural areas such as Mount Tabor Park and Forest Park contributes to the city’s identity. For most of the research participants, this provided a deep appreciation for Portland’s natural areas.

In section 5.3, I examine participants’ connections to natural systems through their perceptions and interactions with urban nature, which informs the realms of the physical environment and neighborhood-oriented stewardship as put forth in my bioregional urbanism model. I look at how they experience nature in the city and the subsequent implications for the retrofit of the built environment. In section 5.4, I discuss participant access to nature. I conclude in section 5.5, by exploring how hands-on engagement in stewardship activities influences environmental learning.

5.1 Proximity and level of engagement
One intention of this research was to test the idea that hands-on stewardship of nature and increased proximity to nature instills or fosters local environmental knowledge and a sense of responsibility to protect and take care of the local environmental. In this chapter
I explore more typical definitions of urban nature, such as parks. I began by specifically looking at Mount Tabor Park because of its scale and prominence in the T2R program, but quickly determined that participant perceptions of nearby and urban nature encompass more than a large “natural” park. For instance, I found that many considered nearby nature as an integral part of their neighborhoods and that a majority felt that street trees provided an important aspect of urban nature.

I have previously stated that, like active engagement in stewardship activities, proximity to nature might enable frequent access that might provide urban residents with a connection to nature that, in turn, could foster greater awareness of nature and natural processes. Therefore, this research explored both how proximity to natural spaces and differing levels of activity with urban nature contributed to local environmental knowledge. I began this research with the conception that “engagement” with larger scale nature would range from passive pursuits like walking in a park, to active forms of engagement like pulling invasive ivy from an urban natural area or park; actions that could be seen as a more typical definition of “stewardship”. However, what emerged was a broader conception of engagement, and subsequently, stewardship.

In Chapter 4, I showed that participants in this study have a high level of proximity to open space. This finding coincides with the City of Portland’s own findings that in 2012 seventy-six percent of all Portlanders lived within a half-mile walk (10 minutes) of a park or natural area, and points to the City of Portland’s commitment to providing more open

55 Much of the writing on stewardship, in an environmental sense, is considered through an ecological lens. In the writings I have cited in my own work, ecological stewardship focuses on projects where land or water has been degraded or native vegetation has been replaced either by invasive species or through purposeful replanting for agriculture. I posit that stewardship can be considered as individual actions undertaken on private or public property that contribute to increased environmental and social health. A definition of stewardship does not have to revolve around the restoration of large land areas or degraded waterways alone; it can also include activities that occur on one’s own property or as part of a neighborhood association, etc.

56 In a 2011 report by the Trust for Public Land (TPL 2011), amongst cities deemed as “intermediate-low” density, Portland had 24.5 acres of park land per 1,000 people. This was the median for cities of this size, but is lower than the average, 27.4. The median for all cities in the study was 12.4 acres per 1,000 people. Although this study does not look at proximity to these spaces, it does show that in terms of park space, Portland has above average per capita park space than other cities in the United States and about average for cities with similar density figures. If looking at percentage of acres per city area, Portland ranks higher for “intermediate-low” density cities – 7th out of 41 cities at 16% (p. 10).
space to its residents (City of Portland 2012). Ninety-five percent of research participants lived within a half-mile (10 minute walk) of a public park or community garden with almost 60 percent of these within a quarter-mile.57 Some participants lived within a half-mile (10 minute walk) to more than one natural space, while 14 percent lived within a half-mile (10 minute walk) to a community garden and no public park.58 Research participants in general showed concern for the environment and expressed pleasure with their experiences in nature. Although proximity to public parks is not in itself a direct cause of their enjoyment, it does provide a constant connection to nature of which these participants are well aware and appreciative.

I found that participants distinguished between nearby nature, and experiences in nature that they considered to be meaningful. I will discuss these distinctions and perceptions in greater depth later in this chapter. Here, I will I highlight the places participants perceived as nearby. In terms of public open space, Mount Tabor Park (57%) had by far the highest percentage of participants who referred to it as nearby nature. Laurelhurst Park (31%) followed Mount Tabor Park, with the Willamette River close behind (26%). Because of their perceived importance, I will highlight them in the following tables (Table 14 and Table 15).

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57 The City of Portland’s overarching policy document, The Portland Plan (City of Portland 2012), integrates goals that include linking “complete neighborhood centers by a network of city greenways” (p. 73) and integrating “nature into neighborhoods” (p. 73). The Portland Plan states that in 2012, 76 percent of Portland’s residents already lived within a half-mile walk to a park or natural area (p. 75). The Plan sets a goal to achieve this same close proximity for 100 percent of Portlanders (p. 77), achieved through the expansion of networked greenspaces through habitat corridors and neighborhood greenways (p. 88).

58 Whether community gardens can provide a “natural” experience is unclear, but my interview analysis suggests that a feeling of solitude (an important aspect of experience in nature for these research participants) can be achieved in these spaces during the non-growing season.
Table 14: Research participant proximity to Mount Tabor or Laurelhurst Parks

| Number of research participants who live in proximity of Mount Tabor or Laurelhurst Parks, summer 2011 |  |  
|---|---|---|
| | Participants | Percent of Total Individual Participants |
| Total Individual Participants (non staff) | 42 |  |
| Live within 1/4 mile of Mount Tabor Park | 5 | 11.9 |
| Live between 1/4 mile and 1/2 mile of Mount Tabor Park | 8 | 19.0 |
| Live between 1/2 mile and 1 mile of Mount Tabor Park | 11 | 26.2 |
| Live within 1/4 mile of Laurelhurst Park | 2 | 4.8 |
| Live between 1/4 mile and 1/2 mile of Laurelhurst Park | 3 | 7.1 |
| Live between 1/2 mile and 1 mile of Laurelhurst Park | 10 | 23.8 |
| Live within 1 mile of Mount Tabor and Laurelhurst Parks | 5 | 11.9 |

Notes:
Individual participant numbers do not include staff members of the City of Portland or partner organizations.
Participants' proximity categories are mutually exclusive within the separate categories of Mount Tabor Park and Laurelhurst Park.

Table 15: Research participant proximity to the Willamette River

| Number of research participants who live in proximity to the Willamette River, summer 2011 |  |  
|---|---|---|
| | Participants | Percent of Total Individual Participants |
| Total Individual Participants (non staff) | 42 |  |
| Live within 1 1/2 miles of the Willamette River | 4 | 9.5 |
| Live between 1 1/2 and 2 miles of the Willamette River | 2 | 4.8 |
| Live over 2 miles from the Willamette River | 36 | 85.7 |

Notes:
Individual participant numbers do not include staff members of the City of Portland or partner organizations.
Participants' proximity categories are mutually exclusive.

Proximity did not necessarily indicate the extent to which these places were meaningful to those who spoke about them. For example, although 26 percent of participants described the Willamette River as nearby nature, of the four who lived closest to it (within 1½ miles or 30 minute walk), only three thought of the river as “nearby”. Another example is
illustrated in participant feelings toward Forest Park.\textsuperscript{59} Fifty-five percent of those interviewed mentioned the park, yet almost 75 percent lived over four miles away.

Many more participants lived in closer proximity to Mount Tabor Park than to either the Willamette River or Forest Park; 57 percent lived within one mile (20 minute walk), and 31 percent lived within a half-mile of the park (10 minute walk). Of the 57 percent who lived within one mile of the park, almost 71 percent spoke of the park as nearby nature. Of the 31 percent who lived within a half-mile, almost 62 percent indicated the park as nearby nature. However, as shown in Map 10, many others spoke of the park as nearby nature despite living further away; 38 percent lived over a half-mile away (over 10 minute walk) and 16 percent lived over one mile away (over 20 minute walk). Notice too, six people who lived within one mile of the park failed to mention the park as nearby nature.\textsuperscript{60}

\textsuperscript{59} Forest Park is located in Northwest Portland and comprises 5,100 acres made up primarily of forested land and trails (City of Portland b).

\textsuperscript{60} Keep in mind that each interview was a new conversation which many times followed its own trajectory. Moreover, participants sometimes came with their own agenda, for example one participant spoke only about Green Streets.
Mount Tabor Park is a large 190-acre park, arguably with a more regional reach than a more neighborhood-oriented park (Image 2). Thus, the fact that participants perceive the park as urban nature regardless of dwelling proximity is unsurprising. Some participants spoke of Mount Tabor Park as meaningful\textsuperscript{61} rather than as merely nearby nature. The language used by these participants suggests that both proximity and engagement are factors in this salience; in essence they felt attachment to the park (Map 10 and Map 11).

\textsuperscript{61} I use the term “meaningful nature” to categorize places participants spoke of in a way that imparted emotion and feelings of attachment to particular natural areas. They used words such as “love”, “sacred”, “need”, “respite”, and “calm” to describe these places. Many also described natural areas in the context of meaningful activities such as family picnics, solitary walks, or as part of a daily routine, etc. Arefi and Triantafillou (2005) write that place meaning “is both abstract and value-laden”, yet they say it is an important way to determine how the built environment is perceived and how people “impart meaning to it”. The depth of discussion surrounding the meaning of urban nature gave me rich interview data to interpret. My interpretations revealed that many participants had emotional attachment to certain natural areas, which I labeled “meaningful nature” during data coding. “Meaningful nature” is closely related to “place attachment”, which is an emotional attachment to a place (Mitchell et al. 1993; Ryan 2005). My research illustrates how this group of people views urban nature and thus shows how people connect to nature, and gives insight into how nature in the city can be a part of urban daily life. I go into greater depth on participants’ perceptions of meaningful nature in Section 6.3.2.
All but one person who spoke of Mount Tabor Park as meaningful nature, and who were also involved with the Friends of Mount Tabor, lived less than one mile of the park. I will discuss and demonstrate through interview data the impact of participation in the restoration and monitoring of the park later in this chapter.

**Map 11 Research participant proximity to Mount Tabor Park: meaningful nature**
Turquoise dots represent research participants who indicated the park as meaningful nature. Turquoise dots with red centers represent participants who volunteer with Friends of Mount Tabor Park.

Map analysis by the author. Participant data from the author. Base map: (Google Earth 2013) Parks: (CivicApps 2002) T2R boundary reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011)

**Image 2 Aerial view of 190 acre Mount Tabor Park (left) and 31 acre Laurelhurst Park (right)**
(Google Earth 2013)
Laurelhurst Park, a 31 acre well programmed park, showed a similar trend to Mount Tabor Park (Map 12). Although many residents within one mile (20 minute walk) of the park considered it to be both nearby and meaningful nature, there were those over one mile away (over a 20 minute walk) who also indicated both categories. Further, some people who lived within one mile of the park indicated the park as neither nearby nor meaningful nature. Moreover, although a Friends group charged with maintaining and restoring the park exists, no one I interviewed indicated that they volunteered to restore or advocate for the park.

**Map 12 Research participant proximity to Laurelhurst Park: nearby and meaningful nature**

Turquoise dots represent research participants who indicated the park as nearby nature. Turquoise dots (and 1 orange dot) with green centers represent participants who regard the park as meaningful nature. Map analysis by the author. Participant data from the author. Base map: (Google Earth 2015) Parks: (CivicApps 2002) T2R boundary reproduced with permission from the City of Portland Bureau of Environmental Services: (BES GIS 2011)

My research indicates that, by itself, proximity to parks did not constitute the park as meaningful nature. I will discuss throughout this chapter how participants perceived urban nature, as well as why certain spaces have more personal meaning than others. Indeed, attachment to certain places was sometimes a result of proximity and time spent in a park; however, even the knowledge of each park’s presence has a positive impact. Finally, it is important to reiterate that the interviews conducted were conversations in
which I, for the most part, did not prompt for specific places or concepts. Therefore, other urban areas that participants may have also considered important or meaningful may not have been discussed, and thus will not be reflected in this chapter. What did emerge is that the presence of multiple scales of nature influenced participants’ sense of connection to nature. Furthermore, active engagement in nature and community contributed to participants’ localized environmental knowledge. I found that proximity (a half-mile to one mile or between a 10 to 20 minute walk) to these spaces is perhaps not necessary for a connection to nature as long as natural features such as trees and plants are an integral part of each neighborhood, including private property. Moreover, many participants desired to access larger natural spaces by bike, transit, or car.

5.2 Nature and urban nature – attitudes and knowledge

In order to discover whether proximity and engagement with urban nature influenced local environmental knowledge, I first asked participants to define or describe nature. In this way, I was able to gauge each person’s feelings and perceptions about “nature” in general. These perceptions included a range of opinions – nature is big, nature can be small, nature is wild but can be manicured, nature is part of a system of which humans are a part. I then followed with a discussion on the role or purpose of urban nature. Our discussions enabled me to understand how participants perceived urban nature as well as the role of urban nature – nature offers human enjoyment and promotes mental health, nature provides habitat, nature is integral to the health of the environment. Asking participants to describe their perceptions and knowledge of nature allowed me to determine how they perceived and valued nature in urban areas. Moreover, I was able to begin to understand their levels of general and place-specific environmental knowledge.

I had discussions with 30 of 42 participants (71%) in which they defined or described “nature”. Almost all of them described nature in terms of its relationship to humans. Several specified nature as non-human made, or specifically plants and animals, “...Nature’s just anything you see that’s living and growing...” [P36, male, aged 56]. In general, definitions encompassed a range of human influence on nature. For example, one person considered there to be no “real” nature as a result of human impact on Earth as a whole. Many others simply described a spectrum of manicured to wild nature, from
one’s own cultivated yard to a relatively untouched wilderness. Of those who gave a
definition of nature, 11 (37%) described nature in terms of an interconnected ecosystem,
and 12 (40%) mentioned humans as being a part of nature; these are articulations of
nature that exemplify environmental understanding. This comprehension is further
demonstrated in how when talking about humans as part of nature, several participants
lamented that humans are a determinant to the environment:

“...nature is the bones of our existence, the trees, the soil...this is something
we have and it’s there for us...I used to think (humans and nature) was a
good fit but (now) I’m not sure. I see an overgrowth of bacteria on things, an
overgrowth of aphids. Sometimes I look at the Google map of the lighted
Earth at night from space. That’s the same thing you see when you see an
overgrowth of aphids or bacteria on a plant or a fruit or something and I
start to wonder, how good an idea are we?”

Much of the participant descriptions of nature encompassed a feeling of the un-built, of
growing, living things, although some specifically spoke of nature and the built
environment as co-existing. Many people equated experience in nature to being outside,
surrounded by natural elements, “...being in nature, to me, means being surrounded by
plants and dirt and not hearing the sounds of human related activities and not seeing a
lot of people...” Indeed, many participants expressed the idea that
an important role for urban nature was a feeling of being in nature and away from the
influence of human-made objects and sounds.

I spoke of the role or purpose of nature in the city with 36 of 42 (85%) participants. Like
nature in general, they frequently spoke about urban nature in human terms. For
example, 18 people (50%) spoke of urban nature as an avenue for mental restoration, 11
(31%) mentioned it in terms of parks or social spaces, and 3 (8%) described urban nature
as providing a space for recreation. In relation to urban form, buildings, cars, pavement,
and trends of density and urban infill, 5 participants (14%) said nature in the city was a
trade-off for development. In terms of the role of nature in connecting humans to nature

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62 Half of these participants had also described nature as an interconnected ecosystem.

63 Her statement was an analogy that humans have become a detriment to Earth like aphids are to plants.
and natural processes, 6 people (17%) specifically spoke of the importance of nature in fulfilling that connection, for example:

“...the role of greenspaces is to help us to see that we’re not separate from nature. If we realize we’re not separate from nature then we can have more compassion and care more for our natural resources” [P2, female, aged 69].

This sentiment is exactly the sort of connection advocated by scholars such as Beatley (2011), Jordan (2000), and Light (2000). Although such articulations indicate a degree of environmental awareness, this consciousness does not necessarily have to do with the presence of nature in Portland but perhaps more so with the trajectories and experiences of their individual lives.\(^{64}\) The presence of nearby nature was important to the research participants. For some, it provided a catalyst of sorts to appreciate the foresight of the city to plan for nature. This was particularly apparent for those who described the presence of nature in Portland in stark contrast to places they had lived prior, for example:

“...if you were just in an environment that is all concrete and cars whizzing by all the time, people tend to not interact with their environment...(In Portland) we are much more connected to where we live because things are more human scale...streets tend to be more narrow. Sidewalks are wider. Buildings are closer to the street. So we have a much more organic connection to where we live, and I think nature plays a big role in that...” [P18, male, aged 71].

“... (Nature) in the city defines it. Trees on the streets and parks define a city and attract a certain type of people. In L.A., people are not there for the parks; they’re there for maybe the bright lights, maybe the blondes; but I would think people are here for the nature that’s imbedded in the city. They’re here for the fact that Waterfront Park was a highway until Tom McCall took it out and created a park with it. That kind of thing is unheard of even here today; but having something like Forest Park allows nature people to live in the city” [P31, male, aged 35].

\(^{64}\) As described in Chapter 5, most of the people who took part in this study were already environmentally aware and inclined toward environmentally responsible behavior. I found that these inclinations came from a multitude of experiences, including those from childhood, in nature, and through public discourse.
Although only six people articulated the idea of a human-nature connection, a concept at the heart of this dissertation, almost every participant articulated aspects of linkages and connections to larger natural systems, although without using such specific language. For example, secondary to the role of nature for human well-being, 11 people (31%) mentioned nature in the city as habitat for wildlife such as birds, insects, raccoons, and squirrels, and 10 (28%) mentioned the crucial role of nature in the carbon dioxide-oxygen cycle. Most significant, however, was the role of nature in providing personal respite from the city; in being surrounded by green, in feeling removed from the sounds of the city, or in being able to watch water flow or birds play. These are tacit reflections of a human-nature connection that could be transformed to ecological understanding through both formal and informal learning processes. Indeed, I hope to show that even simple observation can influence those connections. I found that mental restoration in urban nature was important to the research participants and was described as occurring at multiple scales from a tree, to one’s yard, and to differing scales of parks. Each of these urban natural areas represents a different type of experience and offers differing types of engagement that I will explore in this chapter.

In this section, I have described participants’ general impressions and knowledge of nature and urban nature. I found that the majority of participants greatly value nature, nature in the city, and experience in nature. In general, participants’ appreciation for nature was defined by its value and relationships to humans, although they acknowledged its role in larger systems (e.g., stormwater management, or increased habitat) and felt that role was important. In fact, my research indicates that participants who understand that they are connected to larger natural systems will participate in neighborhood-oriented stewardship activities that they perceive to partly offset environmental degradation.

It was difficult to find participants with negative attitudes toward nature or urban nature. Four participants who did not spend much time in nature acknowledged its role either for recreation or beauty. For example, one person described experiences in nature in a consumptive vein, such as all-terrain vehicle driving in sand dunes and target shooting in the forest, and also named several neighborhood parks as pleasant places for recreation.
and walking. Three others spoke with fondness of activities in nature in their past, and of the beauty and historical significance it provided them in the present, “...I’m not a nature lover...I think that probably I would love to preserve the places that we have. Because I think what we’re doing is probably destroying our own environment, our nature. I just don’t like it when they have to clear all these trees (for new homes). Maybe I am a nature lover, but when I read about (removing a historic tree) I thought, no, that’s history, that’s historical” [P37, female, aged 80].

My research revealed that nature in many forms and multiple scales was quite meaningful to most people. Through each conversation, I was able to determine qualities of nature that were meaningful, and through this dialogue connect their values and subsequent actions with how nature fits into their daily lives. I was further able to delve into the impact of community involvement and stewardship activities on participants’ environmental knowledge and personal actions. In the next section, I will discuss aspects of the physical environment, stewardship, and environmental knowledge, and their relationship to place-based urban planning and design, education, and activity.

5.3 Daily life and nearby nature

Implications for urban form and environmental learning

My analysis showed that the majority of research participants feel that Portland is a nature-full city. Participants spoke with pride of nature in Portland, both large and small. Portland’s attention to saving large natural spaces like Forest Park and Mount Tabor Park are sources of pride and identity. They spoke of smaller instances of nature such as neighborhood trees and private yards in much the same way. When looking at the differences between what participants viewed as “nearby” versus “meaningful” nature, it is the quality and type of experience that sets them apart. Shown in Figure 17, perceptions of nearby nature ranged from simply walking through a neighborhood to having a more immersive experience within the trees at Mount Tabor Park.
5.3.1 Nearby nature

In general, participants described nearby nature experiences as entailing daily interaction with natural attributes such as trees and gardens in one’s neighborhood. Daily interactions also encompassed larger nature places perceived to be within proximity to home or work. Mount Tabor Park and Laurelhurst Park are large parks located within the neighborhoods of this study area. Because of their size, location, and potential for immersive experiences inherent in parks, it is not surprising that participants considered...
them as nearby nature (57% and 31% research participants, respectively, considered the parks nearby nature):

“...we just really loved the fact that Mount Tabor would be our neighborhood park...we’d have this extinct volcano, forested little park just in our backyard...we have this very cool park right within walking distance” [P20, female, aged 58].

“...the park was always where you could go if you just rode up Lincoln Street, you were in the park. And I spent a lot of time there as a teenager...” [P7, male, aged 23].

“...because I live so close to it...I most frequently go to Laurelhurst Park...it’s really nice right now because the plants are all green and in bloom and a lot of people are there, so it makes it feel like a real community space” [P38, female, aged 24].

“There are some parks here that I think are really special. Laurelhurst Park is one. I work about 10 blocks away from there...I make it a point to walk up there once or twice a week, there’s a pond with ducks, and just sit in front of that pond...” [P42, female, aged 63].

As we can see, perceived proximity to these parks is an important part of participants’ feeling that they are “nearby nature”. Nature in the neighborhoods was also important. The significance of neighborhoods as nearby nature (29%) illustrates the general opinion of the research participants that Portland, and Inner Southeast Portland in particular, is both beautiful and green. Many people described feeling connected to nature when walking in their neighborhoods to observe yards, gardens, trees, and bioswales:

“I love to walk, and when I walk I really look around, because we have a beautiful city. We have a lot of trees. This is about my favorite time of the year as far as the trees goes. The linden trees are in bloom, and when they reach a certain time of their bloom and they release the oils from the linden trees, it's marvelous” [P16, female, aged 65].
“...we’re walking all over the neighborhood...and there are trees all around. People have their yards with things growing in them and there are just a lot of differences. So as we’re passing by I identify the trees where, ‘My God there’s a huge flock of cedar waxwings that come here because of the berries’ or ‘Oh yeah, now’s the time (of year) where these particular kinds of trees (bloom) and all the bees are there’...(nature is) just around you in a very normal way... (The neighborhood is) still a part of the green and the growing... House, house, house, house, house, but then there’s also all the trees and the plants and the flowers and everything...” [P26, female, aged 63].

**Image 3 Neighborhood nature**

Photos taken by Robert D. Church and reproduced here with his permission.

These comments demonstrate a high level of awareness of immediate surroundings. Despite differences in one’s attentiveness to one’s surroundings, the comments reveal how neighborhoods that incorporate nature into their very fabric can generate feelings of living close to nature. The comments above also demonstrate a level of localized environmental awareness that link seasonal variations in neighborhood vegetation both to the time of year and to wildlife behavior. My research suggests that integrating nature into neighborhoods has the potential to provide multiple points of contact with nature. These points of contact will have differing degrees of effect for each person, but they can provide a foundation of nature for everyday life.
5.3.2 Meaningful nature

“...Forest Park is wonderful; I’ve spent a lot of time there. There are other similar parks, in terms of parks with trails, Mount Tabor, Powell Butte...These all provide a way to get away...a sanctuary where we can appreciate nature. I'm not involved with a church...I'm spiritual and that’s one of the things that’s also an important piece that nature provides, especially places like Forest Park, and even my backyard, are a sanctuary” [P35].

My research suggests that the notion of meaningful nature encompasses a more personal connection that in large part has to do with nature as a sanctuary and a place for respite. Trees were spoken of with the most reverence and importance for the majority of participants (79%). Trees as meaningful nature included neighborhood trees particularly in Ladd’s Addition, trees within sight of participants’ homes, trees in large parks, and the importance articulated by many that trees are a source of life. Neighborhood trees and trees as part of participants’ outdoor living space were an important and meaningful element that provided relief from urban life; a bit of green in an otherwise busy and built environment, for example:

“...if this tree hadn’t been here, I wouldn’t have moved here, because I had this incredible view before of Mt. Saint Helens and Mt. Hood and the river...Had I just had to look at somebody else’s house I would not have bought here...just think of what it’s doing for us...isn’t that an amazing tree? ...without this tree I wouldn’t have a view. I wouldn’t be here” [P2, female, aged 69].

“...I love the tree grove (in Ladd’s Addition), the fact that we’ve got these lovely big old guardians that sort of look after us” [P28, female, aged 65].

“I really like...just having a neighborhood that has a lot of trees in it. To me...it’s a nicer place to be” [P10, female, aged 26].

65 Ladd’s Addition is a neighborhood in Inner Southeast Portland. The street grid is turned at an angle to the surrounding street grid, and the roads circle around four rose gardens and one central park-like garden. Furthermore, the streets in Ladd’s Addition are lined with elms that provide the neighborhood with a large, encompassing tree canopy. See http://tclf.org/landscapes/ladds-addition for a short description and nice photos.
“...initially I was sort of sad...(a neighbor) said he was going to put in trees, and it was going to disrupt my view...but what has happened, it’s like driving down a country lane through the woods...I love it. So I have all those trees that aren’t really mine, but I get at least as much benefit as the neighbors...” [P35, female, aged 67].

In each of these comments, participants reflect upon trees on adjacent property or in the public realm rather than those on private property. Despite their location, each participant felt a responsibility and affinity toward the trees. Perhaps it is their scale and the ability to feel enveloped in green that gives the trees such importance;66 something as simple as gazing at a walnut tree can bring peace of mind and joy in an otherwise dense urban environment.

Not everyone, however, was exuberant about trees. For example, one participant expressed concern that an emphasis on increasing the tree canopy was taking away from the character of the neighborhoods. Another participant thought that trees belonged in parks, not in parking strips, “I didn’t like when they started messing around with the sidewalks....I think (the trees) should be planted in the parks and not alongside the parking strips” [P24, female, aged 59]. Along those lines, participants often spoke of

66 Of course, this feeling of being immersed in “green” is something that occurs in the summertime. I did not get participants’ perspective of the trees in the winter, although several people complained about various seasonal difficulties with the trees (e.g., sap and leaves). I was repeatedly told that the benefits of the trees outweighed the negatives.
large, older trees found in Forest Park and Mount Tabor Park with relief and gratefulness for the experiences they provide:

“...one thing that I thought was so unique about Mount Tabor...you have this pine tree forest...in my backyard rather than having to drive on a vacation, to go up to the forest and have the smell of pine and just the big trees and the shade on a hot day was really important...It’s a little bit of even going to Washington Park or Forest Park” [P20, female, aged 58].

“There’s some big trees left over from 100 years ago sticking up like flag poles in the Sewallcrest Park. And thank God there’s a few left” [P29, male, aged 66].

“...we love Forest Park...Now that’s a real woods” [P23, female, aged 67].

I found that these large natural spaces are extremely important aspects of Portland’s urban nature that even if not visited often, are a part of the city’s identity. They offer a semi-wild nature experience within city limits, which can provide a localized way to experience the forest.

In addition to these larger natural spaces, I found that participants’ perceived yards as an important part of urban nature both as nearby (33%) and meaningful (38%) nature. Thirty-one people (74%) mentioned their yards during interviews. Many either gardened or enjoyed the trees in their own or their neighbors’ yards. Yards and gardens were nature
in extreme proximity to participants’ living spaces. The ability to experience nature in one’s own yard is a significant aspect of neighborhood-oriented stewardship that deserves serious consideration when contemplating the retrofit of the built environment. This is especially true in light of urban planning’s response to issues such as climate change, which dictates compact and dense development patterns and reduced use of the automobile.67

My research shows that yards and gardens were meaningful and significant in participants’ perception of control and their ability to cultivate their own personal spaces. Moreover, yards and gardens enabled participants to implement and contribute to individual stewardship agendas such as increased bird habitats or food security. They also contributed to participants’ happiness through working in the soil or being immersed in the elements of the natural world, for example:

“I love to be out here (in my garden). I love the dirt. I love my soil. I’ve worked on the soil here for years, and when you dig around my backyard, it’s like moist chocolate cake. The color is beautiful; it’s kind of perfect, actually...I’m really happy to see insects in the soil, and I’m happy to see the birds finding worms back there, and I’m happy to see all the spiders...” [P4, female, aged 65].

(My most important natural space is) “…this place (backyard). It’s the place that I come to most often, and it gives me some sense of pleasure and comfort and enjoyment” [P25, male, aged 73].

“...this is my little oasis...I’m a long view person which makes it hard living in this part of the city because I don’t have any long views because of the trees. On the one hand I love them; on the other hand I’m really a long view person...and staring into my back yard is one way that I get some of my green fix” [P28, female, aged 65].

67 Mainstream urban planning’s response to climate change that has been adopted by many cities has been to advocate changes to the built environment that would reduce automobile use. See (Newman, Beatley, and Boyer 2008; Wheeler 2004; Ewing et al. 2007; Newman and Kenworthy 1999).
Yards and gardens as meaningful nature was an unexpected finding in this research. For most who discussed the importance of their personal yards, gardening was the key factor in this significance. For a few participants, the view of trees provided a connection to nature rather than hands-on cultivation of their space. Others touched upon gardening in passing, it was simply not of interest, or it was something that they or their loved ones had done in the past. In addition, lack of proximity to parks did not appear to contribute to participants’ feelings of yards as meaningful nature (Map 13).

Map 13 Yards as meaningful nature and proximity to Mount Tabor and Laurelhurst Parks
Turquoise dots represent research participants who indicated their yards as meaningful nature.

Despite apparent easy access to larger natural spaces, these participants still considered their yards as a meaningful nature experience. Multiple factors contributed to why participants consider their yards as meaningful nature, including extreme proximity and, for some, the importance of the act of gardening. Discrete yards and gardens are perhaps a luxury in urban areas experiencing densification, for example, “...as opposed to living in Vancouver (British Columbia) where we would have to live (in a condo), that was one of the reasons to pick this neighborhood; we could afford a yard. So that's our little bit of
“nature there” [P22, male, aged 65]. Despite this apparent luxury, my research suggests that personal gardening space can contribute to neighborhood nature and can provide opportunities for human connection to nature as well as neighborhood-oriented stewardship.

As compared with personal yards and gardens, parks and natural areas are on the other end of the spectrum in terms of scale. For research participants, Mount Tabor Park (33%), Laurelhurst Park (19%), and Forest Park (19%) were the most frequently mentioned parks described as meaningful in Portland. Like trees, these spaces provided a scale of experience in nature that cannot be achieved in one’s yard.

My analysis indicates that each of these types of nature spaces is important in different ways. Parks like Mount Tabor and Forest Park offered a semblance of a wilderness experience. They are large and full of substantial trees and rugged trails that present an opportunity to escape from the sounds and landscapes of the city. These experiences were significant for many research participants, and allowed for contemplation, solitude, and exercise in nature. Laurelhurst Park, a more manicured park, is yet another type of respite from the city. It is also more social in nature as a community gathering place. Laurelhurst Park incorporates varied vegetation, almost garden like, that was aesthetically appealing to participants. Paved and dirt trails meander through the park. Furthermore, the pond at Laurelhurst was a source of interest to participants, as were Mount Tabor Park’s reservoirs that served as a visual connection to Portland’s drinking water.
For many participants, Mount Tabor Park was a significant part of their lives. For those who lived near the park, walking or running there was a regular activity. Moreover, the park was regarded as a “sacred” place:

“Mount Tabor Park; the park kind of carries our heart...I go there several times a week...I run in the park whenever the weather is half-way tolerable, and it feeds me, it feeds my soul... Let’s call it a sacred place. Let’s call it a holy place” [P8, female, aged 52].

“...I would say too that every time we go up there (to Mount Tabor Park), especially if we go up there in the rain when there are not very many people, it’s transformational in terms of our moods...I think that you probably have found in your interviews that almost everybody feels like that park is sacred ground...” [P32, female, aged 61].

For others, although Mount Tabor Park could provide a feeling of a larger nature experience, there was a longing for something more that could really only be achieved by leaving the city to reach a larger, perhaps more untouched nature, for example:

“...I get some of what I need from the outdoors from my backyard, and doing all the naturescaping stuff. I actually long for more open space...I bike up to Mount Tabor to the park to get a bigger hit of open space, but it’s still a park. It still doesn’t quite cut it exactly” [P4, female, aged 65].
Indeed, for some participants (14%) Mount Tabor Park was too far away to enjoy, too much of a designed park to be “nature” full-blowen, or too hilly to have a pleasant walking experience. For a few people, Mount Tabor Park’s significance was more social in nature. Activities such as the Mount Tabor Foot Patrol or Weed Warriors were a crucial social connection. For several couples interviewed, participating with Friends of Mount Tabor groups was as a significant part of their social lives. For example, the following couple retired to Portland eight years prior. Living by Mount Tabor Park was accidental, but its impact on their lives was very significant:

“As we think about our social lives it has become part of that because of being out at Mount Tabor Park. We’ve done Foot Patrol. We’ve done a lot of work out there. A web of relationships has developed to an extent not only of where we live in the neighborhood and our association with the neighborhood but with the park as well” [P18, male, aged 71].

“Mount Tabor was I think a turnkey for me… Within twelve hours I had left my career, my city, my state and I was on to something different…through Mount Tabor an entirely different world, a different way of thinking, a different way of planning my day...was just laid out...it was a huge turning point in my life...” [P19, female, aged 60].

The social aspects of volunteering were significant for many of the people I interviewed. For those who did volunteer in restoration activities or rain garden implementation, the social aspects were primary, with external benefits that included being outdoors, a chance to exercise, and lastly, an environmental project. For those who volunteered on Mount Tabor, the social aspects were the most significant, but their activities revolved around a cause in which they each believed – Mount Tabor Park.

Participants used Laurelhurst Park as a neighborhood park, as a place to unwind, watch people, or simply as a pleasant pathway on the way to a different destination. It was also regarded as “nature”; every person who mentioned Laurelhurst Park did so during discussions about urban nature. Its scale, variety, beauty, and accessibility were key

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68 The Friends of Mount Tabor Park (FMTP) is a non-profit organization that helps maintain, improve, and monitor the park. There are two regular groups associated with FMTP, the Foot Patrol (an authoritative-type presence in the park who picks up garbage and answers park users’ questions) and the Weed Warriors (volunteers restore the park’s health through invasive plant removal) (FMTP).
factors in its significance. Laurelhurst Park was regarded as accessible, natural, and beautiful, although participants did not express its restorative properties as fully as Mount Tabor Park’s, for example:

“Laurelhurst...that’s an ideal kind of park to me...it has these nice rolling paths and the trees and the water feature...And there’s picnic areas but they’re discrete...It has enough benches...Laurelhurst for me is very accessible. Mt. Tabor is really cool, but you’ve got to be able to hike those hills” [P30, female, aged 65].

“Laurelhurst Park, for instance, is a beautiful park. I love going in there and that’s pretty well all manmade” [P20, female, aged 58].

“Laurelhurst is like a very large garden...Laurelhurst is a means to get someplace but we also deliberately go there rather than just through the other streets in the neighborhoods because we like it, I mean it’s beautiful there” [P23, female, aged 67].

Participants held up Forest Park, on the other hand, as an example closest to a pure and wilder definition of nature. Many of the people interviewed for this study had spent time in Forest Park; yet it was treated like a destination and a special excursion. Forest Park appears to be part of Portlanders’ pride and identity and is a special place participants expressed should not be taken for granted. As illustrated by previous comments, participants considered Forest Park as a kind of gold standard of urban nature. One participant described Mount Tabor Park as a smaller version of Forest Park, while another described Forest Park as “the real woods”, and someone else declared, “something like Forest Park allows nature people to live in the city”. This latter participant took his family to Forest Park once a month to go hiking. Even one person, who stated there was no true nature left in the world, conceded that Forest Park, if managed properly, could come close to being “nature” unadorned:
“(The) City is antithetical to nature. You have Central Park (in New York City); you have again a large expanse of a controlled more natural area. If it’s big enough, like Forest Park, you can probably almost manage to run it as a genuine natural area, almost. If you are willing to allow your predators in there...I don’t know if the area in a city can be big enough for that” [P5, female, aged 51].

In general, Forest Park held deep meaning for many of those interviewed for this study; a place to treasure. Nature in a wilder sense, forests with many miles of trails, can be accessed in areas outside of the city. However, having such a destination within the City was invaluable for many of the research participants, for example:

“We’re so blessed with Forest Park” [P29, male, aged 66].

“I think having Forest Park and Washington Park in our city...just helps make what I love about this part of the country and about Portland. I feel that everybody who lives here is fortunate to have that...some people may take it for granted...I can’t imagine that” [P21, male, age undisclosed].

“...nature in the city also provides recreation, parks, and we have a wonderful example there in Forest Park as a place that provides all of the things I just said and certainly provides a place for recreation and sometimes a getaway from the hubbub of the city...we’re very lucky to have something like Forest Park. It’s unusual, if not unique. I’ve seen articles that suggest we’re not the only city that has such a big wilderness area. But certainly it’s not common; even Central Park (in New York City) is much more stylized, not wild in the way that Forest Park is...I think it’s a very important part of what Portland is, and what Portland is as a city” [P25, male, aged 73].
Map 14 illustrates just how much larger Forest Park is as compared with Mount Tabor and Laurelhurst Parks. Research participants discussed Forest Park as a destination relative to the proximity of either of the other two parks described in this chapter. It provided participants with an escape to a wilder nature that was likened to a more pristine version of nature found in wilderness areas. Mount Tabor Park came close to this ideal, but could not match the sense of escape that Forest Park provided to the people I interviewed.

For many participants, urban nature afforded a means to escape from the bustle of urban life, and for most, urban nature came in the form of trees or other vegetation. The parks described by participants as meaningful nature adhered to these qualities. In general, differences in how participants thought of these parks as “nature” lie in their perceived wildness; the wilder, the more “natural”. Further, my analysis showed that escape from the sounds of the city was one key aspect of Forest Park that distinguished it from the others. Because of its size, getting away from such sounds, except perhaps from airplanes,
is more probable than the seclusion possible in a more neighborhood-oriented park. Despite the apparent reverence for more wild places for this group of urban residents, the fact that participants held high esteem for neighborhood nature and nature in their yards is an indication that people value nature in many different forms both for its beauty and perhaps utility, but also for the different experiences they afford.

5.3.3 Meanings of urban nature
Nature in the city, or perhaps more specifically open space, has competing goals, from accommodating ball fields and playgrounds, to providing manicured parks and gardens, to integrating wild and natural spaces. I have shown that nature at multiple scales and serving multiple purposes is valuable to the people in this study. Many participants spoke about urban nature as a way to find solitude and a way to achieve a pseudo-wilderness experience without leaving the city. Participants, moreover, saw urban nature as an important contribution toward increased air quality and wildlife habitat. In many respects, my analysis suggests that perceptions of nature in the city came down to ideals surrounding a more pristine idea of wilderness. These perceptions then translated into comments that categorized open spaces into those that are manicured versus those that are wild and less visibly managed. For example, participants deemed Mount Tabor Park, in many ways, too managed to be “nature”:

“...there’s way too much asphalt up there; and they let cars in” [P4, female, aged 65].

“...it’s just entirely manufactured...” [P5, female, aged 51].

“I don’t know if Mount Tabor is the model for a good park, but it’s one that I’ve used and I like” [P7, male, aged 23].

“(Johnson Creek) was a very wild place...this (Mount Tabor Park) is a more established park; it’s actually mowed and stuff like that” [P12, female, aged 68].

Not only were these ideas specific to parks in Portland, participants also discussed them in terms of private yards. Although one person expressed herself negatively toward “wild” vegetation planted in front yards, most saw such vegetation as extremely positive,
especially because it attracted birds and other wildlife. The next three comments demonstrate the variation on opinions regarding yards that incorporated native plants:

“(Planting native plants)...was not something I was aware of at all... (a woman) from the Audubon Society...was talking about native plants and it was like, ‘Why didn’t I know about this?’...I love the birds. I’m so aware that there are so few birds...And so I said, ‘Okay, that’s it; I’m going to do something for the birds” [P4, female, aged 65].

“I know of a gal that has greenery planted right in her parking strip which is not supposed to be allowed. It makes my friend and I just furious. She knows it’s not supposed to be allowed and yet she’s always planting more stuff there... if it was groomed and maintained it’d look fine but to have it all scraggily; it looks awful. And when it obstructs the view, that's not safe” [P24, female, aged 59].

“(This neighborhood is)...a little wilder” [P23, female, aged 67]
“...kind of wild gardens...From Wisconsin we’re not used to that at all...Like the yard across the street...Good intentions, and everything just went wild” [P22, male, aged 65].
[Do you like the wild?] (interviewer)
“Yeah!” [P22]
“Well, not that wild” [P23]

These comments reflect larger issues regarding urban nature, maintenance of urban nature, and the appropriate amount of “wildness” of urban nature. I found that management, programming, and type of vegetation found in these areas, are key to how they are perceived and experienced. Perceptions of a more pristine idea of nature do not preclude the enjoyment of multiple types and sizes of urban nature: manicured and cultivated spaces, smaller and more managed spaces, neighborhood parks, spaces that provide much needed social and neighborhood gathering places such as Waterfront or Laurelhurst Parks. Each of these spaces can provide daily access to nature, or opportunities for recreation, social interaction, or stewardship.
5.4 Access to urban nature

Integrating nature into the fabric of the built environment is an important way for humans to have contact with nature. This is demonstrated by the number of participants in this study who described nature as living, growing things, while imparting the significance of nature found within the daily routines of their own lives. Although it must be acknowledged that the people I interviewed may be more inclined toward both observing and appreciating nature than the general population, even the four who did not share the majority’s strong affinity towards nature told me stories of past or present nature experiences and expressed appreciation for both parks and vegetation.

Most of the people interviewed for this study were knowledgeable about the environment and tried to behave in an environmentally responsible manner. When we discussed issues surrounding sustainability, many participants brought up transportation and their personal efforts to reduce automobile use; for them, automobile use was a marker for environmentally responsible behavior.\(^\text{69}\) Eighteen people (almost 43% of total participants) told me that they tried not to use their car. Many participants told me that they walked, biked, or took public transportation to their destinations, using their car only when transporting heavy items or when going out of town. Five participants (12%) did not own a car. Nineteen participants (45%) discussed trying to use a transportation mode other than the automobile to access nature (not all successfully). It was apparent that for participants who were interested in reducing automobile use, proximity and access to nature was an important part of the decision making process when they decided where to visit.\(^\text{70}\)

\(^{69}\) Automobile use was also a marker of environmental behavior for the one participant whose job required a truck and whose recreation was vehicle-intensive. This person spoke of feeling that the neighborhood looked down upon him, but conceded that perhaps regulating gas usage was necessary: “I'm an energy hog and I admit it. But that should be my right. I shouldn't be forced out of that. And maybe there should be a limit to how much gas I can buy a year. Gee I hate the way that sounds, but I believe in that” [P3, male, aged 54].

\(^{70}\) Access to nature is addressed in The Portland Plan goals, where all Portlanders would be within a safe half-mile walk to a park or natural area (City of Portland 2012).
“I wish we didn’t have to drive so far to appreciate the Willamette River in its more natural state...You can walk along the beach (at)...Oaks Bottom. In that general area it feels like nature...but it’s a little hard to access by walking. You’d have to ride a bike or take the bus from here...we shouldn’t force people for appreciation of these things to get in their car and burn fossil fuels to get there” [P29, male, aged 66].

“We have rose gardens right down the block from me...all the streets have so many trees on them... just walking down the street, it seems like there’s some kind of nature present...I don’t drive, so I typically bike most places or walk... Mount Tabor is not that far away, but I don’t go there as often, just because I don’t have that much extra time...it’s really great to just be able to walk outside and walk to the garden or go on a run to the river. So, just having those things in an accessible area is really important” [P10, female, aged 26].

“I’m surprised I don’t go to Forest Park more, but I don’t...there’s enough other places to go or things to do closer by, and it’s all the way across town. I have to drive to get there, and I try to use my car as little as possible...It’s not like I feel guilty whenever I get in my car, but I just try not to if I don’t have to use it” [P9, male, aged 50].

Image 7 Left: Ladd’s Addition rose garden, Right: Oaks Bottom to downtown
Ladd’s Addition photo by the author. Oaks Bottom photo by The Raisins (The Raisins 2008)
The comments above are examples of how many participants made an effort not to drive their cars. They subsequently accommodated their daily activities, including accessing nature, accordingly. Of course, many other participants did not talk about alternative transportation as being a part of their decision making process for daily activities or accessing nature. Moreover, to some participants did speak about accessing nature, the prospect of using an automobile to reach nature was not an issue, for example:

“It’s great that they are (within biking distance). I don’t know if it’s important...It has nothing to do with why I live where I live...I go to them because they are relatively nearby...If they weren’t bikeable, if they were somewhere in the general vicinity, I would probably just drive there. It’s not a deterrent” [P36, male, aged 56].

“We love Forest Park, but of course we’re further from there. We can get on I-5 and get all the way to the entrance to the park. But usually we drive to the entrance because it’s a lot faster” [P23, female, aged 67].

One of the components of sustainable urban form is urban areas that are compact, dense, and walkable (Wheeler 2004; Newman, Beatley, and Boyer 2008; Beatley 2000). My research suggests that access to nature, both large and small, should also be considered as part of sustainable urban form. It is apparent from these interviews that neighborhood nature integrated into the urban fabric helped these participants have contact with nature. Nature in the city provided participants with places for reflection and solitude. For some, natural areas like Mount Tabor Park or Forest Park located in the city, offered this respite. This proximity then also meant that getting out of town for such experiences was not as necessary, for example:

“(Proximity to nature places) means we don’t have to drive...you have a wider sense of home in a way; because you can walk out of your house and go over to Laurelhurst, or go to Mount Tabor...It means that where we’d like to stay, is here. It’s not like we’re just dying to get out of town...” [P22, male, aged 65].

Despite this sentiment, access to wilderness areas outside the city is also important to some participants, and thus might be one more piece of the human-nature connection. Several participants, who had chosen either not to drive or had reduced their driving,
spoke of a dilemma between the desire to experience nature outside of the city and the means to get there, for example:

“My car gets really bad mileage, so it’s nice if (nature is) close by, if I can walk. I think you have to weigh the beauty with the cost of travel, not only to yourself but to the environment. I don’t bike, so it’s really car, or walk, or nothing...going out to the Gorge or up to the Mountain, I carpool and do it on a weekend; or if I’m lucky enough to find a friend who isn’t working on a weekday. It’s more of a special thing to go outside the city” [P38, female, aged 24].

“When I want more (of a nature experience), I can bike out to Sauvie Island. I don’t have a car. So I can bike out to Sauvie Island, or I can put my bike on the bus and bus out there and then ride my bike around once I’m there...it’s not that not having a car really keeps me from doing what I really would like to do...I’d like to do a lot more hiking...you can hike around here up to Mount Tabor; there’s a bunch of hikes you can do in Portland that are nice. But I’d like to be much more out in the mountainous area” [P4, female, aged 65].

For many of these participants, making environmentally sound choices was part of their daily routines. Although they valued the natural areas found in Portland, some still wished to go to larger natural areas away from the city. The comments above illustrate that some people will go to great lengths to achieve a more pristine nature experience in an environmentally responsible way. These attitudes and actions reflect an environmental ethic.

The maps presented in this chapter have shown that the research participants live close to many natural areas in Portland, including larger spaces like Mount Tabor Park. This is perhaps a luxury of Portland, and is perhaps also why a preferred means of travel to nature in the city was even a topic of conversation. I have shown that for these community members, nature in the city occurs in many forms and many scales, each entailing a different type of experience. Municipal policies or programs can embrace different scales
of nature through the preservation of open space both in and out of the city. If opportunities for urban residents to have daily interactions with nature are desired, municipal policies and programs should also focus upon the integration and promotion of neighborhood-oriented nature through measures such as tree planting or the certification of yards and gardens as bird habitat. Such policies and programs are one way to integrate nature into the urban fabric, which also have the potential to foster individual stewardship of the commons. Moreover, in place-based planning and design, the consideration of how the public can access natural areas should also be considered; preferably through connections and pathways that do not rely on automobile transportation.

5.5 Engagement with urban nature and learning

Despite the importance of urban nature to the research participants, the existence of and proximity to nature alone did not foster local environmental knowledge. The majority of participants exhibited global environmental knowledge, most understood local combined sewer overflow issues, and almost every participant described personal efforts toward environmentally responsible behavior.

My research revealed that participants’ level of engagement was not a determining factor for global environmental awareness. However, engagement with the community in general, as well as ecological restoration and gardening activities, increased the meaning of particular natural areas, and influenced place-specific knowledge such as hydrology.

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71 Some mid-sized cities are working to preserve natural areas both inside and outside of the city. Foothill levy funds in Boise, Idaho protect land outside of city limits by purchases, donations, easements, or land exchanges (City of Boise a ; City of Boise b). Fort Collins, Colorado uses their 2004 Land Conservation and Stewardship Master Plan to plan for the protection of natural areas in the city, region, and land in-between communities. City and county taxes are used to acquire and manage natural areas (City of Fort Collins). The Duluth Natural Areas Program in Minnesota seeks to conserve discrete natural places that represent significant and unique local ecological habitats. The program protects city-owned land both inside and outside of Duluth, and land under private ownership that qualifies for the program (City of Duluth 2002). Moreover, State regulations in Idaho require that cities and counties develop a comprehensive plan within “areas of city impact”, which is a defined area located beyond city limits. Cities and counties work jointly in planning for future development, including protection of “important environmental features” and “prime agricultural, forestry and mining lands” (University of Idaho College of Law 2012).

72 BES advocates for both of these examples (tree planting and backyard habitat certification) as part of the T2R (City of Portland g). Further, between 2008 and 2011 BES planted over 13,000 yard trees and over 13,400 street trees (City of Portland 2011).
The more someone was engaged in hands-on activity in one’s own yard, or as part of the restoration of Mount Tabor Park, the more localized place-based knowledge was apparent (e.g. the health of one’s yard or Mount Tabor Park). Moreover, those involved in community or neighborhood-based issues or projects (e.g., Mount Tabor park restoration, neighborhood associations) appeared to be more likely to expand their thinking related to the environment or to urban planning issues past the individual site to the neighborhood or city. The majority of participants in both categories of involvement (hands-on and community engagement) expressed a global sense of responsibility to the planet. In fact, most people began with global concern and then took their actions down to a more personal level and thus a more personal environmental understanding. On the other hand, some who were less blatantly environmentally minded expressed environmental concern in more personal and local terms rather than a more global view.

In this chapter, I consider active involvement to include participation in the stewardship or maintenance of the public realm, engagement in the stewardship or maintenance of the private realm, and involvement in one’s neighborhood or community. Almost every participant either gardened, was involved with Mount Tabor Park in some way, was on their neighborhood association board, or participated in Transition Portland; a few were involved with several of the above mentioned activities (Table 16). Over half of participants spoke of being regular gardeners, and almost 24 percent volunteered to restore Mount Tabor Park (Figure 18 and 19). The majority of gardeners were over 60 years old and female. There was an equal gender split for restoration volunteers and an even age distribution between those over 60 and under 40 years of age (for those who disclosed their age).
Table 16 Research participant engagement with community or urban nature

<table>
<thead>
<tr>
<th>Research participant engagement</th>
<th>Number of participants</th>
<th>Percent of Total Individual Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Individual Participants (non staff)</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Regular Gardener (private realm)</td>
<td>22</td>
<td>52.4</td>
</tr>
<tr>
<td>Friends of Mount Tabor Park Volunteer</td>
<td>12</td>
<td>28.6</td>
</tr>
<tr>
<td>Regular Restoration/Stewardship Volunteer (public realm)</td>
<td>10</td>
<td>23.8</td>
</tr>
<tr>
<td>Neighborhood/Community Leader</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>Neighborhood Association Board Member Volunteer</td>
<td>7</td>
<td>16.7</td>
</tr>
<tr>
<td>Transition Portland Volunteer</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>Friends of the Reservoirs Volunteer</td>
<td>3</td>
<td>7.1</td>
</tr>
</tbody>
</table>

Notes:
Neighborhood/community leaders were determined inductively due to their level of both formal and informal neighborhood involvement.
Participants’ volunteer categories are not mutually exclusive.

Figure 18 Number of participants who were regular gardeners, by age and gender

Note: Some participants did not want to share their age, therefore a “0” indicates undisclosed age.
Eight participants (19%) did not fit into any of these categories (Figure 20). Of these eight, one person was 95 years old and spent most of her time at home but had been active in the outdoors in her youth, and another was 80 years old and spent her volunteer efforts organizing an annual Chinese Old Timers luncheon. Two of the eight were college students who were educated in Portland’s local ecology and had extensive knowledge of native and invasive plants through formal education. Three others were either unemployed, temporarily employed, or worked over 40-hours per week and were caring for aging or young families; two of these demonstrated less pro-environmental attitudes than the majority of the research participants. Further, not everyone who was involved in their neighborhood or community was also involved in their yards or restoration activities.
As part of this research, I wished to determine how active involvement in stewardship activities contributed to connections and perceptions of relationships across scales; from a house to the globe, and from an individual to the commons. Exploring participants’ knowledge and perceptions of scalar connections was a way in which I could begin to gauge their values and attitudes toward nature. It also allowed me to distinguish how participants saw themselves in relation to multiple scales of natural systems, whether they acknowledged their own impact on such systems, and whether they thought of connections globally or locally. As each interview progressed, I steered our conversations to more abstract ideas on how individual natural areas might connect to larger systems such as the watershed, bioregion, or planet. Their perceptions of trees are one example.

Discussing the role of trees as urban nature many times brought up a core concept that trees give life through the carbon dioxide-oxygen cycle. This is an example of participants’ cognitive connection to a life-system as a whole. Some people also discussed trees as aiding in local air quality or as part of a carbon sequestration strategy, and a few mentioned trees as a localized approach for increased water quality. Others mentioned trees as giving shade and cooling one’s home in the summer. In this example, participants’ knowledge of trees ranged from global benefits to a more place-based
strategy for local air and water quality issues, as well as a perhaps more individualistic strategy for decreasing cooling needs of the home in the summer months. These attitudes show environmental awareness of the multiple benefits of trees at multiple scales and illustrate an engagement with local and global environmental issues. In addition, several people, particularly those in Ladd’s Addition, mentioned trees as a seasonal indicator. For these residents, the trees affected their lives in a very personal way that seemed to have made them more in tune with seasonal variations of neighborhood trees and bird migration. This could be a stepping stone to an awareness cultivated by simple observation and living with “nature”.

When speaking about urban nature and scalar connections, conversations with many participants moved to more personal stewardship endeavors such as gardening or restoring Mount Tabor Park. Stewardship took varied forms, which in most cases was an attempt to contribute to a greater environmental good. Gardeners who did not volunteer with the Mount Tabor Park Weed Warriors appeared to be more focused upon personal environmental goals than the Weed Warriors; the greater good in these cases in large part having to do with increasing bird habitat or being more self-sufficient food producers. Indeed, when I asked if yards were part of a larger system, 15 participants (5 of whom volunteered at Mount Tabor Park) mentioned their yards as habitat for birds and insects, for example:

“I think (the birds) love (my yard). I have a lot of trees. I know a lot of birds nest in some of the trees and shrubs, and other animals that are in there that I find. So I know that it provides some living space for them and I like that” [P36, male, aged 56].

“I think that we need to be respectful of the other creatures’ need for habitat. We’re not the only creatures in this reality and we are very inconsiderate about things like that. That’s why I only grow things that are beneficial in my yard” [P41, female, aged 66].
Going further with the idea of scalar connections, many participants discussed wildlife corridors as greatly needed physical habitat linkages for wildlife in the city. Three people described the potential for yards as wildlife corridors, for example:

“...all of our yards, we think of them as these individual places with boundaries and fences...at one time they were the natural environment. I would love to see all of these yards; I’d like to see the fences down. I’d like to see native plantings everywhere. My back fence neighbor, she’s also into native plants and habitat for the birds. Her husband and I want to take the fence down, but she hasn’t weighed in on it yet; she’s probably concerned about privacy, as am I...we all understand that if we took the fence down it would make a bigger habitat area...I see (my yard) as potentially (part of a) much larger habitat” [P4, female, aged 65].

In a different vein, when thinking of how a yard might connect to a larger system, several participants mentioned not using chemicals or power tools. This was a concern that individual actions can contribute to a decline in water quality, air quality, or adversely affect the health of wildlife or humans. Participants’ perceptions of how their yard might connect to larger systems demonstrate concern for specific systems such as increased biodiversity, but more specifically toward the benefit of birds. Expanding this view of interconnected yards, I found that participants thought about the benefits of linking larger habitats at a regional scale through wildlife corridors, including their yards.

Participants’ interest in decreasing pesticide, herbicide, or power tool use signifies environmental understanding that led to personal action, although how those beliefs and attitudes came to be are complex. Participants’ desire to work toward personal food security and to acquire the knowledge and skills to grow one’s own food is another component of environmental understanding (Hester 2006; Orr 1992). Although these actions are interrelated, most participants discussed only one avenue of concern and action (e.g., backyard habitat certification). This concern and subsequent action brought participants’ pleasure and joy. Such actions demonstrate ecological understanding advocated by many scholars, where a person’s actions change to reflect the understanding

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73 The Portland Plan includes policy goals specifying the integration and expansion of habitat corridors throughout the city (City of Portland 2012).
of the relationships between social-ecological systems and an understanding of how human actions impact these systems (Orr 1992; Hill et al. 2002; Hester 2006; Thayer 2003; Turner and Berkes 2006).

As I have stated, stewardship of their yards, in many ways, was some participants’ way of contributing to the betterment of the planet. The cultivation of individual property, or even a community garden plot, was a way to control one’s own space to fit with each person’s concept of environmentalism while contributing to something larger than oneself, “I’m part of something a lot bigger than myself. That’s a source of joy, but it’s also a source of sadness. It’s definitely a richer life than doing the rugged individualism things that our culture pretty much promotes” [P8, female, aged 52]. For many, these actions fostered a connection to nature in general, to birds, and to their community. For others, food security and food safety was their primary concern. For a few, either because of lack of time or funds, or simply lack of interest, their yard was not a critical element that fostered a connection with nature. Rather, connecting with nature, if that was even desired or expressed, occurred in more traditional ways such as getting outside of the city and into a wilder and perhaps more pristine, nature.

I have shown that participants’ yards provided an avenue for respite in nature. But more than simple enjoyment, or an expression of environmental concern, for many the yard became a means through which they became familiar with the ecology of their property and the seasonal variations of flora and fauna. For example, the next two comments illustrate the importance of slowing down and taking the time to get to know the local wildlife through observation:

“...you do become familiar with the sounds even if you’re not an avid bird watcher...you do notice when there’s a change...We know the native birds well enough and then when you hear something new you think, ‘Oh yeah’. And it does really relate to a different time of year that you would hear these sounds... we have a little chart in the backyard that we can look up birds...” [P8, female, aged 52].
“When I’m out in the yard, I see (the birds), and I enjoy that; working out there with the birds and the crows. Crows are pretty interesting. They have different sounds. I’ve learned some of the odd sounds I never thought a crow would make. Just the other day, in the tree where they sit out on a craggy branch of a weeping birch, I can see from my deck and they sit up there off in the sunset. The other day there were four or five on that same limb which I’d never seen, I think it’s a family that’s grown to that many…it’s one of those wonderful little experiences where you feel like they’re just having their little sunset experience up there, and I’m down on my deck and we’re communing…I see them and I hear all their funny little sounds, and I see them raising their babies…” [P36, male, aged 56].

These comments are an example of the local knowledge gained through repeated experience in and observation of nature, and if desired, taking the initiative to go further to teach oneself about native birds. Gardening in particular was an avenue to gain that localized experience and knowledge, for example:

“…I did find that as I began to garden, when you put those chemicals on the ground and you dig in the soil, everything’s dead. You kill the earth worms, you kill all the insects. You kill everything. You find the poor little ladybirds dead. It started to bother me. It bothered me physically too. So I gradually stopped using them. And I would say in the last twenty years I’ve been rabidly anti-chemical” [P41, female, aged 66].

Thus, through stewardship endeavors, participants were able to cultivate scalar connections. Such activities affect each person’s property, but also have greater scalar reach, such as increased habitat or a localized effect on water and soil quality through organic gardening techniques. Of further importance is the time taken to slow down, observe, and be engaged; which, for example, allows people to learn about native bird species and local ecosystem health.

Like gardeners, those who had spent time restoring or working on projects on Mount Tabor Park become intimately familiar with the park. Knowledge of the ecology, physical layout, or health of the park varied depending upon the type of activity. Regular walkers
in the park recognized the detrimental effects of ivy on the ecosystem, and noticed differences in the apparent health of the areas where ivy had been removed, for example:

“...they’ve been doing a reclamation (in Mount Tabor Park), and they’ve been doing a really great job...they’ve been pulling ivy and cutting down trees, making more bird habitat and letting some of the understory come back that had been drowned out by all the ivy...I’m so amazed at some of the areas of the park, how the native species have come back so well in the areas where they’re cleaning...” [P39, female, aged 61].

Friends of Mount Tabor Foot Patrol members articulated additional knowledge of the park’s ecology through more formal means such as workshops and Friends of Mount Tabor meetings. This knowledge added a layer of understanding on the interconnectedness of the park as an ecological system, for example:

“...with this invasive removal, there’s the concern that if we take too much of it down then we’re going to disrupt the rodents, or we’re going to disrupt the birds. So now we’re going to leave some of the branches and everything so that these animals can still nest...an understanding of that just gives me more of an appreciation of nature in general and our environment in general...if it weren’t for knowing and learning about this in this park, I may not be paying attention to it as much; so then certainly it would carry over if I hear something going on somewhere else, there’s a mental connection that way” [P20, female, aged 58].

The Mount Tabor Foot Patrol is an authoritative-type presence in the park. Part of their duties includes picking up garbage and answering park users’ questions. My experience with the Foot Patrol showed me that they desired to be informed about the park in order to feel confident in their ability to accurately answer the public’s questions. Park users often ask for help in their orientation within the park, and they sometimes ask specifically about the park’s restoration. While in Portland, I attended an educational plant walk on Mount Tabor Park held specifically for members of the Foot Patrol. This plant walk is an example of a more formal means of education meant as an introduction to plant identification. Repeated experience volunteering in the park, including mentorship on native and invasive plant species, is invaluable in its reinforcement of the health and
Hands-on restoration activity added another layer of experience that involved deeper scrutiny of the park, and which deepened participants’ environmental understanding of that specific place, for example:

“I have a better knowledge (of Mount Tabor Park) than (my wife), being on the Board and being on different committees, working on the trails; I’ve been on all the trails a number of times, so I know where they all go and if somebody’s talking about a certain area, I can immediately visualize what they’re talking about and what they’re looking at and if they’re standing there, what you’re going to see...” [P21, male, age undisclosed].

“You can read about invasive plants...it’s a problem and it threatens biodiversity and soil quality and water quality and all this. But until you get out and you actually see and you experience what it’s like, you see how much work it is to remove it and how invasive it really is, you don’t really understand what those words mean...if you look around, it looks green and you think nature and environment. But when you start getting down and really look at things and identify things, you realize what’s going on. Like this is clematis swarming over this entire area. You really start to recognize the individual plants, and when you start to recognize them, you appreciate them” [P57, female, age undisclosed].

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74 Indeed, although I attended one ivy pull, one community garden work party, and one plant identification walk, I would be hard pressed to identify the difference between native and wild blackberry, for example.
This deeper place-specific understanding, in turn, affected the way in which participants viewed other natural places, and also translated to other areas of their lives. For some, simply seeing invasive species like ivy in either Mount Tabor Park or Forest Park made these places seem less natural, “Mount Tabor’s natural, and Forest Park is very natural. I think within city limits it’s challenging because there are so many invasives and those don’t seem as natural to me now that I know more about plants. They’re still natural places; they’re just not as pristine or as beautiful to me” [P14, female, aged 31].

Regular park volunteers translated their restoration knowledge and experience to their yards and gardens. Although many participants not involved in natural area restoration spoke of the importance of native plant species in their yards, many times this was directly influenced by the desire to attract native birds or to reduce household water use. For Mount Tabor Park Weed Warriors, planting native vegetation or removing invasive plants was a direct reflection of their stewardship experiences, for example:

“...we learned about the invasives and of course, one of the first plants we bought was this butterfly bush because we thought it was very cool; then we find out that some butterfly bushes are invasive...it is something that we consider...” [P20, female, aged 58].
“Because we volunteer in the park we know about park issues, and we hear other people talk about park issues. So, the use of pesticides...What to cut down, what not to cut down. What’s invasive. All of that gets brought right back here. This yard used to be covered with English Ivy. I couldn’t even begin to count the lawn bags of English Ivy that we have pulled out...we spent weeks, months, over a period of time pulling that stuff. And we put in something that was a native plant. English Ivy is absolutely horrible in the parks, and it’s because (of) people; no one planted it in the park...our work in the park has influenced the decisions that we’ve made here, and just hearing other people talk about these issues...” [P18, male, aged 71].

Image 9 Garden with ivy and after ivy was removed
Photos taken by participant P18 and reproduced here with his permission.

These comments illustrate an understanding of place that moves beyond the individual yard or experience working in one particular area. These participants understood direct connections between Mount Tabor Park and their own property, and then acted upon that knowledge. Indeed, Mount Tabor Park volunteers saw their yards and gardens as an extension of the park, even if their home was located far away, for example:
“(Mount Tabor is)...a beautiful space and I think if those who are closest to it don’t take care of it, then who will? Because that is part of my back yard...I like birds and I like the bees and if they have a big green space then they’re more likely to come by my yard, and so I feel like it's an extension of my home... (A connection) through the wildlife and through the plants as well...pollen travels, and the native species having a strong population over there is going to make it easier for genetic diversity in my yard as well”

[P14, female, aged 31].

Several residents mentioned Mount Tabor Park as their “backyard”. However, very few of these were truly located in such proximity. Thinking of public places in this way implies ownership, with both the benefits and responsibility inherent in that word. Responsibility toward the commons is an important aspect of the bioregional philosophy and bioregional urbanism, where understanding the local ecology influences individual actions and sense of responsibility toward something larger than the individual.

My research showed that involvement at the neighborhood and community scale provided similar connections. Friends of Trees75 crew leaders had deeper knowledge and understanding of trees, tree health, and the appropriate growing conditions for trees. Friends of the Reservoirs76 advocates had a deeper understanding of water issues in Portland, including the business of water and the Mount Tabor neighborhood’s hydrology and geology. Those involved in city-wide planning issues or their neighborhood association tended to see the city as a political, social, and economic system, thereby moving beyond protectionist attitudes towards an understanding that the city works as an interconnected whole, for example:

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75 Friends of Trees is a non-profit organization that helps neighborhoods and the City of Portland plant street trees in Portland. Their Neighborhood Trees program provides discounted trees to home owners. Neighbors plant the trees together during neighborhood weekend planting days (Friends of Trees).

76 Friends of the Reservoirs is a group of citizens dedicated to protecting and preserving Portland’s historic reservoirs (Friends of the Reservoirs).
“...I'm on several public involvement committees that are city-wide, so I look at things from both the neighborhood and the city, but building on what I've observed in my own neighborhood...If you work on things over time, you begin to see how what you want bumps into somebody, either next door or across the river or something else and you begin to see, if you're paying half attention, you begin to get that bigger perspective...” [P28, female, aged 65].

Each of these types of involvement, from the individual yard to community-wide issues, involves some degree of local understanding. Not every person can be involved in each type of endeavor. However, each activity contributes to a greater whole.

In this section, I explored how active involvement in stewardship activities, from the private to the public realm, contributes to participant connections and perceptions of ecological relationships. I found that proximity and engagement in nature does not, alone, foster local environmental knowledge. I have shown that research participants gained knowledge through multiple means such as reading, being part of an ongoing dialogue, and through observation. Independent of the type or level of engagement, most of the participants in this study demonstrated global environmental knowledge and spoke of acting in environmentally responsible ways. However, as posited in learning theory and literature on sustainable transformation (Schön 1984; Thayer 2003; Hester 2006; Glasser 2007; Orr 1994; Kolb 1984), it is apparent that hands-on restoration or stewardship work fostered stronger place-specific knowledge as compared to the participants who were not involved in hands-on nature activities. For most participants, there was a tendency to first think globally and then to bring down that concern to actions they could personally pursue at a local and individual level. For those less environmentally inclined, I found that environmental concern was focused more on individual and local concerns like the effect of air quality on asthma or the effect of water quality on salmon.

In terms of neighborhood-oriented stewardship, discussions about gardening revealed that some participants were cognizant of scalar connections including habitat, food production, and water and air quality. Each of these concerns is advocated as part of the necessary components of ecological understanding (Orr 1992; Hester 2006). If considering local environmental knowledge, the people who help restore Mount Tabor
Park are particularly tuned in to the ecology of the park and how it connects to other systems like habitat and hydrology. Gardeners are more tuned in to the components that make up a healthy gardening ecosystem. Those who take time out to observe and reflect on nature have a deeper place-based understanding of the seasonal variations of flora and fauna. Participants who are involved and educated in local issues such as native plants tend to see more scalar connections (ecosystem and local ecology, geology, hydrology). Participants not involved in environmental stewardship activities show a concern for the environment and act accordingly (e.g., driving less or using less lawn and garden chemicals).

As varied as humans and their experiences and desires are, these participants show that if so inclined and able, there is a multitude of ways in which to express and act upon environmental concern. These attitudes, and attitudes toward a responsibility of the commons, appear to be prevalent among the participants in this study. The development of municipal policies and programs that allow for and foster these attitudes should be considered if fostering such a place-based ethic is desired.

5.6 Conclusion
In this chapter, I explored how proximity to parks and gardens and stewardship activities contribute to a human-nature connection and how proximity and stewardship might influence environmental knowledge. I began by exploring participants’ perceptions and understanding of a broad concept of nature, followed by the role of nature in the city. In general, participants described nature by its value and relationships to humans, although its role in larger systems was acknowledged and deemed important. Participants displayed general environmental understanding and some local environmental knowledge. Almost every participant articulated aspects of linkage and connection to larger natural systems; some acknowledged these connections through specific systems-based language, others spoke of it in more intuitive terms. I found that the simple existence or proximity of nature does not foster environmental understanding. Rather, I found that nature was appreciated and provided a sense of pride and identity with Portland and Inner Southeast Portland.
I found that in order for a human connection to nature to occur, there is need for nature of multiple scales in the city which also allow for different levels and types of engagement. Participants described larger natural areas such as parks as meaningful sometimes as a result of proximity and time spent in a particular park. However, the knowledge of larger spaces such as Forest Park, contributed to the identity of Portland as a nature-full place. Thus, my findings suggest that even the knowledge of each park’s presence is an important aspect in these spaces’ impact on residents.

In contrast, I found that for many participants, the act of gardening provided meaning and pride, and a sense that they were contributing to a larger environmental good. Volunteering in the restoration of Mount Tabor Park sparked much the same feelings of meaning and of ownership and responsibility to the commons. I found that level of engagement did not indicate level of global environmental concern or knowledge, or intent toward environmentally responsible behavior. However, those who participated in community and/or hands-on activity in natural spaces both large and small conveyed stronger place-specific knowledge than those less engaged. This research indicates that active engagement in nature and community increases place-specific knowledge and greater understanding of natural systems than those less engaged.

My research suggests that nature that is integrated into the very fabric of the built environment is important in its potential to foster a human connection to nature. What emerged from discussions on “meaningful” and “nearby” nature is that multiple scales of nature that encompass different experiences are important to the research participants. Although perhaps it is a human-centered approach to planning, it is important to recognize the feelings and emotions present when people engage with nature. These emotional connections are quite powerful. Even if the experiences are for the benefit of humans, which can be a desirable outcome in itself, some people end up connecting these experiences and the value of nature in a scalar way, recognizing the interconnectedness of urban and natural systems.

Thus, from this analysis, four elements emerge as important. The first is the idea of education both informal and formal – this is how local environmental knowledge, or
place-based understanding, can begin. My interviews revealed that opportunities for hands-on activity in nature through gardening or restoration can deepen place-specific understanding through trial and error and informal mentorship. It is also apparent that observation can provide a baseline appreciation for knowledge of the local ecosystem and a foundation from which to begin to understand ecosystem health. In addition, I found that formal education through workshops, classes, or plant walks can contribute to foundational knowledge of local ecology, with hands-on activity solidifying understanding over time.

The second element is the purposeful integration of nature into the very fabric of the built environment. I found that neighborhood nature in the form of trees and gardens brings about a feeling of a nature-full city, where appreciation for flora and fauna can begin. In addition, there is the larger scale nature to consider. These larger natural areas provided added value to participants’ place identity and enhanced a sense of responsibility to the commons.

One third element to acknowledge is the social significance of natural areas. My research showed that neighborhood parks provided places for socialization and recreation in close proximity to home. For example, involvement with Friends of Mount Tabor Park turned out to be an extremely important part of some participants’ social network and identity. Moreover, stewardship opportunities were invaluable in fostering participants’ local environmental knowledge and sense of responsibility to specific places, and providing deeper connections to the community as a whole.

The fourth element emerging from this research is the importance of access to nature. If considering how to plan and design cities which might foster a human-nature connection and if seriously considering the manifestation of sustainable or place-based urban form, the ability for urban residents to easily access nature is a crucial. For participants who were interested in reducing automobile use, for example, proximity and access to nature was important in deciding where to walk or recreate. Larger and wilder natural spaces within city limits also provided a semblance of a “real” nature experience, which for some meant that traveling outside of the city was perhaps less urgent.
To conclude, the presence of urban nature was important to the participants in this research. For some, it led them to appreciate the city’s foresight to plan for urban nature. In order to foster a human connection to nature, municipal policies or programs should embrace different scales of nature through the preservation of open space both inside and outside of the city. Moreover, policies and programs should focus upon the integration and promotion of neighborhood-oriented nature through measures such as tree planting or the certification of yards and gardens as bird habitats. Further, I found that dialogue around, and opportunity for stewardship of participants’ private yards and public spaces deepened their connection to the local ecology and contributed to social networks and social cohesion.

77 As I discussed in footnote 71, some cities work together with counties and regional authorities to conserve, preserve, and manage land outside of city boundaries.
Chapter 6 Green Streets and rain gardens

*Municipal policies, plans, and programs like T2R exemplify incremental implementation of bioregional urbanism. In Portland, T2R has changed the built environment through the retrofit of public streets and private property to incorporate sustainable stormwater solutions like Green Streets and rain gardens. Although a human-made solution that mimics rather than uncovers nature, such solutions result in the emergence of the stormwater system, making a natural system (hydrologic cycle) visible while concurrently addressing the human relationship to that system.

My research indicates that Green Streets and rain gardens are part of a stormwater management system that contributes to community identity that supports the health of the Willamette River. They further offer the possibility of small scale integration of nature at the local neighborhood level, which has the potential to increase urban residents’ contact with nature and a natural system. Moreover, Green Streets and rain gardens provide opportunities for neighbors to become active in their maintenance and upkeep as an amenity of the commons. The integration of urban nature and a natural stormwater management system into the urban fabric and urban infrastructure constitutes a new way for some urban residents to consider and interact with nature and the stormwater system. For the participants in this research, the concept of sustainable stormwater facilities as nature was not universal, whereas their purpose as stormwater facilities was more readily expressed.

I this chapter, I explore sustainable stormwater infrastructure as nearby nature and a visible natural system. I specifically investigate Green Streets incorporated into public streets and rain gardens implemented on commercial and institutional private property (New Seasons grocery store, St. Philip Neri Parish, Café au Play, Colonial Heights Presbyterian Church). I examine whether participant proximity, facility visibility and

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78 I use the term “sustainable stormwater facilities” to encompass stormwater management facilities such as bioswales, rain gardens, and eco roofs. It is a term used by the City of Portland. I use it because it is directly descriptive of the stormwater infrastructure of which I am writing in this chapter. Others may use the term “green infrastructure”, however I hold green infrastructure to stand for more just than stormwater.
design, and participation with implementation and maintenance of Green Streets and rain gardens, influences participants’ local environmental understanding and perceptions on the connections between human activity and the stormwater system.

In section 6.1, I introduce the concept of proximity and level of engagement as it relates to Green Streets and rain gardens, each of which I discuss throughout this chapter. In section 6.2, I first examine research participants’ general attitudes and knowledge of Green Streets and rain gardens. This section touches upon participants’ development of local environmental knowledge, including the relationship between Green Streets, the built environment, and the Willamette River. This section also informs the area of public discourse, found in the bioregional urban model, which ultimately influences the viability of such city-wide policies. In section 6.3, I examine research participants’ connections to natural systems through an analysis of their perceptions and interactions with Green Street facilities and rain gardens. This analysis informs the realms of the physical environment and neighborhood-oriented stewardship as put forth in my bioregional urbanism model. I look at how participants experience these systems and the extent to which they perceive sustainable stormwater facilities as nearby nature. I conclude by exploring whether, and how, Green Streets and rain gardens contribute to environmental learning.

**6.1 Proximity and level of engagement**

As part of this research, I explored whether Green Streets and rain gardens, integrated into the built environment, might facilitate participants’ connection to nature and the stormwater system. I also explored how differing levels of engagement with sustainable stormwater infrastructure contributed to knowledge and understanding of the local stormwater system. I will show that proximity and level of engagement was not a determining factor for participants’ understanding of the neighborhood water/sewershed. Level of engagement with the community in general, as well as engagement with specific sustainable stormwater facilities like rain gardens, did increase the meaning of these places and intensified scalar and systems connections.
6.2 Green Streets and rain gardens – attitudes and knowledge

Although the participants in this study are for the most part an environmentally savvy group, they expressed varied opinions regarding the City of Portland’s sustainable stormwater infrastructure. This section documents how research participants regarded and understood Green Streets and rain gardens.

Discussing Green Streets with research participants revealed alternatives to stormwater management, such as rain gardens that had been implemented on some private properties, as well as a glimpse into the views of some participants who imagined more sustainable alternatives than Green Streets. Furthermore, discussing participants’ general opinions of Green Streets and rain gardens also revealed how the projects connected with their daily lives, how they interacted with the facilities, and how participants learned about the function and purpose of the facilities.

I asked 41 participants if they had ever heard about or seen Green Streets. Of those asked, 38 (90.5%) had heard of them, with only a few people needing more prompting to jog their memories. The high number of people who had heard of Green Streets or bioswales in my study suggests at least two points. First, as a result of my recruitment method, the participants may have been predisposed toward knowledge of nature and sustainable stormwater infrastructure. Second, they were engaged with and knowledgeable about their own communities and neighborhoods.

Indeed, the high level of knowledge of these community residents could be due to the high levels of their community involvement or proximity to project locations. Eighty-one percent of participants had the potential to have additional information about the Green

79 I did not ask one person this question, as I was not able to steer our conversation in that direction.

80 This percentage is higher than other research on Green Streets. In one study, 53% of respondents (2,192 surveys) in both Green Street areas and control areas (no Green Streets) were aware of projects that were being planned in the Tabor to the River program area (61.7% in Green Street project areas only) (Shandas et al. 2010). In another study, 77% of respondents (748 surveys) in Green Street project areas (located outside the T2R boundary) had noticed Green Streets and 67% were aware of their stormwater function (Dill et al. 2010). In both studies, a Green Street neighborhood and control neighborhood (no Green Streets) were selected for the study from which to draw a representative sample. In contrast, my study was not mean to be representative of Portland as a whole. The high percentage of participants in my study who were aware of Green Streets indicates that these participants are more engaged and more informed than the typical Portland resident.
Street process through the mail or through meetings. Only 18 participants (42.9%) lived within the T2R boundary; these were households that would have received information on the Green Streets to varying degrees depending upon their proximity to future facilities. Sixteen people (38.1%) who lived outside the T2R boundary were involved in other organizations with ties to T2R (e.g., neighborhood association boards, Friends of Mount Tabor), and thus would have had familiarity with the city’s efforts through various meeting agenda items. Only 8 participants (19%) had less obvious ways through which they could have become familiar with Green Streets.

Twenty-four people (57.1% of total participants) accurately described their working knowledge of the facilities’ function and purpose, for example:

“I think the whole Tabor to the River is such a good idea because if you can save the rainwater at the source, then not only you can recharge your ground there but... putting (it) all (in) the Big Pipe\textsuperscript{81} and then running it through a sewer plant, that’s kind of like cutting butter with chainsaws. Why would you want to spend that money to make a pipe four times the size when it’s pure rainwater that can be taken care of right at the site?” [P43, male, aged 54]

Some participants connected Green Streets directly to stormwater management and were generally aware of stormwater issues in Portland because they had volunteered to help install a private property rain garden, or had gone through the Green Street implementation process themselves as a property owner. Others attributed the facilities as street improvements, had noticed them in new developments,\textsuperscript{82} or referred specifically to their appearing in newly constructed bikeways. For instance, many people spoke of seeing Green Streets during recurring aspects of daily life such as while walking, cycling, or commuting.

\textsuperscript{81} The “Big Pipe” project refers to a six-mile long, 22-foot diameter tunnel that was constructed to collect sewage from the east side of Portland. Construction was completed in the summer of 2011 (City of Portland).\textsuperscript{a}

\textsuperscript{82} Portland requires onsite stormwater management for certain projects that meet threshold requirements (City of Portland 2008).
In general, research participants expressed that Green Streets and rain gardens were good ideas. There was almost universal agreement that they benefit stormwater runoff, help reduce basement flooding, and have potential to provide traffic calming. Not every interview conversation lent itself to an in-depth discussion about sustainable stormwater infrastructure. With those where the conversation led to continued dialogue on Green Streets, I found that 31 participants (73.8% of total participants) voiced opinions that were supportive. Some of these opinions were unreservedly pro-Green Street, for example:

“...we saw the bioswale in front of the house as not taking away parking space, but adding something” [P26, female, aged 63].

“...it’s good for pedestrians because it slows the traffic down and makes it better for walking or crossing streets...I think they do not detract from the neighborhood; they add...the design, the trees that they have, and the plants” [P16, female, aged 65].

However, most comments were more nuanced; many people, for example, held reservations, some quite deep, toward Green Streets. Some comments, many second-hand accounts, complained about what city staff had told me were typical issues: parking space loss, tree loss, concerns about mosquitoes, and a feeling that Green Streets would not be maintained. Most people I interviewed agreed with the purpose of the bioswales, but many had questions about facility siting and whether they were functioning in the way the city intended – e.g., were these expensive amenities worth the money? Were they going to work? Were they constructed in the right places?

“...it looks really good to have a reedy bioswale at the end of your street, but whether that actually makes a difference, I don’t know if they’ve been in place long enough to tell...they just finished that Big Pipe project a year or two ago and I’m curious as to whether there’s meaningful benefits coming from all this yet or whether, for now anyway, it just looks good and makes us feel good about ourselves...(Green Streets) have benefits down the line for stormwater and for surface run-off that I think are important...” [P7, male, 23].
This quote is an example of the nuanced opinion of a person who, when interviewed, demonstrated a high level of knowledge of the local stormwater system. The comment also shows cynicism perhaps toward the city, but in this case directed more toward efforts that may look “green” or environmentally beneficial when proof of these green claims were not readily available. This type of comment was not in isolation. Even with high levels of local stormwater knowledge and environmental understanding, skepticism of Green Streets persisted, for example:

“There for a while we were kind of concerned that some of them didn’t seem to be draining like they were supposed to, we could just visualize it, ‘whoa, this is going to be a breeding ground for mosquitoes’...It seemed like quite an extensive and costly endeavor on the part of the city...I tend to be a little bit of a cynic when it comes to getting your bang for your buck on these things. Is this the first time this has been done? Do we know this is going to work? We sure hope it does, because it sure costs a lot of money...They seem to be working. But are the people who monitor these things, are they seeing the actual benefit...and would we be told if it wasn’t?” [P21, male, age undisclosed]

Other participants were less cynical about Green Streets. They saw benefits to stormwater management, but had questions regarding the function of Green Streets and why they had been constructed in certain locations, for example:

“...I’m curious why they put them where they put them. Because it didn’t seem like water would drain there. And then others seem like the natural place to put them... it makes me wonder who’s designing them and why they are putting them there. And I keep thinking there’s got to be a reason to have it there” [P15, female, aged 60].

“...It’s interesting how after a big rain there’s some that seems like they should have more water in them than they do. Either they weren’t placed quite right or they filter faster or something” [P9, male, aged 50].

These types of comments reflect a common sentiment expressed by the research participants; people understand and generally support the rationale behind Green Streets, but they question whether the facilities are functioning properly.
For the participants in this study, a range of attitudes can be seen including those that are very supportive of Green Streets and those who grudgingly agree with the Green Street concept but have reserved final judgment until they see more proof or data that the facilities are achieving the benefits the city suggests. These varied attitudes, although generally supportive, can affect the ultimate success of Portland’s sustainable stormwater policies. These opinions feed into the public discourse on Green Streets facilities, which in turn could influence public opinion and the feasibility of implementing similar stormwater policies in other areas of Portland. It is interesting to note, however, that research participants have obviously thought about Green Streets, leading some of them to question their effectiveness: *Will the plants survive? Why isn’t the Green Street over there instead?* This is an informed and sophisticated way of thinking that connects residents to the rainfall cycle and stormwater system.

As conversations with research participants moved forward, I tried to gain a deeper understanding of whether Green Streets triggered other connections in terms of the public realm, the commons, and nature and natural systems. I will go into more depth on the potential of sustainable stormwater infrastructure as learning tools later in this chapter. Here, I want merely to highlight that even though some participants questioned the functionality and value of Green Streets, there was sufficient interest to trigger reflection, learning, understanding, and a connection to stormwater management. As one participant stated, “*The benefit is there if people want to question it and learn about it and ask questions about it*” [P21, male, age undisclosed]. Indeed, observing, reflecting, and questioning the merits of the facilities reflect Kolb’s (1984) and Schön’s (1984) learning theories in which observation and reflection are part of the learning process, a process that could be transformational. However, the logistics and cost type skepticism voiced by some research participants has the potential to overshadow the conversation on sustainable stormwater solutions as well as other potential social benefits of the facilities that could contribute to local environmental knowledge and subsequent environmentally responsible behaviors.

In addition to skepticism about cost and functionality, another group of participants went even further to talk about alternatives to Green Streets. They suggested the incorporation
of more nature in general, more natural sustainable stormwater infrastructure alternatives, the installation of guerilla planting boxes full of edible plants as traffic calming devices, and the collection of rain water on private property rather than the construction of concrete bioswales. The people who brought up these alternatives represent a more radical rung of environmental attitudes on the spectrum found in Inner Southeast Portland. This subset of participants could also be considered early adopters of a resilience way of thinking. My analysis suggests that these more “radical” opinions are based upon a desire to see more nature in the city and more natural solutions to stormwater management; solutions that sometimes revolved around participants’ own sustainability mission or agenda. Solutions like collecting one’s own stormwater and growing one’s own food are in line with theories of resilience, and bioregional philosophy. Those who spoke of these types of solutions represent a way of thinking that questions core assumptions about “sustainable” living and how those assumptions relate to the retrofit of the urban environment, for example:

“I mean they're concrete, which is not a very good sustainable thing to do...”
[P30, female, aged 65].

“...I see a solution to a problem that needed a solution being done in a way...that’s expensive and uses energy...I think of solving the problem with no out of the box thinking, just using the system to solve a problem... (Green Streets) represent an old way of thinking rather than a new way of thinking. The new way of thinking would say, ‘Do we even need this street? Do we need cars?’” [P29, male, aged 66]

“That’s funny, most people would say, this is a new way of thinking. I mean we didn’t grow up on streets like that...” [P30, female, aged 65].

Indeed, Portland’s sustainable stormwater infrastructure strategy is certainly regarded as innovative. The desire to break out of the status quo and rethink the root causes of patterns of daily life reflects Shove’s (2010, 2003) contention that context is part of

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83 Several participants commented on this regarding Portland’s Green Streets, for example, “But I’m really happy they are there (Green Streets)...it just seems like kind of another unique thing that happens in Portland or happens in Southeast...I go to a lot of other cities and haven’t seen that sort of project” [P9, male, aged 50]. In addition, Portland’s efforts (along with other cities) have been covered in the press as an example of innovation (Wise 2008; Odefey et al. 2012; Ryan 2007; Cauchon 2010; Garrison, Hobbs, and NRDC 2011).
behavior and therefore the context of daily life should be shaped by policies that support sustainable *ways of life* rather than making a *sustainable* option one of many other *unsustainable* options. It is therefore worth considering the potential of a deeper, perhaps transformational, social impact of sustainable stormwater infrastructure (e.g., connection to nature, to habitat, or to the human impact on the stormwater system), and the subsequent form that might take in the physical environment; a form that could look quite different from Portland’s current Green Street solution.

### 6.3 Daily life and nearby nature

*Implications for urban form and environmental learning*

Small-scale nature that is incorporated into neighborhoods can enable daily human interaction with nature. This would be considered “nearby nature”, rather than nature as a destination, and a way for urban residents to consider and interact with nature and localized natural processes as part of daily life. In this section, I delve into the physical realm, the backdrop for lived experience. The integration of Green Streets and rain gardens into the existing built environment has the potential to shape the form of the city through the integration of small networks of neighborhood nature that uncovers the previously unseen stormwater system. In the following pages, I will discuss how Green Streets and rain gardens fit into practices of daily life and whether participants considered them to be “nature”. The connections and perceptions of urban residents could influence the shape of the city and the form of sustainable stormwater solutions; their manifestation ultimately a product of their policy intent (e.g., primarily stormwater management). I will show that, for these urban residents, considering Green Streets as instances of nature and the potential for environmental learning through such facilities may not be fully realized in their present form and distribution. In addition to the discussion of the physical context of Green Streets and rain gardens and the ways in which research participants experience the facilities, this section covers aspects of neighborhood-oriented stewardship (experience in nature, volunteer work, social and environmental learning).
6.3.1 Experiencing Green Streets

Like the varied opinions of Green Streets, the participants in this study also described a variety of experiences with Green Streets. As I mentioned previously, when asked about Green Streets specifically, many research participants described seeing them on their walks or during their bike commutes, and sometimes while driving, for example:

“...when I walk up in Colonial Heights, there’s a whole bunch up there that are just actually in the neighborhood...” [P15, female, aged 60].

“There’s some there at Clay and 12th that I’ve seen grow up in the year or two since they put them in. I go by there pretty much every day...on my bike or sometimes driving...” [P34, male, aged 53].

Image 10 Green Street facility in the Colonial Heights neighborhood

Many of the research participants are physically active and have chosen not to drive their car if at all possible (for varying reasons: cost of parking, less environmental impact, exercise). Because of these lifestyle choices, they are frequently out and about, and therefore have opportunities to see Green Streets. Research participants had not changed their daily patterns due to the facilities; Green Streets had simply become another aspect of interest in their daily routines. For some, Green Streets had changed the urban landscape into something more stimulating, for example:
“One of the fun things about walking around here is you never know quite what you’re going to see...what people do with their yards and then those ‘swale things and the different kinds of plants in them’” [P23, female, aged 67].

The plants found in Green Streets are part of Portland’s stormwater system and, therefore, do look different than typical neighborhood vegetation. Green Street vegetation must be hardy enough to filter pollution and survive in standing water as well as seasonal drought. This type of landscaping can signal a difference in purpose and functionality than grass or trees. In addition to the appeal of different types of plants, the differing shapes and sizes of the Green Streets also add interest:

“I have noticed all the plantings with them, and the different kinds of bioswales...some are just the sides, some are sloped, and the kind of vegetation and trees that are in them. It looks like it has been thoughtfully well done” [P26, female, aged 63].

“...the designs are not all the same... some of them are very, very narrow so they don’t take up that much space...and so they’re not huge, where you’ve really got to go around them if you’re driving and I think that’s kind of neat...And then you have the bigger ones, which, I don’t know if it was just for the water or if they were intended to slow down traffic...” [P16, female, aged 65].

“...big grasses and rocks, instead of solid pavement...it looks better, it looks interesting, it makes the road a little less linear” [P39, female, aged 61].
My analysis shows that, for some, Green Streets had become an appealing new feature within the built environment. They were something to watch and observe while passing by, as well as something that had broken up the linear paths of the street, thereby contributing both visual interest and pedestrian safety. In contrast, participants also spoke of Green Streets as becoming a normal, perhaps invisible part of the urban landscape. Some people conjectured about this possibility, while it had already occurred for others, for example:

“...Well I’ve gotten so used to them, they don’t register necessarily. I don’t think, ‘oh there’s one’ and I don’t remember where I see them” [P36, male, aged 56].

“...once they’ve been in for a while to just see them and not even really think about them, to just gaze past them or not consider them...” [P9, male, aged 50].

This is an interesting dilemma, and it begs the consideration of what fuller purpose sustainable stormwater infrastructure might serve. What are the implications of Green Streets blending in and becoming part of the “normal” urban landscape? It is possible that their functionality as a part of the stormwater system might also disappear, along with any subsequent educational benefits. On the other hand, nature as aesthetic might
bring enough contact to nature and natural systems to foster a place-based ethic, or perhaps the water and pollution resilient plants found in Green Streets provide a more explicit link to the stormwater system than simply adding more street trees.

Experiential and transformative learning theory indicates that learning can occur when observation includes an opportunity for reflection and subsequent connection to individual experience (Kolb 1984; Dewey 1938; Schön 1984; Mezirow 1997; Jarvis 2009). However, research on environmental behavior change shows that one act alone such as simple observation of a physical object, does not hold as strong potential for change as active engagement (Chawla 1998; Vaske and Kobrin 2001; Ryan 2005; Kaplan and Kaplan 2005; Barlett 2005), or simply the need for multiple inputs for pro-environmental behavior change (Stern 2000). It is therefore all of these things – nature as aesthetic, water and pollution resilient plants, a functioning Green Street in a rain event, observation and reflection – that have the potential to contribute to the building of localized environmental knowledge or place identity, whether or not Green Streets are invisible to some of the population. Indeed, my research indicates that the presence of nature and natural systems as a normal part of the built environment, combined with opportunities for passive education, can contribute to a dialogue that shapes the practices of daily life.

While many participants’ comments indicated that Green Streets were beneficial to the aesthetics of their neighborhoods, not everyone agreed. There was some concern that Green Streets themselves and the plantings within them were monotonous, unimaginative, and a monoculture of vegetation. There was also concern that some city policies such as increasing the urban tree canopy, would detract from the character of Portland’s urban landscape, for example:

“...we’ve lost a lot of our rose hedges to the urban canopy, the desire to have trees in parking strips...that’s changed the character of the neighborhoods and you have all the bioswales looking the same, it’s going to be dull” [P27, female, aged 70].
Only two participants who knew about Green Streets had consistently negative views of the facilities,\(^8\) four expressed skepticism of their functionality and voiced distrust of the city, while 16 had similar doubts yet trusted the city’s judgment. Despite this, most participants saw the facilities as something that added interest to the monotony of the built environment, and a project whose rationale had clear benefits even if they were not immediately trusted. How the facilities integrate into neighborhoods and how they affect the character of Portland’s streets is an important consideration, and one which people will have a multitude of opinions. The previous participant comment gives a sense of a potential conflict around larger issues of urban nature such as questions of maintenance, the appropriate amount of “wildness” of urban nature, and in terms of sustainable stormwater solutions, how Green Streets facilities in Portland integrate into the built environment. The plants found in Green Streets signal the function and purpose of the facilities as part of the stormwater system. However, community residents’ preferred aesthetic may not coincide with city stormwater management goals, or community member preferences for other benefits such as increased bird or insect habitat, or food production.

### 6.3.2 Sustainable stormwater facilities as nature

Thus far in this chapter I have shown that research participants generally see Green Streets as beneficial for the management of stormwater as well as for external benefits such as aesthetics and traffic calming. Some participants’ comments signal strong

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\(^8\) Four participants had no knowledge of Green Streets. Another four liked their overall purpose but felt that there were more sustainable and more natural solutions for stormwater runoff.
opinions regarding urban nature and vegetation in their neighborhoods (e.g., more nature, more wildness, more edible plants; and the opposite – more manicured and less wildness). In this section, I discuss whether participants perceived Green Streets and rain gardens as small-scale nature, thereby potentially providing a way for urban residents to have contact with nature in daily life.

Research participants’ generally positive attitudes toward Green Streets continued even when delving into more abstract ideas concerning their purpose. By shifting the conversation to sustainable stormwater infrastructure as nature, I was able to begin to determine the value of the facilities as spaces of nature to these community members. In doing so, I was also able to see glimpses into potential environmental connections and how these participants linked the facilities to larger environmental systems (e.g., water, wildlife, built environment). My interviews included discussions on nature in general and urban nature in particular. I included questions that tapped into participant views of Green Streets as nature in order to delve further into the potential social benefits of the facilities as place-based infrastructure.

I discussed sustainable stormwater facilities as nature with 21 research participants. Approximately half of these considered Green Streets “nature” and half did not. Unprompted, some people described Green Streets as nature, and a few even volunteered them as an example of small-scale nature. When explaining their views on the facilities as nature, most likely because of their backgrounds in the natural sciences, only three participants described Green Streets as mini-habitats, particularly for microorganisms and insects, “…it’s all about scale, I guess. I’m human, so I want bigger green spaces, but to the insects that live in that little community and to the fungi in the soil, that’s their nature, that’s their world. So, yeah, it can come in small doses, definitely” [P14, female, aged 31]. Quite a few more participants considered Green Streets nature because of their vegetation. Many people were quite split on how to think about Green Streets. They assessed the perceived quality of Green Street vegetation and what that type of nature might provide for human benefit in contrast to something such as asphalt which is more obviously not natural:
“(Green Streets are not nature), but I suppose then you could argue, you have pavement over there, so that’s not nature and so (the Green Street is) kind of trying to recreate what would naturally happen” [P20, female, aged 58].

This was a recurring idea: that Green Streets, as human-made nature, is a recreation of a natural process rather than a natural process itself. The comment above implied that Green Streets are not nature. However, to some, although human-made, Green Streets were indeed nature:

“...they’re kind of fake aquatic systems...but you know they do support vegetation, there’s going to be animals on those” [P22, male, aged 65].

On the other hand, some articulated that nature is nature, and thus it does not matter if the Green Street is better or worse than what it replaced. More than nature for nature’s sake, some pointed out that Green Streets are serving a human purpose, a purpose that is more useful than what was there before even if what was replaced was nature:

“...as long as there are plants and they’re growing and doing their thing, they are nature...if what was there before, it could have just been grass or something or someone’s plants and that’s nature too. I don’t know if it’s better nature in terms of just visual impact, in fact they’re equal. So it’s more of the awareness of doing better things, better impact than what was there before. (They) add to the understanding” [P36, male, aged 56].

Perhaps then, whether or not Green Streets are considered “nature” is not important, but rather their function is what counts. In the comment above, unprompted he used the words awareness and understanding, both of which are key notions in place-based urban planning and design. The function and purpose of Green Streets was for some, an understanding and awareness perhaps not of nature per se, but towards a more direct relationship to other systems such as the effect of pavement on stormwater runoff. Indeed, in the next section of this chapter, I will show that sustainable stormwater infrastructure can bring awareness of natural systems, even if that system is human-made. The rationale and purpose behind sustainable stormwater infrastructure can create

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85 BES material specifically states that sustainable stormwater facilities mimic nature (City of Portland f).
meaning and connections to the consequences of the built environment and lifestyle choice, for example:

“I think of mindful rehabilitation of the way things would be if we weren’t paving everything and diverting water in a thoughtless way with paving and rooftops...There are things like the bioswales that are restoring or attempt to restore water drainage that was taken out with road building and development” [P33, male, aged 67].

In contrast, some participants felt that human-made restoration of natural systems did not count as nature, for example:

“(Green Streets are) not even close (to being nature). It’s more of a natural area than the asphalt it replaced, however; it is a direct result of the asphalt it replaced. It’s remediation. Remediation is not nature. And what’s planted in there is something that’s tough enough to handle antifreeze, used motor oil, whatever else is running off of the street. It’s far from nature. But it may be the closest we can get” [P5, female, aged 51].

These comments show an awareness of natural systems and an awareness of the primary purpose of sustainable stormwater facilities. Perceiving Green Streets as nature is complex. I have shown that many participants viewed Green Streets as an amenity; something that added visual interest to the neighborhood. However, when asked to gauge these facilities against a larger idea of “nature”, for half of participants Green Streets did not hold up to that ideal. For example, the notion of Green Streets as potential habitat was for the most part overlooked by most participants. Perhaps because of the blatantly engineered appearance of the facilities (concrete and curbs) and the participants’ general knowledge of their intended purpose, their function for stormwater overshadowed any other potential benefits.86 Therefore for some participants it appears that Green Streets may not fulfill a role of nearby nature if placed against a pure, or more ample notion of

86 The City of Portland sees Green Streets as providing multiple benefits including habitat (Dunlap 2011; Nelson 2011) but also encompassing environmental benefits such as decreased air temperatures in the summer, sequestration of carbon, screening of air pollution, and a contribution to habitat corridors (City of Portland 2007). Portland’s Watershed Health Management Plan, the guiding document for the operations of the Bureau of Environmental Services, specifies that a benefit of watershed planning is that it can achieve multiple goals including improvements in hydrology, habitat, water quality, and biological communities, and increasing Portland’s livability while also meeting regulatory obligations (City of Portland 2011).
what nature is (particularly in a neighborhood which already has many trees, gardens, and parks), for example:

“...if we want something to look unnatural and emphasize traffic, let’s put a yellow stripe on it...I hate the yellow. I think they’re gaudy, and far from natural looking...I like what’s in them. I like plants and I like trees” [P29, male, aged 66].

“...they seem really industrial to me. And have these big old curbs...I guess I would (consider them nature), but I wouldn’t rank them very high on my list...” [P17, female, aged 40].

However, as instances of green, or as purposeful nature, the facilities begin to have more standing. This sentiment was clearer for half of participants who did regard Green Streets as nature, for example:

“...it’s an excuse to put a little more green into a place...it’s this feeling of adding some more green to the gritty urban environment...” [P28, female, aged 65].

Overall, Green Streets can be considered a neighborhood-oriented and place-based urban design component which brings to light the visibility of the stormwater system. Arguably, then, Green Streets are a means to bring human consciousness more specifically to the connections between the stormwater system and the consequences of the built environment and individual choices on the urban hydrological cycle, even if the facilities are not considered to be truly unadorned “nature”.

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87 Pavement and roof surfaces increase stormwater runoff due to their impermeability. Much of this water runs down streets and into the stormwater system rather than percolating down into the soil, making it more difficult for groundwater to be replenished. This cycle is further taxed by toxins and pollutants from roads, cars, roofs, and yard and garden maintenance, which if not filtered can pollute groundwater, creeks, and rivers.
Participants who were not fully on board with the idea of Portland’s Green Streets tended to give me their own alternatives. These ideas invariably were more natural, wilder, or more in line with personal environmental agendas:

“...what I would love to do is maybe work with (the city) and build a tree bed out here because we don’t have very much shade. Or I’ve been really thinking about guerrilla planting boxes in the right-of-way for traffic calming...I would say, ‘Can we grow anything edible in them?’”  [P17, female, aged 40].

Others upheld rain gardens as a better alternative to Green Streets if considering the benefits of wildlife habitat in particular, for example:

“...there are some ‘swales, like the one down at St. Philip Neri...it’s deeper and has a better selection of shrubs there. I just think that’s a nice little wild space and I’d like to see it planted with some native blooming plants too, because it’s a wonderful sanctuary for insects and birds. I think if you’re going to put in a ‘swale...maybe that would be a good model for many of them so that you could make that a multi-use habitat area...If it were me, I’d just let the whole thing run wild. Not completely wild but much less concrete and structure than it has now” [P41, female, aged 66].
She continued to express ideas surrounding the retrofit of the built environment into something a little more natural and wild:

“I think they should let people experiment with these country lane projects, tear up some sidewalk when it’s on a slope...They were going to take out the sidewalks, starting at Brooklyn and going south to Franklin down to Waverly Boulevard. Then Waverly Boulevard had been turned into a huge bioswale and they were going to plant that whole thing with native plants and habitat and it would be called the country lane...I thought it was a wonderful plan” [P41, female, aged 66].

The country lane\textsuperscript{88} approach falls in line with other ideas put forth by research participants that questioned core assumptions of roads and infrastructure. It is also a wilder and perhaps more natural stormwater management solution that could achieve a dual purpose of stormwater awareness and a connection to nature. For some, rain gardens were a more palpable connection to nature. Private property rain gardens such as St. Philip Neri’s, are currently being implemented in Portland. Such gardens address some of the noted concerns regarding human-made versus “natural” systems. Although the rain gardens are also human-made, their lack of concrete, their larger scale, and the greater diversity of plants perhaps falls more along the lines of what is typically regarded as “natural”.

\textsuperscript{88} Two community members spoke to me about the Brooklyn Country Lane project [P41, P43]. One person described the project as a 3-block microclimate “eco” street. The first block was to mimic a savannah, the second block would be a forest, and the third a wetlands (the rain garden at the end of Waverley on SE 35th). The project was never completed beyond the scoping phase (Brooklyn Country Lane).
For whatever reason, rain gardens are salient. Participants asked me a number of times if I had seen the rain gardens at both St. Philip Neri and Café au Play. While Green Streets were spoken of with interest, and sometimes with pride as an example of “innovative Portland”, people used words to describe rain gardens that suggested they were more special. As I discussed in Chapter 5, my analysis suggests that people value the experience of larger scale and less manicured nature. Perhaps these larger scale versions of Green Streets can serve as a connection to nature in a wider sense.

In addition to their scale, the rain gardens at St. Philip Neri and Café au Play are quite visible. They are both supported by the community, are located near community gathering places (the church and a community-owned coffeehouse) and along a busy arterial road (Division Street), and they had both been constructed through volunteer effort. An information sign discussing the purpose of the rain garden was also installed at St. Philip Neri, which is a crucial feature in conveying its fuller intention and connection to systems such as stormwater and habitat. Along those lines, the art sculpture at New Seasons was another favorite topic of conversation; a feature that I will discuss in the next section. For the purposes of this research, I also looked at rain gardens at Colonial Heights Presbyterian Church located in a quiet neighborhood in the Tabor to the River program area. This church’s gardens were not mentioned by research participants. However, I pursued interviewees who were members of the church in order to explore the implications of the rain gardens’ larger physical scale and the efforts of church volunteers to install the gardens. These gardens appear to be a beloved part of the neighborhood, admired particularly for their beauty as gardens rather than their contribution to the stormwater system.

My research shows that, at least to some, Green Streets are considered small-scale nearby nature. For others, the function and purpose of the facilities were more important than as a possible connection to “nature”. Perhaps the incorporation of small-scale engineered

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89 Café au Play is housed at Tabor Commons. A former gas station site, the Tabor Commons property was seized in 2004 by the U.S. Marshall Service due to illegal drug trafficking. The neighborhood and many partner organizations came together to determine a community vision for the site – a community center and coffeehouse which embraces the needs of families and children. The Southeast Uplift Neighborhood Coalition is the owner of the site in partnership with the community (City of Portland 2008; SE Uplift; Leistner 2011).
Green Streets and larger scale wilder rain gardens into the built environment is an appropriate combination. Green Streets offer a direct connection to the stormwater system, while rain gardens have the potential to provide more of a connection to nature. Although not as plentiful as Green Streets, rain gardens could be more fully integrated into neighborhoods in order to increase the feeling of nearby and easily accessed nature; a nature that is more explicitly native to the region and provides a fuller sense of habitat.

Ultimately, if human connection to nature is desired within urban areas, policy decisions regarding Green Streets and rain gardens should necessitate decisions regarding their purpose(s) and whether human connection to “nature” should be part of that purpose. As it stands now, the purpose of Green Streets, at least in the eyes of these community members, is in their function as a stormwater solution. If human connection to nature is also desired, then something like rain gardens should become a more significant part of the stormwater strategy. Moreover, if watershed health is seen as a community endeavor, and if an overall understanding of local hydrology by urban residents is desired, then it is important to continue to evaluate the potential Green Streets have toward fostering environmental learning. The Tabor to the River tag line is “Partnerships for sewer, green stormwater management, and watershed improvements” (City of Portland 2009). Public education and outreach is a crucial aspect of Portland’s stormwater strategy; a strategy that recognizes the human impact on the urban hydrological system (Nelson 2011; Dunlap 2011). Green Streets and rain gardens play a part in this complex community partnership approach to watershed health. The visibility of the stormwater system uncovers a previously unseen waste, which could in turn affect community residents’ considerations of downstream impacts. I discuss the potential educational aspects of sustainable stormwater infrastructure next.

6.3.3 Green Streets, rain gardens, and environmental learning

Green Streets and rain gardens are a localized and visible stormwater management system. In Portland, sustainable stormwater facilities are linked to the health of the

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90 Inherent in this statement is the importance in engaging with the public. The Bureau of Environmental Services does this through education and outreach on watershed health and stormwater management, and financial incentives for managing stormwater on personal property, disconnecting downspouts, or even planting trees (Nelson 2011).
Willamette River, but more specifically to the reduction of stormwater runoff flowing into the stormwater system itself. In this section, I seek to uncover whether the visibility of the stormwater system through Green Streets and rain gardens, combined with opportunities for engagement with these systems, contribute to participants’ local environmental knowledge. I examine their connections to natural systems through their perceptions and interactions with Green Streets and rain gardens.

I had conversations regarding the impact of sustainable stormwater infrastructure on environmental awareness with approximately 27 participants, only 9 of whom did not live within ¼ mile of a Green Street or rain garden. I saw no difference in how informed or aware these 9 people were as compared to those living in closer proximity. These 9 participants had a science background, had spent time walking in their neighborhoods, or were active volunteers. I did not have discussions on this topic with the other 15 participants. Of these 15, 6 lived within a ¼ mile of a Green Street, 6 volunteered with volunteer organizations (Friends of Mount Tabor Park or Transition Portland), 2 participants did not know about sustainable stormwater infrastructure, and 1 had not yet seen the facilities.

Recall that the residents I interviewed are a highly environmentally conscious group who for the most part are well aware of the city’s efforts in stormwater management and of the purpose of sustainable stormwater infrastructure in general. In our discussions, I tried to determine whether they connected sustainable stormwater facilities to themselves and their individual lives. I further wished to uncover if and what type of environmental learning might occur and how that learning took place. I sought to establish whether environmental learning and scalar connections could arise through passive observation of Green Streets fulfilling their stormwater function, or whether hands-on engagement through implementation processes or maintenance of Green Streets and rain gardens was a more significant determinant of learning. In the case of these participants, environmental knowledge and scalar connections between individual actions and environmental consequences already existed. Despite this, I found that generally, sustainable stormwater infrastructure and participation in community life can influence environmental awareness and learning, and has a positive effect on sense of place.
Most participants had something to say about a visible connection between sustainable stormwater infrastructure and the environment. We were able to hold conversations about these ideas even if larger connections to watershed health and the built environment were not on the forefront of their minds. Such a dialogue points to the high level of environmental awareness of these community members. Because they already understood the function of sustainable stormwater infrastructure, they would not be prone to have ah-ha moments; sustainable stormwater infrastructure on their own did not prompt environmental connections. In fact, only a few participants expressed a situation where merely observing the function of Green Streets (filling and draining with water) triggered environmental learning; the potency of their comments, however, suggests learning can occur. For example, one person who lived within a ¼ mile of a Green Street facility described having read the T2R material sent to his home about Green Streets; this literature was a significant factor in his understanding of the function of the facilities. Although his street was not directly affected by Green Street construction, he was quite aware of the purpose of the facilities and told me that he enjoyed observing them while walking in his neighborhood. Even with this knowledge, Green Streets served as a connection to the stormwater system through the visibility of stormwater:

“It’s like a giant rain gauge. When you just see some water in the gutter going to a storm drain, you know it just goes away. But seeing the rain in those ‘swales is sort of a reminder that yeah, that is a lot of water, and it does have to go somewhere. It keeps more water from flushing right into the river...Another purpose” [P9, male, aged 50].

This resident uses the word “rain gauge” to describe the Green Street facility, showing that this localized solution to stormwater management, for him, had made a visible connection to the amount of water that prior to the existence of the Green Street had been flowing down the streets and into the Willamette River or directly into the sewer system. Likewise, another resident spoke of the function of Green Streets in much the same way,

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91 In fact, BES’s downspout disconnect program was one of the first places research participants went when thinking in terms of their own actions toward helping to alleviate stormwater runoff. These findings are supported by other research that indicated similar results regarding that particular program (HANSA GCR 2008). Approximately 14 research participants indicated that they knew of or had participated in this program, and directly related that program to stormwater management and sometimes as the predecessor to Green Street facilities.
speaking compellingly about the connection between stormwater, Green Streets, and the built environment:

“...it does make you aware of how much the streets are impervious surfaces, and how much water goes down (to the Green Street)...thinking about what goes on the streets, what collects on the streets, all of wear from the brakes, and the brakes liners, and the metal, and the asbestos that comes off from all that, and the oil that drips out of your vehicle...you begin to realize the city is an ecological system...” [P13, male, aged 67].

This comment, like the preceding one, reflects a realization about the amount of water coming down from the sky. He then moves this idea further to include the impact of impervious surfaces of roads and roofs as well as the pollution coming from the streets (cars) themselves. His comment was directed toward a Green Street located in front of his home and the rain garden at Café au Play. These facilities may not have actually led to this realization, but they certainly contributed to his thoughts on these connections.

As illustrated above, just asking participants to remember a time they had seen a Green Street or rain garden function during a rain event brought about thoughtful recollections. In some cases these recollections surrounded rain gardens such as the one located at Café au Play, for example:

“...when this new facility went in here just a year or so ago, I remember the first day that we had a big rain. Man, that water was rushing down and you could see it functioning and see what it was doing. I think a lot of people came and watched the facility just to see it do its thing. I think this functioning visibly is important” [P45, male, age undisclosed].
This comment is not quite as salient as the previous descriptions of Green Streets as a rain gauge or deeper connections to the built environment, but it shows that the rain garden at Café au Play is perhaps a focal point, especially during a rain event. The opportunity that particular rain garden provides for educating the community is promising, especially given the fact that the café is an important part of the neighborhood itself.92 I was told it is in the future plans for the café to develop informational signage, and perhaps a rain sculpture and children’s learning workshops to aid neighbors in understanding the function and purpose of the rain gardens (Leistner 2011; Lighthipe 2011).

The three comments above represent views of Green Streets and rain gardens in accord with theory that suggests that the visibility of natural systems helps to connect people to natural systems (Hough 2004; Newman and Jennings 2008). These facilities offer a localized, place-based system that for some provides a connection to larger systems such as a sewer/watershed (e.g., the Brooklyn Creek basin) and to a degree cultivates ecological awareness (e.g., the impact of the built environment on water quality). Others failed to make this connection. For example:

92 Many of the people I interviewed asked me if I had been to Café au Play, not only because of the rain gardens, but because of the incredible story of how it came to be. I visited the café four times (and four different times of day) during my stay in Portland and each time it was full of adults and children. In terms of stormwater management, Café au Play has integrated several stormwater features into their property which diverts stormwater runoff from their own property as well as runoff from adjacent streets (Leistner 2011; Lighthipe 2011).
“I understand the basic idea. Water collects instead of going down into the sewer system and out to the water and overflow...pollution and whatnot is theoretically lessened...In action, it’s pretty damn boring. It doesn’t look very exciting necessarily...” [P17, female, aged 40].

“I’m very conscious of what they do in terms of filtering the water, keeping the stormwater out of the sewer system, and preventing and addressing the problems of stormwater combined sewer stormwater overflow in the rainy season...but that’s not immediately apparent...I’m sure I have (seen the bioswales in the rain). But I can’t say that I’ve gone and looked in the bioswales to see...I just can’t say that as I’m thinking about it that I’ve stopped and looked in the bioswale and said, ‘hmmm’, but I can’t say that I haven’t either” [P35, female, aged 67].

“...what does it mean to see them in action? Do they do something? ...I’ve never thought about it” [P36, male, aged 56].

My interviews revealed that people have differing perspectives toward Green Streets. There appears to be no clear pattern as for whom these facilities provide learning opportunities. Time spent in Portland, level of knowledge of the facilities, level of engagement, and proximity appear not to be factors that influence environmental learning from simply observing sustainable stormwater facilities while they function. That sustainable stormwater infrastructure does not automatically lead to an awareness of the connection between these facilities and the environment, could mean that without some sort of educational component (signage, literature, lectures, tours, dialogue), the opportunity for this type of environmental engagement with Green Streets and rain gardens is likely to be lost. Without some sort of prompt, the Green Streets are just holes in the ground or pretty urban design features:

“...the first time I walked by several of them, I thought, ‘huh, that’s neat’; but (it) didn’t cross my mind that it had a purpose above being fancy... (My thinking changed during) a conversation at my brother’s house where other people were discussing them and I sort of learned from there. It wasn’t that it changed my opinion on them...I learned about them later” [P31, male, aged 35].
This comment shows the importance of public discourse in setting the stage for environmental awareness and learning. Indeed, for these community members, it is apparent that knowledge of Green Streets occurred through means other than simply seeing them function in a rain event. In fact, many participants discussed reading about Green Streets, although not recalling specifically where they had read the information. These comments highlight the importance of public discourse, including dialogue and reading, and its contribution to participants’ local environmental knowledge such as sustainable stormwater infrastructure. As illustrated in the model of bioregional urbanism, public discourse feeds into individual actions and behaviors, and in this case contributed to environmental learning.

Informational signage was seen to be an appropriate method to convey the purpose of sustainable stormwater infrastructure in order to “connect the dots” regarding sustainable stormwater infrastructure and their connections to the environment, for example:

“Why not have a sign that says, ‘We’re building a bioswale. This is what this is’. You could have a ton of them and they just go around to all the different projects...Connect the dots for people...‘Oh this is what this is and here’s a place where you can go find more information’. Because otherwise it’s just becomes a new piece of the landscape...” [P17, female, aged 40].
These informational signs do exist, although perhaps not in the prominent and extensive manner in which this person imagines.93 Further, participants did mention signs as an aspect of knowledge building, for example:

“There’s actually a little info sign at the corner of 16th and Division. That’s right near my house, so I’ve read that before. It’s the St. Philip Neri Church. New Seasons also has little info signs and if I’m standing there waiting for something, I read those. So those actually are usually informative for me…” [P10, female, aged 26].

The value of passive learning through informational and interpretive signs is a significant and influential aspect of environmental learning during daily activity. In the comment above, she spoke about the interpretive signs at St. Philip’s Neri and New Seasons in the context of going about daily life, “...if I’m standing there waiting for something, I read those”. The sign at New Seasons is located next to their popular rain sculpture and a bus

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93 BES incorporates signage into Green Street facilities to inform the public about what is going on with each facility at different stages of construction (Drennan 2011).
stop; a prime location for impromptu learning. Further, the rain sculpture at New Seasons provides a focal point for observing rain events. The sculpture or rain garden, combined with interpretive signage is an opportunity for spontaneous learning during daily activities, for example:

“...the one at New Seasons. That baby was filling up yesterday, it was pouring in there. It’s like a waterfall” [P34, male, aged 53].

“I certainly always watch the one with interest at New Seasons because I go past that regularly...seeing it fill and then watching it drain...” [P28, female, aged 65].

**Image 18 News Seasons' rain sculpture**
Photos taken by the author.

In addition to the more passive and informal means of learning through reading interpretive signs, participants also described other means of gaining knowledge such as educational tours, for example:

“As part the Pedalpalooza event last year, there was a tour about ecoroofs, and for me that was a really huge introduction to the entire idea of stormwater management in the city...the bioswales kind of piggy back onto that...I’m just more aware of the way that water use impacts the city...coming out of that tour...I noticed the stormwater swales” [P10, female, aged 26].
“...they took us on tours of some of the very early bioswales... and we started to notice any new establishment being built, like at New Seasons...” [P12, female, aged 68].

Such tours actually influenced these participants’ ability to see Green Street facilities as more than just aesthetic urban design components of the street. Twelve people spoke specifically about tours (e.g., Green Streets, ecoroofs, and the Bull Run watershed) as increasing their knowledge of Portland’s hydrological system.

The acknowledgment of the need for multiple forms of education encompasses BES’ strategy toward watershed health, particularly in the T2R program. As a result, the Bureau has developed a range of tools including tours, art, demonstration materials at festivals, and written material, etc. that touch on watershed health in many different ways (Nelson 2011; Dunlap 2011; Timm 2011). In addition to these educational strategies, my research findings suggest that well-placed educational signs or interactive art displays, combined with opportunities for a more formal introduction to stormwater and watershed health, could be a significant factor in local environmental learning.

My research has shown that if considering level of engagement with sustainable stormwater infrastructure in terms of proximity, the level of understanding of Portland’s stormwater system is similar across this group of research participants. If we look instead at level of engagement in terms of involvement in the implementation of rain gardens or the maintenance of Green Streets, there is also no significant difference in stormwater and watershed knowledge. With the possible exception of the Colonial Heights Presbyterian Church participants, the people I interviewed who were involved in the implementation of rain gardens or the maintenance of Green Street facilities did not attain additional environmental knowledge as a result of their engagement with these projects. Those who did participate in rain garden work parties, however, used language that indicated they had a more meaningful connection and attachment to those particular places, which is a phenomenon that has been documented in other research (Ryan 2005; Ryan and Grese 2005). Their understanding of the stormwater system was not necessarily greater than those who were not involved. Rain garden work parties were an aspect of
community building which just happened to be centered on an environmental activity, for example:

“...it was just a thrill for me to see so many people out there working, and the workers were having a good time, the people working with the food and the hospitality were having a good time and it was just a really neat thing to see all of that come together with our community...it’s nice to have that more positive feel in our neighborhood...I love (the gardens); I think they’re beautiful” [P42, female, aged 63].

Only after prompting, did she recall aspects of environmental learning:

“I didn’t realize how the plants and the roots in the plant system helped to filter the water. That was kind of a learning for me...(Learning) was just part of the process...” [P42, female, aged 63].

This conversation shows that community building was primary for this person in terms of the rain garden. In addition, like the other research participants, she expressed her efforts toward environmentally responsible behavior prior to any additional knowledge she may have acquired during her work on the rain garden. Moreover, her comments exhibit a meaningful connection to the garden for both its beauty and for its place in the neighborhood.

**Image 19 Colonial Heights Presbyterian: work party (left, middle), completed garden (right)**

Photos taken by Colonial Heights Presbyterian staff and reproduced here with their permission.
Another participant who had helped install a rain garden told me there was no direct education about the purpose behind their work or the fuller purpose behind the rain garden. However, her work at Café au Play had made her more aware of the site and the progress being made during the rain garden’s construction:

“...when I go past Café au Play I definitely notice, ‘Oh, the permeable pavers are in now’. I notice the space more, now that I’ve actually spent a fair amount of time there and got to look at all the work and all the process that went into it” [P10, female, aged 26].

Café au Play’s prominence in that particular neighborhood as a community gathering place also enables the café to easily find volunteers to help maintain the gardens:

“In terms of Café Au Play, (the rain garden is) the one area we can usually get volunteers, just to do weeding and stuff...That tends to be one where we’ll get the drop-in kind of volunteer” [P13, male, aged 67].

These comments speak to the importance of being involved in the community or simply having those spaces that are either visible to the neighborhood or are gathering places in their own right. Research participants spoke with pride about something as simple as New Seasons’ rain sculpture, about enjoying the beauty of the rain gardens at St. Philip Neri Parish and Colonial Heights Presbyterian Church, and both pride and aesthetic enjoyment of Café au Play and its rain gardens; not to mention the Willamette River itself. My research showed that these spaces and places have the potential as places of local identity and a focal point through which dialogue around the environment and individual actions could take place.

Portland itself is a significant aspect of identity for the research participants. The efforts of the City of Portland to integrate natural systems, soft instead of hard infrastructure, only added to a sense of uniqueness and pride toward their neighborhoods and city. Several participants had moved to Portland from other places, and the contrasts between the two places were still a part of everyday thinking, for example:
“...we’re always making comparison between this world and our previous life. In order to manage runoff in this city, yes they will construct something but then they will bring in that part of nature that will help them do that job. Where we were before, if there was a flooding problem well then you’d dig a hole and make a culvert and put a pipe in there and then asphalt over it again...” [P19, female, aged 60].

Involvement in restoration activities on Mount Tabor Park was also an influential part of how participants regarded the hydrology of Portland as well as the responsibility toward both the health of the park and the alleviation of stormwater runoff into the Willamette River. The conversation below highlights these connections and is also another example of a couple who note the differences between Portland and their previous home, both in terms of the physical environment but also the public discourse around environmental issues like the watershed which occurs in Portland:

“It’s an entirely different (water) system to worry about...there were lakes and creeks and stuff like that, but it wasn’t part of the everyday conversation, which it is in Portland. You’re totally aware of where your water’s going and it’s going to end up in the Willamette River” [P21, male, age undisclosed].

“...I’m still more aware, pay more attention to this because of my relationship to Mount Tabor...I still wouldn’t have that same level of knowledge or interest or anything if it weren’t for feeling almost personal” [P20, female, aged 58].

This last comment reflects a significant general finding from this research. People who are involved in other issues in their community or neighborhood (e.g., as board members or as part of an organization like Friends of the Mt. Tabor Park), have more meaningful connections to certain places and also seem to have a greater appreciation for systems, like the hydrological cycle, as a whole.

Such involvement also brings a sense of responsibility for the commons. Even if someone were environmentally inclined prior to participation, for many research participants, stewardship of their “place” was described as something like second nature, for example:
“... (Being involved) seems like it’s such a small thing and it just feels so much like the right thing to do. I don’t give myself this sense of credit like, ‘I made a difference here’ and I don’t even stop to think about ‘How many gallons of water are now being treated on site?’... It’s just like, ‘Of course, I helped’...” [P28, female, aged 66].

I then asked if helping construct a rain garden was educational in any way. The answer indicates that more so than working on the rain garden, understanding the construction and function of Green Streets was instrumental for learning. In this case understanding the function of Green Streets fostered an understanding of urban hydrology. This knowledge then contributed to finding solutions for handling water on her private property:

“...with the bioswales, understanding the construction and what’s supposed to be happening...understanding how those systems work, that’s just the hydrology of how you handle all the water on small urban lots...I definitely learned about things that I never knew about before I came to Portland” [P28, female, aged 66].

These comments illustrate that being involved in the community at broader scales than an individual piece of property provides a broader perspective of that city’s systems and ecology. For some participants, this then influences perspectives and decision making toward their own property. Further, municipal policies implemented by the City of Portland that put precedence on the integration of nature and natural systems into the built environment, along with a general dialogue that supports the environment, provides a foundation through which to cultivate a sense of responsibility toward the local environment. It is quite powerful to hear newcomers’ stories, people who already had an environmental ethic, express with amazement of what Portland has achieved in terms of its built form and the normalcy of dialogue around the environment and Willamette River. These are strong indicators of the importance of place-based policies that also encourage community outreach and dialogue.

If interested in contributing to watershed health as well as dealing with stormwater on their personal property, people in this study participated in whatever way they were able. Most were very much aware of the problems of combined sewer overflows into the
Willamette River as well as the hydrology of their own property. If unable to participate in the city’s programs directly, participants would consider alternative ways of dealing with stormwater on their own property, from increased vegetation to the installation of French drains. These efforts toward the implementation of stormwater management solutions on individual property may be taken as examples of stewardship, which also contributed to increased stormwater awareness for some participants:

“I was thinking about the collection of water and we have rain barrels. The amount of water’s so small and yet when it goes down the drain I think ‘Oh wow there’s 50 gallons of water’ and it seems like such a huge amount of water for one barrel...” [P33, male, aged 67].

“But the remarkable thing is that we have three rain barrels and in half an hour almost, a good rain, three of them are full. And so you think about, ‘Oh my gosh all this coming out of the sky is just amazing’” [P32, female, aged 61].

Hands-on activity can be an important factor in place attachment and increased local environmental knowledge. I found in my interviews that gardening connects people to their land, particularly if one is producing food for self consumption. Maintaining rain gardens or Green Streets contributes to deeper knowledge of vegetation. Removing invasive species from natural areas provides an education about native and invasive plants, knowledge of a healthy ecosystem, and a greater understanding of the various functions that such natural areas provide. Perhaps collecting rainwater, and using that rainwater purposefully, is yet another aspect of sustainable urban living that has the potential to cultivate a local environmental knowledge and a sense of place.

In this section, I examined research participants’ connections to natural systems through their perceptions and interactions with Green Streets and rain gardens. I sought to establish whether environmental learning and scalar connections could take place through simple observation of the facilities fulfilling their stormwater function. I further wished to determine whether hands-on engagement with the facilities through the implementation processes or their maintenance was a significant determinant of learning, and for whom this happened and how.
I found that passive observation of sustainable stormwater facilities “in action” does not, by itself, trigger environmental learning for most participants. However, during a rain, the facilities can prompt awareness of the amount of stormwater the facilities handle; water that previously had been running down the streets and into the stormwater system or river. For others, observing sustainable stormwater facilities was not something they had consciously considered. The incorporation of more direct and perhaps more formal stormwater education is therefore a critical part of awareness around Portland’s stormwater system. The value of passive educational experiences through informational and interpretive signs in daily life is another aspect of environmental learning that could be emphasized; the rain sculpture at New Seasons being a good example of a captivating bit of stormwater infrastructure.

Time spent living in Portland, level of knowledge of Green Streets, level of engagement, and proximity to Green Streets were not factors that contributed to learning through simple observation of sustainable stormwater facilities. There was also no significant difference in the level of understanding of Portland’s stormwater system when looking at how close residents lived to Green Streets or the level of engagement residents had in the implementation or maintenance of Green Streets and rain gardens. Participants who had volunteered to join rain garden work parties had a more meaningful connection and attachment to those particular places; however, the community building and social aspects of these projects were at the forefront of people’s minds rather than the purpose of the environmental activity itself. Moreover, participants involved in other issues in their neighborhood had more meaningful connections to certain places (e.g., Mount Tabor Park). They also seemed to have broader systems perspectives, such as the tradeoffs for different city policies, or the understanding of the linkages between local human, ecological, or hydrological systems. For most participants, knowledge, proximity, or engagement with sustainable stormwater infrastructure did not influence their behaviors, because they were already acting in environmentally responsible ways.

Overall, the influence of Portland’s policies that emphasized the integration of nature and natural systems into the built environment is effective in fostering place identity and, for some, cultivating awareness of local hydrology. Furthermore, Portland’s dedication to
educating the public on watershed health and to encourage dialogue concerning environmental issues seems also to have contributed to participants’ local environmental knowledge.

### 6.4 Conclusion

In this chapter, I explored the premise that the incorporation of visible natural systems through Portland’s T2R program provides a means to connect people to nature and natural processes, and thereby also contribute to the development of place-based understanding. I examined whether participant proximity, facility visibility and design, and participation with implementation and maintenance of Green Streets and rain gardens, influences participants’ local environmental understanding and perceptions on the connections between human activity and the stormwater system.

The people who took part in this study were, for the most part, environmentally savvy and acted in environmentally responsible ways. I have shown that they were in almost universal agreement that Green Streets benefit stormwater runoff, help reduce basement flooding, and have potential for traffic calming. Efforts toward watershed and Green Street education by BES, BES’ downspout disconnect program, and the visibility of the larger “Big Pipe” infrastructure project had brought stormwater management to the forefront of conversation for most participants. The visibility of sustainable stormwater infrastructure showed some potential in providing opportunities for observation and reflection on the larger effects of the built environment and residual vehicle pollution on water quality, the health of aquatic species, and the functioning of the stormwater system as a whole. These connections were verbalized by some, but certainly not all, research participants. Moreover, many questioned whether the facilities were sited or properly functioning. These varied attitudes, although generally supportive, can affect the ultimate success and feasibility of Portland’s sustainable stormwater policies.

My research revealed that many participants experienced Green Streets and rain gardens during commutes or neighborhood walks. This was likely due to the fact that many Green Street facilities are located in Portland’s Neighborhood Greenway system (a networked system of bike routes), which enable them to be seen by cyclists and cycling commuters.
This integration into the neighborhood street right-of-way also facilitates pedestrians’ observation of Green Streets while walking in their neighborhoods. Moreover, I found that rain gardens located in key public spaces, which also incorporate interpretive signage, allow for multiple points of contact and the opportunity to observe and read about the purpose and function of the gardens. These rain gardens not only provide access to more of the public due to their location, they offer points of social interaction. People can choose to learn more about the stormwater feature if they would like, or they can simply enjoy the benefit of nearby nature and social interaction.

Recall that one concern of this research is the premise that urban residents are disconnected from nature and natural processes. I explored Green Streets and rain gardens as small-scale nature, and whether participants considered them to be “nature”. I found that this was not straightforward. The experience of Green Streets, for some, afforded a connection to nature; the virtue of interesting and native plants within the bioswales facilities softened the city and brought nature close. For others, the purpose and function of the Green Street facilities overshadowed connections to nature or any other systems than stormwater. Indeed, for several people the utility and the engineered appearance of Green Streets meant they were far from natural, yet they could still appreciate their value for stormwater management. I found that although the facilities brought about an awareness of stormwater, Green Streets as “nature” is not universal. Alternatively, because of their size and diversity of vegetation, rain gardens come closer to an ideal concept of nature.

Although Green Streets and rain gardens did not appear to be catalysts for learning, I did find that volunteer work contributed to social cohesion, increased place attachment, and some localized environmental understanding. Further, participants who were involved in other issues in the city or their neighborhood appeared to have more meaningful connections to the places with which they were involved (e.g., Mount Tabor Park). Community involvement also seemed to foster a broader perspective of Portland’s urban systems (e.g., the relationship between transportation and land use) and local ecology (e.g., the hydrology of personal property).
The City of Portland appears to cultivate place identity. There is a dialogue of environmental values found throughout the city. Most of the people I interviewed were aware of the dialogue around the health of the Willamette River, of the source of their drinking water, and of the reasoning behind sustainable stormwater infrastructure. This awareness in large part had to do with their involvement in their neighborhoods and being a part of the public discourse, even if just through reading or listening. Even the few people who spoke with more conservative language regarding environmental behaviors were aware of and concerned about the polluted Willamette River, air and water quality in general, and the consequences of automobile use. Although the creek in this area has long ago been buried, BES has done a good job connecting the Brooklyn Creek sewer basin to the identity and health of the Willamette River. The name of this program itself, Tabor to the River, is rooted to place. It taps into the importance and the identity surrounding Mount Tabor Park and the importance of the Willamette River to Portland and Portlanders.

I began this research keen to examine how the visibility of natural systems might help people think about connections to larger systems and the consequences of individual actions and lifestyle choices on the environment. This may still be possible. However, it is apparent that for the people who participated in this study, environmental learning occurred primarily through other means such as meetings, conversations and reading, along with more formalized education like watershed tours or workshops. That these opportunities for learning and dialogue exist was an important part of participants’ knowledge of Portland’s stormwater system, and contributed to some acceptance of place-based policies. The findings I derive from these research participants gives shape to social practice theory which says context is part of behavior (Shove 2010, 2003; Reckwitz 2002). Context is more than the physical environment; it is a network of social, environmental, and institutional connections. In Portland, policies, urban form, and public discourse support sustainable ways of life and foster a place-based ethic. My research has shown that an open and informed discourse around the environment and environmental values along with city policies that shape the city around nature, rather than controlling nature, is a backdrop where a place-based ethic can become the norm.
Chapter 7 Conclusions and discussion

*Neighborhood-oriented stewardship*

In this study, I have explored human interactions and stewardship activities with urban nature and sustainable stormwater infrastructure. I sought to discover how these interactions and activities contributed to participants’ understanding and perceptions of local ecological systems, natural processes, and urban nature. I have synthesized theories from bioregional philosophy, behavioral change, and ecological planning into a framework of bioregional urbanism, which I then used to examine how people connect to nature and how they develop local environmental awareness.

I explored how the scale of nature, proximity to nature, and stewardship of nature influenced environmental knowledge and a stewardship ethic for the urban residents I interviewed. I sought to understand the subtleties of human experiences with urban nature in order to inform both city design and the development of policies and programs that would restore, reconstruct, or supplement, local ecology, while also enabling public interaction and stewardship with urban nature and natural systems. I therefore investigated three drivers of place-based awareness and environmental learning as articulated in my bioregional urbanism model: 1) that access and proximity to nature provides people with the potential to connect with nature, which in turn, can foster place attachment and a place-based ethic, 2) that changes to the built environment that utilize and uncover natural systems can influence environmental awareness, and 3) that active engagement in nature-related activities deepens environmental learning and awareness.

This dissertation is an exploratory qualitative case study undertaken in Portland, Oregon in which I conducted 42 semi-structured interviews of community members and 14 experts. I explored how urban nature and sustainable stormwater infrastructure in the city is seen, perceived, and experienced by urban residents, and how these perceptions influence a human connection to nature and local environmental knowledge. Overall, my research informs the retrofit of urban areas toward softer infrastructure solutions, human dimensions of urban nature, and the implementation of opportunities that might foster neighborhood-oriented stewardship.
I found that urban residents’ awareness of local ecology and sense of responsibility towards their community and the broader region was influenced by the following three factors: 1) participation in community and stewardship activities, 2) passive and active forms of education, and 3) a public dialogue surrounding the local and regional environment and natural resources. Moreover, I found that in order to address a human connection to nature and influence environmental learning, the following aspects of urban retrofit should be considered: 1) Integrate a foundation of nature in the city for everyday life; 2) Incorporate multiple scales and types of nature for multiple experiences; 3) Ensure access to nature through walking and cycling; 4) Provide opportunities for hands on work in nature and personal control of space.

In this chapter, I examine these factors in more depth through a discussion of my research findings. In Section 7.1, I answer my research questions and discuss key findings from my analysis. In Section 7.2, I discuss the implications of my analysis on policy, and present policy recommendations for the City of Portland, other local governments with similar programs, or jurisdictions who are contemplating a shift to place-based policies and programs. In Section 7.3, I discuss the contributions of this research to urban design and planning literature and my contribution toward the implementation of bioregionalism in urban areas. In Section 7.4, I conclude with final thoughts and suggest a future research agenda.

7.1 Answering the research questions – key findings
In this section, I answer each of my research questions, beginning with the sub-questions that lead to the overarching research question regarding active engagement in the T2R program. Although each of these questions can be answered, the results of my analysis point toward a different question and research outcome than the original research questions would suggest. That is, participation in the implementation process of Green Streets and the restoration of Mount Tabor Park were not catalysts for learning. Instead, active involvement in T2R programs provided an outlet for environmental concern for people who already demonstrated knowledge and behaviors characteristic of a place-based ethic.
7.1.1 Research questions 1, 2, and 3 – scale, proximity, and context

How does the scale of nature and natural systems influence place-based awareness and environmental learning?

How does proximity to nature and natural systems influence place-based awareness and environmental learning?

What contextual elements facilitate place-based awareness and environmental learning?

My research revealed that the scale of, and proximity to, nature and natural areas are not alone in influencing place-based awareness and environmental learning. Other influences include multiple scales of urban nature, participation in different types of nature activities, observation and reflection upon nature and natural systems, and other passive and active educational experiences.

Rather than influencing environmental awareness or learning per se, I found that the residents I interviewed felt a sense of connection to nature as a result of the presence of multiple scales of nature in Portland. The layered scales of nature, from a street tree to the 5,172 acres of Forest Park, provided a way for participants to have contact with urban nature and opportunities for stewardship and environmental learning. Apart from proximity, I found that each scale and type of nature held different meanings, and contributed to different experiences, for the people I interviewed. Overall, my research revealed that different scales and types of urban nature facilitated different ways of interacting with, observing and reflecting upon, and learning about nature and natural processes. Finally, I found that, in addition to experience in nature, other avenues for learning must be part of any endeavor to increase place-based awareness (Table 17).
Table 17: Scale, proximity, and context: place-based awareness and environmental learning

<table>
<thead>
<tr>
<th>Contextual elements (physical environment)</th>
<th>Scale and proximity of contextual elements of the built and physical environments</th>
<th>What does it facilitate? (for some participants)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Canopy</td>
<td>small and proximate</td>
<td>contact with nature (few species but large enough to create a microclimate); stewardship potential (elm inoculation, tree planting), potential for place identity</td>
</tr>
<tr>
<td>Green Streets Rain Gardens</td>
<td>small and proximate to some, potential for proximity during daily activities and increased distribution in the built environment</td>
<td>contact with the stormwater system, reeds, grasses, birds, and insects; stewardship potential (implementation, building, maintenance); learning potential (stormwater system, local hydrology)</td>
</tr>
<tr>
<td>Planting Strips Private Gardens</td>
<td>small and proximate to some, requires single-family neighborhoods or multi-family housing with yards and gardens incorporated into their design</td>
<td>contact with small-scale nature (walking by yards or cultivation); stewardship potential (cultivation, maintenance); learning potential (local ecology)</td>
</tr>
<tr>
<td>Community Gardens Neighborhood Parks</td>
<td>small to medium and proximate to some, potential for distribution within walking distance of work or home</td>
<td>contact with nature harnessed for human benefit (experience in the park); stewardship potential (cultivation, maintenance); learning potential (local ecology)</td>
</tr>
<tr>
<td>Regional Park Regional Natural Area</td>
<td>large and proximate to some, nature as destination for most</td>
<td>contact with nature (experience multiple species with seasonal and hydrological cycles); stewardship potential (restoration, maintenance, individual behaviors); learning potential (local ecology, hydrology); potential for place identity and attachment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other contextual elements</th>
<th>Passive or active learning and the potential for spontaneous learning during daily activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informational Signs</td>
<td>passive learning, located in the built environment, potential for proximity during daily activities</td>
</tr>
<tr>
<td>Tours</td>
<td>passive learning, takes place in the built environment, must decide to participate</td>
</tr>
<tr>
<td>Program Materials</td>
<td>materials mailed to homes, must decide to read</td>
</tr>
<tr>
<td>Newsletters</td>
<td>public dialogue, potential for spontaneous passive learning</td>
</tr>
<tr>
<td>Newspaper Radio</td>
<td>public dialogue, potential for spontaneous active and passive learning</td>
</tr>
<tr>
<td>Neighborhood Meetings</td>
<td>public dialogue, potential for spontaneous active and passive learning</td>
</tr>
<tr>
<td>Personal Conversations</td>
<td>active learning, can take place in the physical environment</td>
</tr>
<tr>
<td>Workshops</td>
<td>active learning, takes place in the physical environment</td>
</tr>
<tr>
<td>Stewardship</td>
<td>active learning, takes place in the physical environment</td>
</tr>
</tbody>
</table>
I conclude it is activity and opportunity for learning, rather than scale or proximity that is important in the development of participants’ place-based awareness and environmental learning. My analysis suggests that the influence of the scale of natural areas should be considered more in its ability to promote human connections to nature than to serve as a point of learning. Experience in nature is beneficial in itself. My research has shown that nature integrated into neighborhoods has the potential to be experienced by urban residents as part of daily activities such as going to work or school. Large natural areas provide a way for urban residents to become immersed in a natural setting. When combined with stewardship activities or other more passive ways of learning (e.g., reading or conversation), place-based and ecological awareness may develop over time.

My research supports what is argued in the literature on the human-dimensions of urban nature and ecological restoration (Hull and Robertson 2000; Newman and Dale 2009; Jordan III 2000; Light 2000); proximity to urban nature can influence the human consciousness of nature and natural systems. I found that the significance of proximity to urban nature lies in the simplicity of contact with, and subsequent appreciation of, nature as part of daily life. Supplemental educational information may remind residents of their connection to nature and natural systems, which can in turn increase local environmental knowledge such as the benefits of backyard bird habitat to larger ecosystems.

My research revealed that participants who actively participated in nature activities (e.g., gardening, rain garden construction, or native habitat restoration) or who participated in place-specific organizations (e.g., Friends of the Reservoirs and the Mount Tabor Foot Patrol), had increased place-specific understanding of local ecology and hydrology of private property, parks, or neighborhoods. Indeed, as I stated previously, urban nature of different types and scales facilitated different ways of learning about local ecology. With gardening, learning occurred through hands-on experience through trial and error, reading, and conversation. With restoration activities, learning occurred through mentorship combined with hands-on activity. Place-specific organizations provided a way to learn through hands-on work in that place, formal education, or problem-solving toward a common goal. These findings are consistent with research that shows active engagement in hands-on activity with nature deepen connections to those specific places.
as well to other natural areas (Ryan 2005; Ryan and Grese 2005; Vaske and Kobrin 2001; Degenhardt 2002). Although I found that hands-on activities in urban nature influenced learning and awareness on a much deeper level than for those less engaged, not every person can commit to high levels of engagement. Therefore, because of their potential for contributing to spontaneous learning and contact with nature, attention should be paid to other, perhaps more mundane, place-based urban design elements placed within the built environment (e.g., sustainable stormwater infrastructure, street trees, informational signage).

7.1.2 Answering the overarching research question

*How does active involvement in Portland’s Tabor to the River watershed health program foster place-based awareness and environmental learning?*

When I began this research, I considered “active” involvement to encompass a range from passive to active; from walking in Mount Tabor Park or walking by a Green Street, to living in their proximity, to a more hands-on engagement through ecological stewardship. My research revealed that the consideration of “active engagement” requires a broader conceptualization than what I had originally defined. I found that not only were participants concerned and knowledgeable about environmental degradation, they were consciously making environmentally responsible choices. Many of the people I interviewed pursued neighborhood-oriented stewardship activities as a result of their environmental concern and a desire to influence change on a personal level. That is, concern for the environment manifested in localized and personalized stewardship efforts.

Participants’ stewardship activities included projects such as the cultivation of bird habitat in their yards, neighborhood tree planting or invasive plant removal, teaching others about organic gardening, coordinating emergency preparedness workshops, as well as a simple deep appreciation of trees and forests and volunteers that maintain them (Figure 21). Each of these stewardship responses touch upon the *Individual Actions* portion of the bioregional urbanism model, where behaviors change (e.g., removing ivy from one’s own yard) and those with knowledge pass on their knowledge to other people.
My research revealed that neighborhood-oriented stewardship took varied forms. Moreover, most participants pursued projects that they intended as purposeful contributions to the betterment of the environment or toward community resilience. I found that, if so inclined, there was a multitude of ways that people could express and act upon environmental concern. Some of the stewardship activities in which community members participated were specific to the T2R program (rain gardens, tree planting, Green Street maintenance, and a portion of Mount Tabor Park restoration), others were ancillary (backyard bird habitat or food production), and still others were unrelated to T2R yet were an important aspect of sustainability and resilience (food security, emergency preparedness).
Through my analysis, I discovered that the majority of participants involved in stewardship activities expressed a sense of responsibility to the global ecosystem. Their global environmental concern seemed to have manifested in action on a personal level. Such actions correspond to the Kaplans’ *meaningful action* realm of their Reasonable Person Model (Kaplan 2000; Kaplan and Kaplan 2009). Moreover, the place-based understanding described by those actively engaged in urban ecological stewardship demonstrated Hester’s (2006) notion of *inhabiting science*: through activity and time spent in a place or community, urban residents would have a working understanding of basic local ecology. These findings also coincide with research which demonstrates positive correlations between hands-on ecological restoration and environmental learning (Ryan and Grese 2005; Krasny and Tidball 2009).

The T2R program offers one other important aspect of place-based awareness – the attention given to important places of Portland’s identity: Mount Tabor Park and the Willamette River. These landmarks are a common cause around which the public can rally. For some, protecting Mount Tabor Park meant the preservation of a meaningful place that was also an important point of socialization and community building. The Willamette River is also a significant place of identity. For example, almost every participant expressed a sense of responsibility for its health and protection, whether or not they knew how to protect it. The simplicity of just the *title* of the T2R program highlights the importance of place. It brings concern of the health of important places to the forefront of the conversation in Inner Southeast Portland. Like neighborhoods that provide a foundation of nature, identifying those significant natural aspects of urban areas may also provide a foundation for place-based concern.

In the end, although not necessarily tied to the T2R program, residents who participated in hands-on activities such as gardening, restoration, and rain garden construction, possessed greater place-based awareness and environmental knowledge than those less active. However, this is not to preclude other avenues of learning or discount the simple pleasure of nearby nature. I have shown that, for the people I interviewed, connecting to nature at multiple scales promotes contact with nature, and for some influences environmental learning. I have also demonstrated that multiple scales of urban nature
facilitate different experiences, from a pleasant walk in a neighborhood, to being immersed in an urban forest, to a sense of local identity. Varied scales also imply that there are different types of stewardship opportunities inherent in each natural area. My findings lead me to conclude that there are multiple benefits that emerge from the layered experiences of multiple scales of urban nature. Such benefits include the facilitation of a range of personal meanings of urban nature, and opportunities for local environmental learning and urban ecological stewardship.

7.2 Implications for policy

My research can influence decision making and program and policy development that implements aspects of bioregional urbanism. Such aspects include the human dimensions of sustainable stormwater infrastructure, increased contact with urban nature for urban residents, and the implementation of opportunities that might foster neighborhood-oriented stewardship. In Chapter 2, I discussed that place-based urban planning is only one community and regional vision among many. Indeed, the goals and visions of each jurisdiction and its residents can influence how (and if) nature and natural systems integrate into the built environment, opportunities for stewardship, and whether there is a public discourse on local environmental issues.

Status quo development or sustainable development that focuses primarily on reducing automobile use, does not confront more fundamental issues of the relationships between humans, the built environment, and nature. My research has shown that urban nature of multiple scales, combined with a context of environmental dialogue, education, and stewardship, contributed to the research participants’ connection to urban nature. These scales also facilitated the potential for environmental learning and urban ecological stewardship opportunities. I therefore offer the following considerations for cities whose goals and vision would restore a balance between urban areas and natural systems and the human relationship to those systems.

7.2.1 Bioregional urbanism model

Bioregional urbanism is a model of incremental change synthesized from my integration of bioregional philosophy with behavioral change and ecological planning literature. It
draws on the catalytic principles of change to create a pragmatic framework for implementing bioregionalism into existing cities. The model underscores the importance of designing to the specifics of local ecology and hydrology. It also encourages human access to nature and natural systems and opportunities for engagement with nature both individually and in the community. Bioregional urbanism offers a framework for policy analysis and implementation toward place-based urban planning and design that addresses the relationship between the built environment, nature, and urban residents. Although the model may seem simplistic in terms of the realities of municipal planning, politics, and economics, it can provide an avenue for planners and decision makers to consider a place-based means of policy making and program development.

In the following sections, I highlight considerations as revealed in this research that address a bioregional urbanism framework for municipal policy and programs. I frame these considerations through three dimensions of the bioregional urbanism model: the physical environment, neighborhood-oriented stewardship, and public discourse. These are separately taken up below.

7.2.2 Physical environment
There are benefits to the integration of nature and natural systems into the built environment, including reduced stormwater runoff, increased biodiversity, decreased heat island effect, increased carbon sequestration, and increased human health. My research has shown that additional social benefits include the potential for urban residents to have contact with nature and engage in activities that might increase their local environmental knowledge. My research has revealed that in order to address human connection to nature the following elements specific to the shape of the physical environment should be considered:

1. **Foundation of nature for everyday life, at multiple scales for varied experiences**
   In order to cultivate a human connection to nature, planning agencies should attempt to incorporate nature into the very fabric of the built environment (street trees, vegetated planting strips, yards, gardens, bioswales and rain gardens, community gardens, and large and small parks). Although the establishment of larger parks
within the boundaries of existing cities may not be possible, the integration of these smaller instances of nature may be more feasible. This integration can be achieved through examples like the following: infill development or de-development; the incorporation of native vegetation in planting strips or yards; tree planting; the naturalization of institutional spaces such as churches or schools; restoration of waterways; or changing the form of streets and alleyways into greenways.

My research has shown the importance of urban nature layered at multiple scales for human contact with nature. Street trees and yards, for example, contribute to a feeling of nearby nature, whereas larger natural areas offer a means for respite from the city and a way to immerse oneself into a more natural setting. Neighborhood parks provide a point of relaxation, recreation, and socialization. Neighborhood gardens (e.g., rose gardens, community food gardens) offer much the same experience. Functional and purposeful natural systems such as bioswales, rain gardens, and rain sculptures provide urban residents with a visual and potentially educational connection to the natural processes of the city, as would the increase of habitat from native and naturalized plantings throughout the city.

My research has also shown that participants enjoyed and used different types of urban nature. Wild, manicured, and programmed natural areas, as well as natural infrastructure, are important for the different experiences they offer (e.g., solitude, socialization, stewardship, etc.). In place-based urban planning and design, natural systems and natural areas would reflect the local ecology, geology, and hydrology, which would further provide a connection to local ecology.94

2. Visible natural systems

Sustainable stormwater infrastructures such as Green Streets and rain gardens have the potential to facilitate local environmental learning as a result of the visibility of stormwater and their vegetation. Due in part to participants’ identity and concern for the Willamette River (as well as the benefit of less basement flooding), Green Streets showed some potential as a visible way of connecting the consequences of stormwater

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94 Place-based awareness has been shown to have a positive influence on individuals’ attitudes toward native plantings (Ryan and Grese 2005).
runoff from pavement and other human activity. For cities contemplating urban infrastructural changes, such localized environmental knowledge is an additional potential social benefit worth considering as a supplement to traditional stormwater management goals.

In addition to human-made sustainable stormwater solutions, human reconnection to natural systems could occur through the restoration of existing water systems (e.g., daylighting creeks, restoration of culverted or degraded streams and rivers) or through the collection of stormwater on personal property. I would take this notion further to consider other visible resources that link to consumption and resource extraction, such as decentralized and localized energy production (e.g., district heating, urban windmills, or solar panels), as well as local food systems (e.g., community gardens, farmers markets, locally produced and consumed food). In order to facilitate spontaneous local environmental learning, it would also be necessary to situate informational signage, rain gardens, and rain sculptures in prominent community gathering places. My research suggests that these spaces and places provide a social role that can then also facilitate opportunities for stewardship, dialogue, and environmental learning.

3. *Access to nature through walking and cycling*

The urban planning response to climate change has been to emphasize greenhouse gas emissions reductions through compact, higher density development in order to reduce vehicle miles traveled. Participant interviews revealed that the reduction of automobile use was a marker for environmentally responsible behavior. Forty-three percent of participants told me that they tried not to use their cars, and 12 percent did not own cars. Whether or not these participants were successful in reducing automobile use is not as important as the acknowledgment that some urban residents wish to reduce their car use and others may not have access to a personal vehicle. Therefore, access to. Therefore, in order to foster a human connection to nature, planning for access to nature and natural areas through alternative modes of transportation should be considered in the restructuring of cities. Alternative
transportation and bike trails could also be expanded to wilder areas located outside of the city.

4. **Opportunities for hands-on work in nature and personal control of space**

   My research has shown that, for some participants, experience in nature and hands-on work in nature increased place-specific environmental knowledge, provided an outlet for environmental concern through stewardship, offered mental restoration, and a way to socialize. In order to influence local environmental learning and provide stewardship opportunities for urban residents, policies and programs that enable and promote hands-on activity in nature (e.g., gardening, habitat restoration, building community rain gardens) should be supported. Moreover, in order to ensure that natural areas within public and private realms (e.g., yards, gardens, planting strips) exist in perpetuity, conservation and preservation strategies of urban nature should be considered.

   Ensuring private gardening space is particularly problematic in densifying cities and cities where land prices are prohibitively high. My research revealed that private garden space was particularly beneficial for study participants’ relaxation and interaction with nature, and for a sense of control over personal space. Ideally, gardening space would be an integral part of urban areas because of their potential to foster a personally fulfilling stewardship activity for some urban residents, and which also positively benefits wildlife habitat and food production. Incorporating gardens that provide a sense of control and respite will be a challenge for the retrofit of cities that are simultaneously attempting to increase residential density. Prevalent and geographically distributed community gardens might provide for residents’ gardening needs in high density urban neighborhoods as long as there are also natural areas for tranquility and solitude.

7.2.3 **Neighborhood-oriented stewardship**

1. **Municipal policies and programs**

   As demonstrated through regular backyard gardening or instances of guerrilla gardening, neighborhood-oriented stewardship can occur without the guidance or
consent of local government. However, my analysis of the T2R program has shown that combining varied learning opportunities (e.g., reading, tours, workshops, festival booths) along with hands-on stewardship opportunities (e.g. implementing a rain garden), influenced a valuable dialogue around place, the environment, and an ethic of stewardship, for the people I interviewed. This suggests that municipal policies and programs are an important aspect of promoting neighborhood-oriented stewardship, facilitating local environmental knowledge, and influencing a place-based culture.

Such policies could be as simple as changing zoning ordinances to allow front yard gardening, or zoning to allow undeveloped parcels of land to be used for urban agriculture, or even a specific urban agriculture zoning that might also utilize transfer of density or development rights. Hands-on stewardship programs might also include tree planting programs, or stewardship programs such as elm inoculation, backyard habitat certification, or rose garden adoption, or through a concerted effort toward urban ecological restoration of key natural areas or waterways. Moreover, in order to foster a local dialogue around such issues, my research has shown that policies and programs should be promoted and shared through varied methods of dissemination such as those described next.

2. **Education and outreach**

   My research has shown that shifts in local environmental awareness can occur through observation and reflection. However, the majority of participants described multiple ways of environmental learning that included conversation, lectures, workshops, meetings, mentoring, reading, and hands-on activity. In order to cultivate local environmental knowledge, multiple approaches to learning about the specifics of place and the local environment would likely be most effective. Local governments and their partners can contribute to education through literature distribution, attendance at public events and neighborhood meetings, and educational workshops, events, or speaker series. Specific to visible natural systems such as Green Streets and rain gardens, I found that informational signage located in key public areas had potential to facilitate spontaneous environmental learning as part of daily life. Finally, I found that stewardship activities, both private and public, contributed to
participants’ place-specific knowledge and attachment. Therefore, in order to positively influence local environmental knowledge and stewardship activity, cities should establish and promote stewardship programs, remove barriers to place-based policies (e.g., zoning codes), and consider programming stewardship opportunities in city activities (e.g., restoration projects, park maintenance workdays).

3. Place identity

My research revealed that participants’ identity with local natural areas was a catalyst for protective feelings for those areas. I found that the T2R program was particularly good at promoting place identity. Therefore, in order to contribute to urban residents’ sense of ownership and responsibility of the commons, I suggest the development of educational material and programs that touch upon meaningful places of a city or region. Moreover, experience in nature, frequent use of natural areas, and hands-on activity in nature, also show potential to contribute to place identity. In order to cultivate a sense of place, it is therefore important that jurisdictions, with their partners, highlight these significant spaces and communicate their broader ecological and social connections. This can be achieved through many of the considerations described in this section.

7.3 Contributions

Overall, my study was an exploration of how active engagement in stewardship activities influenced urban residents’ local environmental knowledge, investigated through the following research question: How does active involvement in Portland’s Tabor to the River watershed health program foster place-based awareness and environmental learning? Through the interview process, I was able to determine that most research participants already understood local and global environmental issues. As interviews progressed through questions that established participants’ environmental knowledge, I was able to glean detailed descriptions of their thoughts on nature, nature in the city, experiences in urban nature, and stewardship activities. Therefore, much of my findings resulted in evidence of the role of urban nature in the lives of the people I interviewed. Participants described the importance of urban nature as part of their daily lives, as well as the restorative potential of experiences in urban nature. These findings add empirical
evidence to a body of research that documents benefits of nature to humans (Kaplan 1995; Campbell and Wiesen 2009; Louv 2005), particularly nature preferences in urban areas (Chiesura 2004; Burgess, Harrison, and Limb 1988; Ozguner and Kendle 2006; Baur, Tynon, and Gomez 2013). In addition to adding evidence to existing areas of study, my research has significance in moving forward research in two areas: human dimensions of sustainable stormwater infrastructure, and bioregionalism. I discuss these contributions in the following pages.

7.3.1 The human dimensions of sustainable stormwater infrastructure

Much of the research on urban waterways and stormwater management focuses on scientifically based goals such as water quality and habitat restoration (Bolund and Hunhammar 1999; Moran 2007; Aronson, Milton, and Blignaut 2007; Dietz 2007). The social benefits of urban sustainable stormwater management solutions such as bioswales and rain gardens have had less study. Past research on the human dimensions of sustainable stormwater infrastructure has evaluated the efficacy of incentives for households to implement stormwater solutions on private property (Thurston 2012; Shuster, Morrison, and Webb 2008; Keeley 2007). Several studies have looked at urban residents’ perceptions and acceptance of sustainable stormwater infrastructure (Dill et al. 2010; Apostolaki, Jefferies, and Wild 2005; Shandas et al. 2010; Shandas, Steele, and Nelson 2012). One researcher, Kathleen Wolf, includes sustainable stormwater

95 In Chapters 5 and 6, I described how participants perceived urban nature, from a bioswale to large natural areas. I showed that, for these urban residents, different scales of urban nature provided valuable personal experiences as well as opportunities for stewardship and learning. Literature on the benefit of nature for humans, time and again, shows that a variety of nature experiences is of value for humans and provides a setting in which people can become mentally restored. Restoration can occur simply from a view of trees from the window (Kaplan 2001), to spending time in a park to escape from the noise of the city (Chiesura 2004). My research adds evidence to much of this work. I found that participants were grateful for the trees in their neighborhoods and neighbors’ yards, “...without this tree I wouldn't have a view. I wouldn't be here” [P2, female, aged 69]. I also found that many participants felt deep respect and were thankful for the large natural areas of Portland, “...we're very lucky to have something like Forest Park...” [P25, male, aged 73]. I found that the people I interviewed did indeed express that urban nature was a way that they could feel restored while viewing or being immersed in nature, “...Mount Tabor Park is transformational in terms of our moods...” [P32, female, aged 61]. Moreover, my findings that participants valued the varied experiences of neighborhood nature adds more evidence to research that found that urban residents prefer a range of nature experiences in their neighborhoods (Burgess, Harrison, and Limb 1988).

96 One study was primarily a quantitative evaluation of the effectiveness of Portland's T2R outreach efforts. Like my own research, these researchers also found that research participants viewed Green Streets as a generally positive addition to the built environment (Shandas et al. 2010). A follow up study (Shandas, Steele, and Nelson 2012) found the same general positive attitudes toward improved aesthetics and increased watershed health. Importantly, this study included a photo survey asking for both quantitative
infrastructure in a list of “civic nature” that has potential benefits for human health (Wolf 2008, 2010). Despite this contention, I have found only two studies with empirical evidence that touch upon the notion of sustainable stormwater infrastructure as nature (Apostolaki, Jefferies, and Wild 2005; Shandas, Steele, and Nelson 2012). My research provides empirical evidence that specifically addresses whether stormwater infrastructure might be considered urban nature. My findings suggest that participants primarily regarded Green Streets as part of the stormwater system. Only half of participants reported feeling that Green Streets provided a way to connect with “nature”. I found that rain gardens may have more potential as a way for urban residents to connect with nature. My findings suggest that Green Streets’ potential as urban nature was diminished as a result of participants’ understanding that the facilities were part of Portland’s stormwater system. This finding is a preliminary investigation into whether sustainable stormwater infrastructure might contribute to urban residents’ feeling of nature in the city. A next step in this endeavor might be to interview urban residents who are not already aware of the role and function of sustainable stormwater facilities like Green Streets.

Like previous research (Shandas, Steele, and Nelson 2012; Dill et al. 2010), my study addresses how sustainable stormwater facilities are perceived by urban residents, particularly as urban design features within the built environment. However, my work provides additional details about how participants interact with them in daily life. For example, I found that because Green Streets, in many cases, were installed on streets that also incorporated bike lanes, many participants saw them while commuting to work. Moreover, I found that rain gardens and informational signage located in key public places facilitated spontaneous learning opportunities about the local stormwater system. In this regard, my research is a good start in providing evidence on the potential of and qualitative evaluations of bioswale types which provided important information as to why particular aesthetics are preferred over others. In a different, mixed methods, study researchers looked at individual perceptions of what the researchers termed Sustainable Urban Drainage Systems (SUDS), finding overall satisfaction with increased aesthetics and habitat provision of SUDS, some perceptions of connection to nature, and increased concerns over safety (Apostolaki, Jefferies, and Wild 2005). A third, quantitative, study analyzed the effect of Portland’s Green Streets on physical activity, interactions with others, and sense of community for those aged 65 and over (Dill et al. 2010). The study found that in general, residents of neighborhoods with Green Streets appeared to walk more, had increased social interactions with their neighbors (e.g., saying hello), had generally positive attitudes toward Green Streets due in part to increased vegetation, and had negative feelings regarding increased parking difficulties and increased litter.
sustainable stormwater facilities in facilitating local environmental knowledge. The contention that the visibility of waste or resources can contribute to public understanding of the consequences of production and consumption seems primarily to be a theoretical concept (Hough 2004; Newman and Jennings 2008). I have found no studies on sustainable stormwater infrastructure that specifically analyze their potential influence on learning. Therefore, my work is an early exploration of research in this area.

Overall, my research gives empirical evidence to a burgeoning focus on the human dimensions of sustainable stormwater infrastructure. My findings provide valuable reasoning behind people’s feelings and perceptions of sustainable stormwater infrastructure, their potential to provide urban residents contact with nature, and their efficacy as a tool for environmental learning.

7.3.2 Bioregionalism – embracing the urban
I have proposed an alternate path for sustainable urban development, bioregional urbanism, which addresses the fundamental relationship between people and the environment. I contend that this framework can contribute to a gradual transition to bioregional ideals in urban areas. In doing so, I break from the traditional view of bioregional philosophy. It envisions a grand scheme that would culminate in a holistic transformation of society, reinventing political borders and governance structures to those that are localized and governed through local control. Rather, my work builds upon a core concern of bioregional philosophy; an epistemological shift in the human relationship to the environment. Bioregionalists contend that human settlements should be built to respond to and reflect the local environment and that community members should live in one place long enough that they understand local ecology, history, and culture. My bioregional urbanism model reflects these contentions through incremental implementation of bioregional principles into existing urban areas, with concurrent efforts toward environmental education and stewardship opportunities.

As I described in Chapter 2, bioregional philosophy posits that communities should be decentralized, governed by self-rule, and distributed within the natural boundaries of a region. As a result of this seeming emphasis on a holistic shift in governance structure
and spatial distribution, in bioregional philosophy there has been less attention to the implementation of bioregional principles in urban areas. There is, however, general sentiment amongst bioregionalists that cities cannot be ignored, as the majority of the world’s population lives in urban areas (Sale 1985; Berg 1991; Carr 2004; McGinnis, House, and Jordan III 1999; Register 2006). For example, Richard Register, advocates for efforts that would transition existing cities into “ecocities”, or “city-islands in a sea of biodiversity” (Register 2006). Register is an incrementalist who advocates for change within the existing system through the use of planning tools like ecocity zoning, transfer of development rights, and ecological general plans. He also encourages urban residents to involve themselves in activities that would encourage such a transformation. Carr (2004) tells us that John Todd and George Tukel (Todd and Tukel 1981; Tukel 1982) also advocate for incremental change to urban areas. They propose that these changes occur through the retrofit cities, utilizing principles of ecological design such as solar orientation, soil rebuilding, and urban agriculture, within a long-term comprehensive vision (Carr 2004). Further, like most bioregionalists, they recognize that cultural identity must also change to one where humans are part of, rather than separate from, nature.

Indeed, Carr states, “Reinhabitation in cities confronts the daunting triple challenge of transforming the consciousness and behaviour of large numbers of urban residents, the necessity of implementing institutional/structural change, and the need for physical transformation of built environments” (Carr 2004). My bioregional urbanism model engages each of these challenges and complements practical efforts, like Register’s, Tukel’s, and Todd’s, toward the implementation of bioregional principles into urban areas (Figure 22). The strength of my model is that it shows potential interrelations of public discourse, the democratic process, municipal policies, urban form, and urban residents. Register’s ecocity zoning, or Todd and Tukel’s ecological design principles, are policy actions that would fit neatly into the municipal policy realm of my model. A benefit of my model, however, is that it then shows how such policies might intersect with neighborhoods and neighborhood residents. The model illustrates how ecological design principles, for example, might influence the shape of the city and how they might influence the people who reside in the city. This model is intended as a means of
conceptualizing how urban form, policy, and dialogue work together to influence a shift in the human relationship to the environment.

**Figure 22 Bioregional urbanism model**

This model represents my synthesis of bioregional philosophy, behavioral change, and ecological planning literatures. I used the model as a framework through which to analyze my findings. As I described in Chapter 4, after an initial inductive analysis of interview data, I then used this framework for deductive analysis. As a result, I refer to each of the applicable realms of the model throughout this dissertation. Moreover, I analyzed how the different realms of bioregional urbanism model corresponded with Portland’s policies and programs, and then integrated my interview analysis accordingly (Table 18).
Table 18 Research analysis matrix using the bioregional urbanism model

<table>
<thead>
<tr>
<th>Model Components</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Municipal Policies</strong></td>
<td></td>
</tr>
<tr>
<td>Tabor to the River</td>
<td>Place identity, stewardship opportunities, place-based urban design, learning opportunities</td>
</tr>
<tr>
<td>Sustainable stormwater management policies (Green Streets, rain gardens, tree canopy)</td>
<td>Access to nature, experience in nature, learning opportunities</td>
</tr>
<tr>
<td>Parks Plan and Portland Plan</td>
<td>Access to nature, experience in nature</td>
</tr>
<tr>
<td>Stewardship programs (Weed Warriors, Backyard Habitat certification)</td>
<td>Stewardship opportunities</td>
</tr>
<tr>
<td><strong>Physical Environment</strong></td>
<td></td>
</tr>
<tr>
<td>Multiple scales of nature</td>
<td>Place attachment, connection to nature</td>
</tr>
<tr>
<td>Nature integrated into the built environment</td>
<td>Place attachment, access to nature, connection to nature, place identity, place-based urban design</td>
</tr>
<tr>
<td>Passive learning</td>
<td>Place-based awareness</td>
</tr>
<tr>
<td><strong>Neighborhood-oriented Stewardship</strong></td>
<td></td>
</tr>
<tr>
<td>Stewardship</td>
<td>Place-specific understanding, place-based awareness, place attachment, connection to nature, social practices</td>
</tr>
<tr>
<td>Experience in nature of multiple scales</td>
<td>Access to nature, experience in nature, place attachment, connection to nature</td>
</tr>
<tr>
<td><strong>Individual Actions</strong></td>
<td></td>
</tr>
<tr>
<td>Observation and reflection</td>
<td>Place-based awareness, connection to nature</td>
</tr>
<tr>
<td>Stewardship</td>
<td>Place-based ethic, social practices</td>
</tr>
<tr>
<td>Teaching others</td>
<td>Place-based ethic, social practices</td>
</tr>
<tr>
<td><strong>Public Discourse</strong></td>
<td></td>
</tr>
<tr>
<td>Passive learning</td>
<td>Place-based awareness, place identity</td>
</tr>
</tbody>
</table>

In gathering data for this study, I created vivid profiles of over forty Portlanders. Analyzing these profiles, I have shown how participants experienced urban nature, what influenced their local environmental knowledge, and how they personally contribute to what they perceive to be the greater environmental good in Portland. My research is just the beginning of empirical work that could explore the benefits and possibilities of bioregional urbanism as a process of incremental change. It adds credibility to the implementation of bioregionalism in urban areas. It shows that, for the participants in
this study, the interconnectedness of each realm found in the bioregional urbanism model, influenced participants’ contact with nature, opportunities for local environmental learning, and opportunities for stewardship. Future research might study a different demographic, a different city and region, additional place-based urban design strategies, or other localized resource infrastructures. Within practice, further incremental changes might be those suggested in this chapter, including the integration of nature of multiple scales, increased visibility and interactivity of resource infrastructure, and concerted efforts to foster urban ecological stewardship opportunities.

Bioregional urbanism addresses the relationship between humans and the environment. It suggests incremental changes in urban form through the incorporation of natural systems into urban areas and concurrently addresses human relationships to those systems. The potential of incremental changes to urban areas can be seen through the cumulative impact of bioregional projects such as ecological restoration, nature as an infrastructural backbone, and other bioregional policies, together with the commitment toward an open dialogue and an informed and active populace.

7.4 Final thoughts and future research

Nature in the city is a condition that few will dispute is a good idea. Subjectively, wouldn’t we all prefer a nature-full city? In some ways, my findings are quite intuitive and correlate with previous research – nearby nature is a desirable aspect of urban life, which contributes to both physical and mental health of humans. My project has shown, in people’s own words, the deep meaning people attach to urban nature, mundane and special, large and small, manicured and wild. It has also given a first glimpse into the potential of visible natural systems in influencing environmental learning. It has given direction to the retrofit of urban areas that might reflect a more natural rather than engineered approach to city building.

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97 There are, of course, varied opinions on the value of nature in the city. For example, as I have shown, there are varying degrees of public acceptance toward various forms of vegetation such as native plants and plants found in bioswales.
In my project, I sought to discover how stewardship activities, urban nature, and urban natural systems influenced the development of place-based awareness and environmental learning. Because the majority of participants were already environmentally aware, my work had to move beyond learning per se. Instead, I was able to focus upon the behaviors participants described as they related to nature in the city. The importance of meaningful action in this regard was an important finding. That concern over the global environment manifested itself in stewardship of the local is significant; it provides evidence for the relationships between environmental concern, place attachment, and environmentally responsible behavior. Moreover, as a result of my line of questioning that sought to uncover learning processes, my research revealed the importance of dialogue and public discourse in contributing to environmental knowledge and acceptance of environmental policy.

What is lacking most from this project is the view of urban residents who might not have high environmental concern, or those who perhaps cannot devote time to volunteer activities. However, through this research I have found that people connect with nature and learn in many different ways. Nature in the neighborhoods can benefit different kinds of people, whether or not they have time to reflect. I have also found that opportunities for involvement in nature should be varied. If the right programs are in place, it is feasible that many different people could participate if they are willing and able. In addition, as I have discussed, interpretive signs about rain gardens by a bus stop or grocery store is another opportunity to engage the public during daily activities. This is not to say that a future study on a different population is not warranted; indeed it is. This study looks at one population living in Portland. It gives insight into the subtleties of human experiences with urban nature and informs both city design and the development of place-based policies and programs.

I conclude that smaller instances of urban nature and a broader definition of environmental stewardship activities may represent opportunities for increasing access to the benefits of interactions with nature to a far greater number of urban residents than has traditionally been considered. Further, in an urbanizing world which must also deal with climate mitigation and adaptation, the densification of cities is necessary. My
research showed the importance of personal control of some amount of outdoor space, particularly in personal gardens. Therefore, policy makers should consider not just adding more nature to the city, but how urban residents interact with nature and their ability for personalization of space and ability to achieve solitude in those spaces.

My work offers several directions for further research:

**Differing contexts**
In many ways, some of the limitations of this research point toward avenues of additional research. As I have discussed, an obvious future direction is to pursue the same research agenda in a different context or with a different demographic. This could even be within Portland itself, but in a different part of the city with a more sprawling urban form and different population. Also of interest could be a different climate context such as the desert southwest. By researching different contexts, comparisons of perceptions of urban nature, environmental awareness and environmental learning would be possible.

**Resource infrastructure**
The glimpse I have given into the possibilities of Green Streets in contributing to increased understanding of Portland’s stormwater system is compelling. Building upon this first attempt at discovering the potential for environmental learning through sustainable stormwater infrastructure could be instructive for future infrastructure planning and policy development. A next step might be to interview urban residents who are not already aware of the role and function of sustainable stormwater facilities in order to further understand such facilities’ potential to influence environmental learning or in their capacity as small scale “nature”. Moreover, I suggest pursuit of a research agenda that explores the impact of the visibility of other resource infrastructures, including localized energy production and distribution and local food production, on local environmental knowledge and place-based awareness.

**Community gardens and urban agriculture**
Although there is an abundance of community garden research in terms of environmental learning and community building, there is room to explore the role of community gardens
and urban agriculture as nature for urban residents. Because of the importance of private gardens for those I interviewed for this research as well as the proximity to community gardens for many participants, I began to question a fuller role community gardens and urban agriculture might play as nearby nature. For example, do community gardens provide a connection to nature whether or not one gardens? Can community gardens provide a place of solitude and respite? Can individual garden plots take the place of private gardens in terms of sense of control and mental restoration? Many jurisdictions have embraced local food production. When considering sustainable urban form which is densifying and at the same time incorporating nature and local food production systems, can community gardens provide multiple roles for cities and their residents?

Working landscapes
Place-based awareness should also include an understanding of the realities of the economic base of the region. Geddes, through his valley transect, and Mumford, through his regional survey, advocated not only for a deeper ecological knowledge of one’s place, but of the importance of working landscapes (including the workers) to the viability of cities. There is value in studying the human dimensions of working landscapes in this regard. Do urban residents understand the regional landscape that provides them with sustenance and a region’s economic base? Such understanding might also contribute to an open and informed dialogue that surrounds potential benefits and conflicts of resource extraction.

Of further interest, would be delving more fully into the idea of active participation in nature. I am currently living in a region (Idaho) whose economy is based primarily in agriculture. It has occurred to me that farmers should be deeply in tune with their land and climate regimes. How might deep knowledge of one’s own land translate to environmental behavior? How have farming practices changed over time and what are the differences in techniques and attitudes for those who have been farming over generations versus those who are newcomers? How does farming link conceptually to the surrounding communities? Is there value in working landscapes becoming a more connected aspect of urban life?
Simply adding nature to the city will not make all urban residents environmentalists. There are subtle interconnections, of which education and open dialogue are important. Whether or not implementing bioregional urbanism influences a shift in society to a new epistemology and a new way of living with nature, my findings can influence the livability of cities and their connectedness to the larger global ecosystem. Planners, designers, and policy makers have a responsibility for bettering the lives for all people and all communities, and for influencing the betterment of the environment as a whole. This can be done incrementally within the existing economic and political system if only there is the will do so. There are many publications that outline the benefits of a place-based, ecological city. My research has shown place-based and ecological design can also influence urban residents’ well-being. There is much to gain from a shift in policy that embraces rather than ignores nature. Let this work contribute to this transformation.


City of Portland. 2005. Title 3 Administration, Chapter 3.96 Office of Neighborhood Involvement.


Google Earth. Satellite image displaying the geographical context of the Portland, OR. 2012 [cited August 24, 2012.]


Environment Federation, the American Society of Landscape Architects and ECONorthwest.


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### Appendix 1 Research participants, community members

<table>
<thead>
<tr>
<th>Participant</th>
<th>Role</th>
<th>Participant</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kate Belt</td>
<td>community resident</td>
<td>Diane Redd</td>
<td></td>
</tr>
<tr>
<td>Linda Brown</td>
<td>Kevin Fisher</td>
<td>Steve Reinemer</td>
<td></td>
</tr>
<tr>
<td>Kent Buhl</td>
<td>Charles Heying</td>
<td>Brad Rence</td>
<td></td>
</tr>
<tr>
<td>Kelly Caldwell</td>
<td>Wendy Kunkel</td>
<td>Eileen Rence</td>
<td></td>
</tr>
<tr>
<td>Evelyn Ching</td>
<td>Evan Landman</td>
<td>Kyle Robbins</td>
<td></td>
</tr>
<tr>
<td>Randall Clarke</td>
<td>Malia Latin</td>
<td>Nancy Russell</td>
<td></td>
</tr>
<tr>
<td>Myra Cline</td>
<td>Monique Leslie</td>
<td>Beau Russell</td>
<td></td>
</tr>
<tr>
<td>Tony Cole</td>
<td>Gayle Marechal</td>
<td>Ralph Schmoldt</td>
<td></td>
</tr>
<tr>
<td>community resident</td>
<td>Bunny Marechal</td>
<td>Linda Schmoldt</td>
<td></td>
</tr>
<tr>
<td>community resident</td>
<td>Sheryl Oldham</td>
<td>Joan Simko</td>
<td></td>
</tr>
<tr>
<td>community resident</td>
<td>Susan Pearce</td>
<td>Marilee Tillstrom</td>
<td></td>
</tr>
<tr>
<td>community resident</td>
<td>Jane Pullman</td>
<td>Laura Vail</td>
<td></td>
</tr>
<tr>
<td>community resident</td>
<td>Patty Ragnone</td>
<td>Alison Wiley</td>
<td></td>
</tr>
<tr>
<td>community resident</td>
<td>Merritt Raitt</td>
<td>Dan Wilson</td>
<td></td>
</tr>
</tbody>
</table>

Note: Participants listed as “community residents” did not agree to have their names published in this study.
Appendix 2 Research participants, city and partner organization staff

City of Portland Bureau of Environmental Services
Rhettia Drennan Community Relations
Ivy Dunlap Stormwater Specialist
Emily Hauth Stormwater Specialist
Marie Johnson Environmental Program Coordinator
Anne Nelson Environmental Program Coordinator
Naomi Tsurumi Environmental Specialist

City of Portland Office of Neighborhood Involvement
Paul Leistner Neighborhood Program Coordinator

Cafe au Play
Josh Lighthipe Volunteer

Colonial Heights Presbyterian Church
Shirley Bennett Tormey Intern
Linda Stewart-Kalen Pastor

Friends of Mount Tabor Park
Alexa Todd Volunteer Coordinator

Friends of Trees/Bureau of Environmental Services
Amy Chomowicz Volunteer /Ecoroof Program Administrator
Erica Timm Neighborhood Trees Senior Specialist/former intern

Portland Public Schools
Nancy Bond Resource Conservation Specialist
Appendix 3 Key documents analyzed for policy and program review

The Portland Plan, 2012 (City of Portland)

Actions for Watershed Health, 2005 Portland Watershed Management Plan (City of Portland Bureau of Environmental Services)

Framework for Integrated Management of Watershed Health, 2006 (City of Portland Bureau of Environmental Services)

Portland Watershed Management Plan 2008 - 2010 Report (City of Portland Bureau of Environmental Services)

Grey to Green Initiative update 2008 – 2011 (City of Portland Bureau of Environmental Services)

Tabor to the River Program, An Evaluation of Outreach Efforts and Opportunities for Engaging Residents in Stormwater Management, 2010 (City of Portland Bureau of Environmental Services and Portland State University)

Parks 2020 Vision (City of Portland Bureau of Parks and Recreation)

Regional vision: The 2040 Growth Concept, 1997 (Metro)
Appendix 4 Demographic questionnaire

ID #: 
Date: 
Time: 
Place: 

1. Including yourself, how many people live in your household?

2. Are there any children under the age of eighteen years currently living in your household? 
   What are their ages?

3. What is your marital status?

4. What is the highest level of education you completed?

5. What did you study in school (what is your degree)?

6. How would you describe your current employment status?

7. What is your occupation (and/or what do you wish it to be)?

8. How would you describe your political views? (i.e. political party)

9. Do you volunteer? 
   For what organization? 
   Doing what? 
   How many hours per week/month?

10. Not counting religious organizations, how many civic or community organizations do you belong to? 
    What are the organizations you belong to? (names or types)
11. Do you consider yourself to be part of a particular religious faith? (which one)

12. If you have a religious preference, how active do you consider yourself in the practice of your religious preference?
   - Very active
   - Somewhat active
   - Not very active
   - Not active
   - Does not apply / Prefer not to say

13. How would you describe yourself in terms of race/ethnicity? What is your heritage?

14. What do you expect your 2011 family income from all sources before taxes to be?
   - Under $25,000
   - $25,000 - $39,999
   - $40,000 - $49,999
   - $50,000 - $74,999
   - $75,000 - $99,999
   - $100,000 - $124,999
   - $125,000 - $149,999
   - Over $150,000

15. What is your gender?

16. In what year were you born?

17. What is your zip code?

18. Any other comments about this study and your experience today?

Thank you!