A COMPARATIVE INSTITUTIONAL ANALYSIS OF MANAGEMENT IN URBAN RIPARIAN GREENWAYS: THE AMERICAN RIVER PARKWAY (SACRAMENTO, CALIFORNIA) AND THE WILLAMETTE RIVER GREENWAY (PORTLAND, OREGON)

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ABSTRACT

A Comparative Institutional Analysis of Management in Urban Riparian Greenways: The American River Parkway (Sacramento, California) and the Willamette River Greenway (Portland, Oregon)

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Greenways are linear corridors of park land that can have great ecological and socio-cultural value. Some of the most popular greenways are those adjacent to rivers. A riparian greenway typically includes the actual river or stream channel plus a corridor of protected land on either side of the waterway. Riparian greenways provide important habitat for plants and animals, ecological services and recreation opportunities. Creating and managing successful greenways in urban environments requires long-term planning and continuous commitment of financial and human resources that take into account environmental constraints and socio-political expectations. In general, a three step process including 1) planning, 2) implementation, and 3) management is necessary to establish and maintain successful greenways. This study examines the management of urban riparian greenways. Management was defined as the process of sustaining greenways once established. Models of successful greenway management were initially explored through literature review. An analytical framework for assessing successful greenway management was developed and included presence of institutional structures for continuous management, capacity to manage and monitor greenway resources, to maintain positive relationships with the public and to secure operational funding. Site

visits and qualitative interviews with greenway managers were combined with review of local planning documents to analyze and compare two cases based on the analytical model: the Willamette River Greenway in Portland, Oregon and the American River Parkway in Sacramento, California.

Results showed that the model provided a useful framework for a comparative analysis of the two cases. Both greenways suffered from recent budget cuts which affected the overall management of greenways including public safety and maintenance of facilities. The research also identified striking differences in the institutional structure of the two greenways and in their interactions with the public. In particular, the degree of collaboration with not-for-profit organizations contributed significantly to the success of the American River Parkway and went beyond the more commonly understood patterns of relationships between greenways and the public found in the literature. These findings can be used to inform greenway management in other locations.

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INTRODUCTION

All organisms influence their environmental conditions, and humans are no exception. As the human population has increased and civilizations with advanced technology have developed, the rate and scale of human-influenced environmental modification have increased. Wildlands are rapidly being converted to alternative uses such as agricultural and urban landscapes. This conversion of land due to urbanization is outpacing population growth (Erickson 2006). By 2030, it is expected that 61% of people will live in urban areas, and by 2050, 80% of the global population will reside in urban centers (Brand 2006). Increasingly, urbanization has fragmented environments, severely jeopardizing wildland ecosystems that protect water supplies, maintain biodiversity, and preserve natural beauty (Alberti 2005).

Urbanization is a major cause of stream impairment all over the world, including impacts to riparian areas and corridors (House et al. 1993, Naiman et al. 2005). Riparian ecosystems are transitional zones between terrestrial and aquatic ecosystems (Naiman et al. 2005). They provide aesthetic values, recreation opportunities, wildlife habitat and critical ecosystem services, including filtration of pollutants, by intercepting sediment, nutrients, and other materials coming from uplands and upstream (Griggs 2009, Hellmund and Smith 2006, Howard 2007).

Historically, many urban centers developed adjacent to rivers, within riparian ecosystems, as these waterways supported commerce, and provided access to various water resources (Botkin and Beveridge 1997). As urban areas grew, the many ecological services that rivers and riparian areas provided were largely taken for granted and disrupted (Paul and Meyer 2008). Urban growth along rivers and streams typically

fragmented riparian corridors by clearing forests (Katibah 1984, Wilkins 1997, Naiman et al. 2005). The scattered riparian forest remnants could no longer provide critical ecosystem functions (Hellmund and Smith 2006). Channelization, waste dumping, and reduction or elimination of riparian vegetation degraded stream banks and caused erosion, resulting in unforeseen hydrologic impacts, including higher frequency and magnitude of flooding (Naiman et al. 2005). Attempts to re-stabilize water courses often led to the removal of riparian vegetation and application of engineered bank armoring of rock, brick or concrete (Berry 2008). Replacing riparian vegetation with these materials increased total impervious surfaces along waterways, which in turn, increased runoff and further impacted stream function (US Environmental Protection Agency 2009).

Today, recognition that riparian vegetation is important for managing and restoring rivers is growing (Tabacchi et al. 2000). For example, functioning greenways in urban areas have been found to participate significantly in stormwater management, such as treating urban runoff in natural floodplains and providing "natural green infiltration" systems (Swenk and Gabbard 1999). River restoration strategies include removal of artificial channelization, recontouring and riparian vegetation replanting projects that improve the physical and ecological conditions of degraded urban rivers (Bernhardt and Palmer 2007). River restoration and associated riparian area restoration often occur in the context of greenway establishment.

Greenways are linear open spaces established along natural corridors, such as riverfronts and stream valleys, or overland along railroad rights-of-way, canals and scenic roads (Little 1990, Fabos and Ahern1996). In the United States alone, Little (1990)

indicated that lands that border rivers and streams totaled 3.2 million miles and provided great potential for greenway corridors and wildlife habitat.

Creating and managing successful greenways in urban environments requires not only a clear grasp of complex ecological processes but long-term planning, management and continuous commitment of financial and human resources that take into account environmental constraints and socio-political expectations (Searns 1995).

Challenges abound for the successful establishment and management of urban riparian greenways. Even where environmental values have not been degraded and where land for greenways is available, institutional barriers can confound progress toward greenway creation and management. Such barriers can include disagreement among stakeholders, poor coordination among agencies, organizations and local government, conflicting land use policies and plans and a lack of vision with greenway development efforts implemented in isolation. These barriers reduce opportunities for cross jurisdictional connectivity. If these issues are not addressed, degradation or loss of greenway resources may result (Erickson 2006).

In general, establishing and maintaining successful greenways involves a three step process 1) initial planning with its associated mounting of political support and funding; 2) implementation through which the greenway is initially established; and 3) long term management (Flink and Searns 1993, Howard 2007). In particular, it is very important to maintain the initial vision and goals for greenways to ensure appropriate management once a greenway has been established (Howard 2007).

The objective of my study was to identify key elements that factor into successful greenway management for the long term. Through a comparative institutional analysis of

two well established and seemingly successful case studies, the Willamette River Greenway in Portland, Oregon and the American River Parkway in Sacramento, California, greenway management and challenges and barriers to greenway success were explored. Such institutional analysis of greenway management is particularly relevant for communities assessing capacity building needs to sustain natural resources for the long term.

In this case, the researcher is an administrator in the Korea Forest Service sent to the United States for graduate studies. In recent years, Korea has made efforts to rehabilitate urban riparian areas by reducing man-made structures so that these natural areas may integrate into the local setting. Findings from this research will be applied to management of urban riparian greenways and forests and will be incorporated into an emerging metropolitan-wide, riparian landscape management strategy for Korea.

LITERATURE REVIEW

Greenways, or parkways, are linear park lands managed for ecological, recreational, cultural, and aesthetic purposes (Little 1990, Fabos and Ahern 1996, Erickson 2006). Greenway connectivity is increasingly recognized as an important factor in both landscape ecological function and in human ecology (Turner and Gardner 1991, Erickson 2006, Hilty et al. 2006). Ecosystem connectivity has been defined as the degree to which species habitats are continuous or traversable across a spatial extent (Andersson 2006). Connectivity also refers to the interrelations and modes of circulation of people and goods in human society (Alberti 2005). In 1987, the President's Commission on the American Outdoors advocated for greenways networks that:

> "provide people with access to open spaces close to where they live, and link together rural and urban spaces in the American landscape [by] threading through cities and the countryside like a giant circulation system" (Pashek Associates 2008).

By connecting fragmented and isolated open spaces with more cohesive natural landscapes, greenways provide ecological, economic, and recreational benefits to cities and surrounding landscapes (Little 1990). By linking diverse city neighborhoods, greenways serve to enhance a community's infrastructure and increase social interaction (Milam 2001, Hellmund and Smith 2006). By enriching people's connections both to the natural community and to each other, greenways can be powerful catalysts for creating a stronger sense of community (Erickson 2006). Where connected greenways have been achieved through processes of civic participation and collective decision-making, greenway development has been credited with enhancing democracy (Hellmund and Smith 2006).

Although the term “greenway” first appeared in the late 1950s in North America, the purposeful design of linear, green landscapes dates back to the early 1900s (Hellmund and Smith 2006). A number of planners and landscape designers have influenced open space initiatives and contributed to the modern greenway concept (Howard 2007).

Searns (1995), president of an urban design and planning firm in Colorado as well as former project director for Denver’s Platte River Greenway, defined three stages of greenway evolution in the United States. The first generation, ending in 1960, consisted of boulevards and parkways. In the 1860’s, Frederick Law Olmstead created parkways as transitional paths from everyday life to the natural world for visitors as they approached great parks in the city (Little 1990). Ebenezer Howard took Olmstead’s initial notion of bringing nature into the city and expanded it to include urban growth control and buffering concepts. The London Plan drew on Howard’s ideas of using greenways as features that provided buffers from urban development by defining clear boundaries between urban areas and natural areas (Searns 1995). In his “Garden City” model, Howard used greenbelts of rural land, defined as linear conservation zones, to limit urban sprawl and to bind city and country together, thus offering the benefits of both to the community (Hellmund and Smith 2006).

Second generation greenways, from 1960 to 1985, were trail-oriented, recreational greenways and linear parks that provided access to rivers and streams and emphasized non-motorized travel (Searns 1995). With the increased dominance of automobiles within cities, interest in escaping auto-created noise and pollution grew. People’s interest in “walkability” increased, and trail-oriented greenways, or “hike-bike paths” met their desire for motor-free corridors (Searns 1995). Benton MacKaye

contributed to the modern trail-based greenway system by expanding upon Howard's country belt idea and creating large networks of open space (Little 1990). Searns (1995) argued that after 1985, a third generation of greenways emerged that served multiple objectives, including wildlife protection, flood control, water-quality management, and recreation. These greenways also offset and mitigated impacts from rapid urbanization (Searns 1995). Around this time, a number of planners and architects, including Ian McHarg, began to do research on more environmentally sensitive urban development (McHarg 1992).

Today, the value of greenway restoration and management is increasingly recognized. Urban rivers are being rediscovered and urban riparian greenways are being restored (Howard 2007), but these efforts are very challenging. Greenway projects demand a commitment to planning, implementation, and long-term management and maintenance (City of Boulder 2001, Howard 2007). Planning for a greenway project can grow out of particular community needs or problems, such as a shortage of recreational or cultural opportunities, or the degradation of a river, as well as from general issues, such as concerns over loss of open space (Hellmund and Smith 2006, Howard 2007, Pashek Associates 2008). In some cases, proposals for greenways are identified through formal legislative action at a state or regional level, in others they are driven by local government policy. Communities realize that the value of greenways extends far beyond their physical parameters. As people embrace a greenway, it is institutionalized and becomes a part of a community's collective consciousness and self image (Hellmund and Smith 2006).

Greenway planning necessarily calls for community support, organization and agency collaboration. Communication with a broad range of organizations in the early stages of a project is helpful in fostering relationships, gaining public enthusiasm, and finding a committed support network for greenway implementation (Hellmund and Smith 2006, Howard 2007, Pashek Associates 2008). Building community support through regular public outreach is critical as citizens want to know what is going on in their communities, and tend to not trust things that they do not understand (Boyer 1998, Collins et al. 2003). It is recommended that local governments begin communicating with the community early and often to avoid the spread of misinformation (Alberta Agriculture Food and Rural Development 1999). Also, outreach contributes to building social capital, the networks of social ties and interactions that provide a critical basis for trust, cooperation, and successful social political activity (Pennsylvania Greenways Partnership Commission 2001, Innes and Booher 2004, Warburton et al. 2006, Hellmund and Smith 2006, Dietz and Stern 2008, Flora and Flora 2008, Innes and Booher 2010).

Designing greenways is an inherently political process and requires building consensus for an idea that accommodates a broad spectrum of interests (Searns 1995, Ahern 2004). Various authors agree that in order to sustain long term political support, greenway planning should be fair and responsive to all stakeholders and it should be undertaken with cooperation from a broad range of participants (Little 1990, Erickson 2006, Hellmund and Smith 2006).

Successfully implementing a greenway project requires determination and problem-solving. Implementing a riparian greenway is a process of weaving together a number of key elements and tools over time, as greenways combine ecological, social,

cultural and economic features (Erickson 2006, Pashek Associates 2008). Every greenway is established in a unique historic and socio-political context. Because of this, developing a greenway implementation plan can become complex. Resources for preserving or restoring greenways have to be analyzed within the context of private property rights and land ownership, and the political climate (Howard 2007). It is rare that a public entity, seeking to establish a greenway, would control all of the land necessary to do so. In most cases, implementation proceeds opportunistically as greenway advocates work with various landowners.

One strategy of greenway development is to take a segment by segment approach as it may make implementation more tangible. As one property along the greenway is acquired and protected, planning for the acquisition of the next can proceed. Incremental successes can be publicized at each step as proof that creating a greenway is possible (Little 1990, Howard 2007, Pashek Associates 2008).

Establishing greenways often requires the use of various funding sources not only for short term construction and development, but for long term management and maintenance. Plans can be limited by available funds and may be reduced in scope to fit budgeting constraints. Securing funds can be very challenging (Pennsylvania Greenways Partnership Commission 2001, Howard 2007, Flora and Flora 2008). Managers need to have a clear idea of what greenway plan implementation will cost, who is likely to fund it, and how to obtain that funding (Flink and Searns 1993). Greenway advocates will need to raise funds for annual operating and maintenance budgets. Once the greenway has been established, continued corridor development and maintenance, and keeping up a positive public profile all require financial support (Howard 2007, Casey and June 2008).

Erickson (2006) and Howard (2007) suggested that diverse funding sources are preferable to single sources. In financing greenways, all available financial partnerships need to be considered. Also, long-term dependable funding should be sought as the funding stream from most grant-based sources tends to have a maximum life of three years (Flink and Searns1993).

Literature on greenway management emphasizes focusing on factors that should be taken into consideration. Searns (2005) mentioned user safety as well as volunteer labor and public-corporate partnerships. Flink and Searns (1993) discussed patrol and emergency procedures, administration, and finding money for maintenance. Howard (2007) and Johnson (1998) suggested volunteers, maintaining reliable funding, strong and collaborative relationships with the public and monitoring as management challenges.

In all cases, experts agreed that development of a management plan was critical. In this management plan, specific issues to address are determined, coordination strategies are identified, resource needs are defined, and means of maintenance are clarified (Jordan Jones & Goulding 2000, Rogue Valley Council of Governments Natural Resources Department 2005, Economic & Planning Systems 2005, Howard 2007). A management plan can also include a public access plan with guidelines that help to ensure user safety, minimize conflicts among users, and prevent environmental degradation. A maintenance, or monitoring program is an essential component to the plan. A successful management plan will provide guidelines for users to act in accordance with public access rules and will define the maintenance needs for biological and physical infrastructure, such as vegetation and trails (Grey 1996, Hellmund and Smith 2006, Howard 2007).

Once the implementation phase is completed, it is essential to maintain a greenway's positive image as a new resource for the community (Howard 2007). Experience indicates that failure to maintain and enhance a greenway can lead to erosion of public interest (Little 1990, Flink and Searns 1993, Rogue Valley Council of Governments Natural Resources Department 2005).

Once a greenway has been established, management for the long term begins. The literature indicates a number of factors that are critical in this regard including the greenway's institutional context and administration, well run management of natural resources and user facilities, a reliable funding stream, and collaborative relationships with the public (Flink and Searns 1993, Howard 2007).

Greenway management necessarily includes a long term administrative strategy. Flink and Searns (1993) suggested different models of greenway management including: a park agency model; joint agency operations; creation of a special greenways agency; operation by a federal or state agency; and(or) maintenance by nonprofit groups, private property owners and volunteers. The parks agency model is the conventional means of greenways administration. Under this model, park management is the responsibility of a branch of local or sometimes regional government, usually a department or district that manages the greenway in-house (Parsons, Harland, Bartholomew & Associates 2000). For instance, the Arapahoe Greenway is run by the South Suburban Park and Recreation District in Littleton, Colorado. Greenway maintenance was included in the local government's budget, and operations were carried out by department personnel (Flink and Searns 1993, Johnson 1998).

The joint agency model refers to greenway management by two or more agencies of a local government. Under this model, the most obvious advantage is savings in both construction and maintenance costs. In metropolitan Denver, the Urban Drainage and Flood Control District shared greenway maintenance responsibilities with local park agencies (Flink and Searns 1993). In some cases, greenways may be managed by a federal or state agency, such as the National Capital Regional Bikeway system in and around Washington, D.C. and the Cuyahoga Valley Heritage Corridor in Ohio. Operation by federal or state agencies usually brings considerable experience, expertise, and financial resources to greenways. On the other hand, when management decisions are made by more distant authorities, local preferences may not be taken into account or there may be a lack of coordination with local governments (Erickson 2006).

Creating a special agency involves the establishment of a special taxing district or greenway authority to generate ongoing revenue. The major advantage of this approach is that the greenway gets specialized care. The down side is the cost, time, and effort involved in setting up a new agency. There can be political resistance to creating another government body and such an agency may isolated and vulnerable to cutbacks in hard times. The Jefferson County Open Space district in Denver is one example of this approach (Flink and Searns 1993). This type of management is comparatively independent of management by local county government. In some cases greenways are managed and maintained entirely by non-profit organizations, such as the Appalachian Trail Conservancy (Flink and Searns 1993).

Greenways are long-term investments, and maintenance activities that facilitate the smooth and safe functioning of a greenway system are required (Searns 2005).

Effective maintenance will also help ensure that conservation and recreation objectives are met, and that greenways continue to be safe and desirable community resources (Howard 2007).

Maintenance includes both routine and remedial activities. Routine maintenance is the day-to-day upkeep of trails, sign replacement, tree and shrub trimming and other regularly scheduled activities. Remedial maintenance refers to correcting significant defects as well as repairing, replacing, or restoring major components (Flink and Searns 1993, Johnson 1998, Searns 2005).

In particular, the maintenance of trees has been emphasized for their unique function, for example, filtering and storing sediment to avoid erosion as well as creating aesthetically pleasing settings for urban recreational opportunities (Flink and Searns 1993). Also, it is often financially impractical to reverse the imperviousness of urbanized, paved-over-landscapes, while it may be relatively easy to re-vegetate riparian areas (Swenk and Gabbard 1999, Wilson 2002).

Monitoring of natural features and attributes of the landscape is a critical component of adaptive management (Benedict and McMahon 2006). Managers monitor greenways to understand what changes are taking place, which management policies are improving ecological function, and which are not. By responding to new information from monitoring efforts, greenways management becomes a dynamic process of adapting to ecological and cultural changes. A practical example may include closing, or limiting access to areas which are facing heavy recreational impact (Labaree 1997). Monitoring can also be used to assess users' preferences and community needs (Flink and Searns1993, Erickson 2006).

Public access to greenways promotes healthy lifestyles, alternate transportation, and community well being (County of Sacramento 2008). Managing public access requires balancing recreation demand and the capacity of the corridor landscape to absorb the impact of human use (Hellmund and Smith 2006, Waterfront Trail 2007). Access to greenways can be divided into four types: 1) pedestrian (including disabled); 2) vehicular (motorized and non-motorized); 3) water-based; and 4) other (for example, equestrians and roller-bladers) (Flink and Searns 1993).

Visitor safety is always a primary concern in public parks. Facilities provided, such as trails, playgrounds and boat ramps must be built to meet safety standards. Patrols and other crime prevention measures must be applied. There is potential for visitors to be exposed to natural hazards such as floods or wildfires (Flink and Searns 1993).

Organizations and agencies that own and manage lands that offer public access, automatically assume a measure of responsibility, risk, and liability. Greenway authorities must provide safe conditions for the full use and enjoyment of those who have access to them (Flink and Searns 1993, Howard 2007). Threats to public safety, real or perceived, can be a significant barrier to greenway visitation rates (County of Sacramento 2008). Flink and Searns (1993) and Haden (1999) suggested that important components of a safety and security program include a safety committee or coordinator, a greenway safety manual, user rules and regulations. In particular, patrolling greenways serves a number of purposes including security, preventing vandalism, handling of medical emergencies, rescue, evacuation in the event of a flood or other problem, and dissemination of public information (Flink and Searns 1993).

It is essential to maintain ongoing active community support by building collaborative relationships with the public (Howard 2007). Collaborative community support can be developed through regular communication with local citizens about greenway initiatives, efforts to make the public aware of new community resources, and providing recognition of the importance of ongoing public support to sustaining greenways (Benedict and McMahon 2006, Howard 2007). These efforts also are important to create an environment where greenway issues are resolved agreeably by gaining involvement or support from people with diverse interests (Leatherman and Howell 2000).

Interpretive programs and education can contribute to increasing people's awareness of their surroundings, and help them understand the value of greenways as open space, and as reservoirs for natural and cultural history (Berg and Martinez 2006, Erickson 2006).

Ideally, maintaining greenways will generate the support necessary to sustain their continued popularity and the community's pride in their greenways (Howard 2007). Greenway users who value this resource will be more likely to join in efforts to extend them or to upgrade and maintain existing sections.

Greenway programs can help to promote the long-term involvement of people in the planning, design, implementation and management of the parks (Haden 1999). Volunteerism can be very important to ongoing efforts to protect and restore a greenway's natural amenities, maintain healthy and safe conditions, explore alternative funding opportunities, and create a greater understanding and sense of awareness of outstanding natural and recreational resources to the community (Erickson 2006,

Waterfront Trail 2007). Many greenways use volunteers to expand offerings to the public and to help with park maintenance. Further, volunteer efforts can serve to publicize greenway initiatives and generate support. The City of Pueblo, Colorado, created a program in which volunteer rangers served as interpretive guides, picked up trash, and provided a sense of security for users (Flink and Searns 1993). A number of authors reported that keeping a group of greenway volunteers and supporters (e.g. the "Friends of the Greenway") together is critical to the continued success of greenways. This may include regular meetings which help to maintain a group's cohesiveness and provide opportunities to monitor progress, evaluate the maintenance program, and continue fund raising efforts (Boyer 1998, Beierle and Konisky 1999, Pennsylvania Greenways Partnership Commission 2001).

Volunteers are not cost-free, however. Consistency of volunteer workmanship or availability of volunteer labor cannot be guaranteed. Volunteers must be recruited, trained and supervised, which calls for an investment of resources (Flink and Searns 1993). Rather than managing volunteer activities from within a parks department, greenway authorities often partner with non-governmental organizations that take on the work with volunteers. Non-profit partner organizations can significantly enhance management and especially public outreach activities provided by government entities (Erickson 2006).

Non-profit groups often staff visitor centers. They can enhance public outreach and publicity about greenways, for example, with websites and newsletters. They can organize volunteers to help with litter collection, invasive plant management, and landscape care such as weeding, pruning, mulching, and plantings. For these types of

activities, non-profit organizations with volunteers can train and supervise volunteers and provide work tools (Flink and Searns 1993). Volunteer organizations may also conduct periodic user surveys to keep administrators in touch with visitors' views and necessary changes, repairs, or upgrades to facilities (Parsons Harland Bartholomew & Associates 2000). Volunteer organizations also frequently organize public events in greenways such as races, natural history educational tours or concerts. In all of these ways, volunteers can provide a significant supplementary labor force to park managers.

Organizing a greenway project, developing trails, and maintaining a high public profile all require a certain level of financial capital and technical assistance (Howard 2007). Failure to secure enough funds to maintain a greenway reliably can influence overall management including public safety, natural resources, and in the end, put the success of greenways in danger with the accumulation of a large backlog in deferred maintenance (Lukenbill 2005).

My study provides an institutional analysis of established riparian greenway management for the American River Parkway in Sacramento, California, and the Willamette River Greenway in Portland, Oregon. Both of these greenways are well established and documented in the literature. "Institutional structure" refers to relevant agencies, organizations, and citizens' groups, and their system of interaction including public participation and decision-making processes (Bandaragoda 2000, Matsaert 2002, Erickson 2006). Institutional analysis is particularly helpful in determining the effectiveness of organizations and their procedures (Hellmund and Smith 2006).

The analytical framework developed was used as a basis for comparing the Willamette River Greenway in Portland, Oregon and the American River Parkway in

Sacramento, California (Figure 1). Four factors identified by the literature to be influential for successful greenway management were compared.

Institutional structures were compared through analysis of the greenways' governance structure, land tenure arrangements, partnerships, and planning. As long linear features, riparian greenways often belong to several landowners. Effective management requires cooperation between landowners and often across jurisdictions of diverse local and regional institutions. Collaborative partnerships are often applied to develop locally appropriate management plans.

Management of greenway natural resources and facilities for public access requires maintenance and monitoring in order to balance recreation demand and the capacity of the corridor landscape to absorb the impacts of human use. Reference to maintenance of trees was defined as an indicator of managing biological resources. Further, policies for facilitating and controlling public access and visitor safety were compared. Building collaborative relationships with the public is a critical aspect of greenway management. Managers seek to sustain and increase citizens' long term interest in greenway conditions. Communication with people is critical to have them realize the benefits from greenways. Volunteerism to support the maintenance of greenways can make valuable contributions to successful greenways.

Finally, the maintenance of greenways requires stable and long-term funding. This factor was closely related to how to overcome budget shortfalls and how to secure stable funding sources. Therefore, financial arrangements were compared.

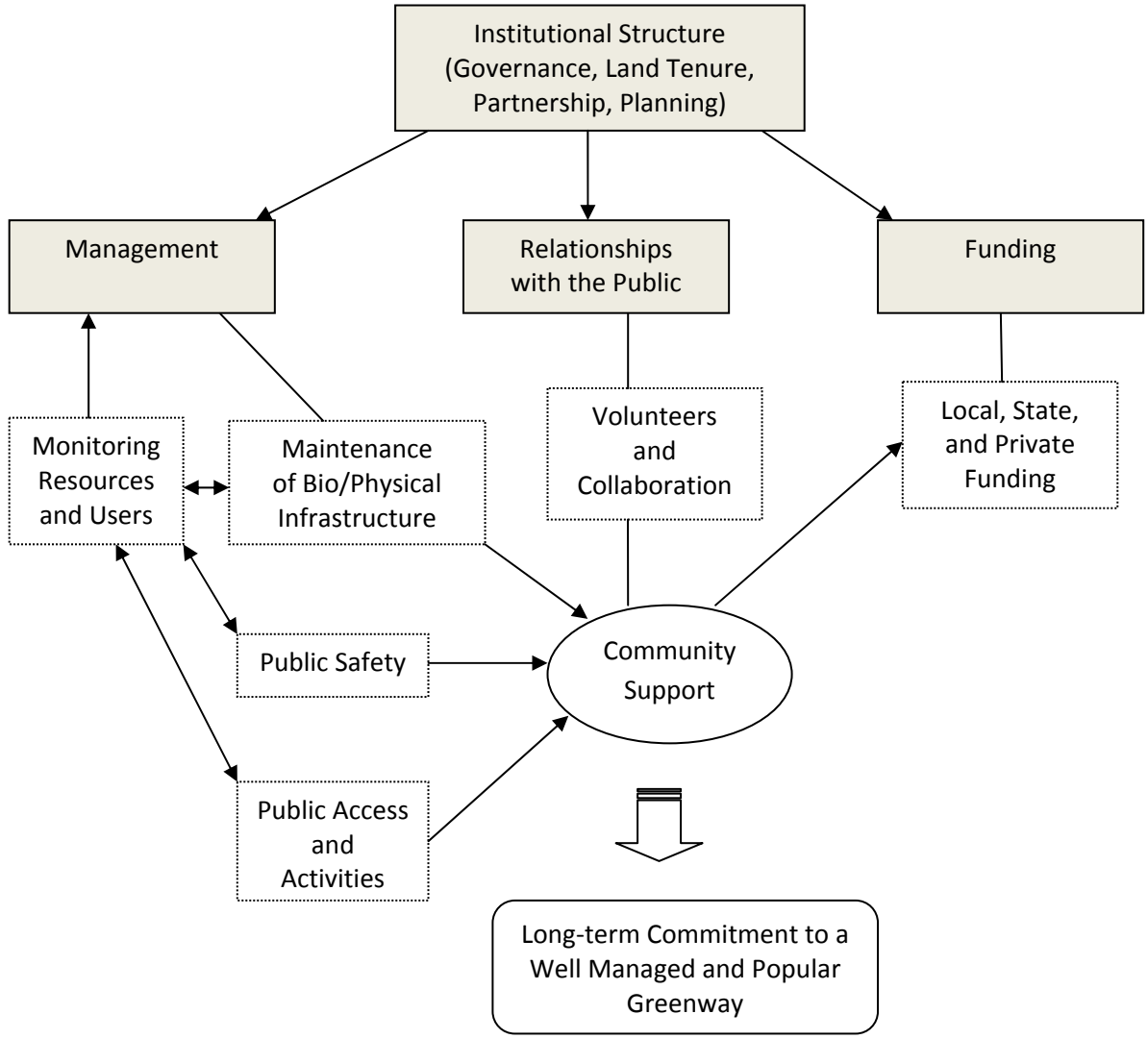


Figure 1. Analytical framework used to compare two urban riparian greenways.

METHODS

Qualitative methods were applied to a comparative analysis of two cases in this thesis. A review of the literature on urban greenways was used to identify key components of successful riparian greenway management. These were used to develop an analytical frame through which to evaluate greenway success. I used a comparative analysis of two case studies to contrast how these key components manifest in arguably successful greenways. Case studies can reveal themes, explain intricate dynamics, and answer questions about how and why things happen as they do. Case studies are also useful for turning anecdotes and generalizations into concrete documentation, bringing to light successful projects that can be replicated elsewhere (Francis 1999).

The two riparian greenways contrasted were: 1) The Willamette River Greenway in Portland, Oregon and 2) The American River Parkway in Sacramento, California. These sites were selected because they are well documented examples of urban riparian greenway development. I gathered various sources of information documenting the two greenway cases. Documents reviewed include historic documents, planning reports, research studies, maps, legal material, and other pertinent information. I then identified a set of characteristics critical to successful greenway management. I then developed the analytical framework to compare and contrast the management of the two greenway case studies.

Studying the available literature on the sites prior to conducting interviews allowed me to formulate questions that could only be answered by talking with knowledgeable people at the site. Site visits were made to Portland, Oregon and Sacramento, California to gather GIS data, conduct interviews, access historical resources,

and tour the riparian greenways. GIS-based spatial analysis using ArcGIS 9.3.1(ESRI, Redlands, California, 2009) was applied to existing data sets from the greenways' managing agencies. I used several GIS tools to analyze the spatial data. The distribution of public and private ownership on the Willamette River Greenway was highlighted by re-classifying ownership attributes. The field calculations tool was used to quantify the extent of different bank conditions on the Willamette River in Portland. Additional maps were reformatted from existing data sets.

Interviewees were chosen through "snowball sampling" by identifying key participants from greenway management agencies in greenway documents and then asking these participants to suggest additional people to interview (Patton 1990). I sent an initial cover letter to each potential interviewee requesting an interview with a document explaining the research project and the types of questions to be discussed. I conducted interviews in person where possible, or if not in person, then by telephone. In-person interviews were conducted in participants' offices or other convenient locations. Research was approved by the Humboldt State University Institutional Review Board for the Protection of Human Subjects (PERMIT #10-135)

An interview guide approach was used to ask participants both simple answer and open-ended questions. When necessary, follow-up questions were added for more detail or to clarify responses with supportive materials from interviewees. Interviews were taped and transcribed, or notes were taken and compiled immediately following the interviews. Content analysis was applied to the compiled results to identify common and contrasting themes. The results for the two riparian greenways were compared and discussed in relation to the analytical framework and the literature.

To conduct this research, eight primary questions drawn from the analytical framework were addressed.

1) What was the institutional context for each greenway? This included identifying the policy framework for the greenway, its jurisdictional structure and management authority.
2) How were these greenways managed and maintained? This included how staff and volunteer efforts were organized and integrated.
3) How was public access planned for and managed?
4) How were relationships with the public managed?
5) How was funding secured?
6) What were noteworthy successes for these greenways?
7) What were management challenges for these greenways and how were they overcome?
8) What were implications for greenways elsewhere?

STUDY SITES

The Willamette River is the heart of Portland's natural open-space network. It extends for 187 miles and is Oregon's longest river. It drains 11,500 square miles, beginning in the high Cascade Mountains southeast of Eugene and winds down through forests, farmland and towns before joining the Columbia River in Portland. The Willamette River and the City of Portland are inherently linked. The river is central to Portland's history and has been instrumental in shaping the city's economy, culture, and quality of life (City of Portland 2001).

Growth and development have dramatically altered the river channel and its banks (City of Portland 2001). As Portland has developed, residential, commercial and industrial developments have resulted in habitat loss and fragmentation and alteration of natural systems. Floodplains and wetlands have been filled, streams diverted and portions of the riverbank altered to facilitate the economic growth of the harbor.

In addition, urbanization along the Willamette River has slowly reduced public access to its shores. Only a few places remain where people can connect with the river, and as a result, the community has become detached from Portland's defining natural feature (City of Portland 2001). Yeakley and colleagues investigated riparian vegetation buffers in Portland after the city experienced rapid population increase in the 1990s. They found declining riparian vegetation health and loss of riparian buffers between 1990 and 1997 (Yeakley et al. 2006).

Portland policy makers have identified the restoration of the Willamette River's health for the benefit of fish, wildlife, and people as one of Portland's greatest challenges in decades to come (City of Portland 2001). The idea for a Willamette River Greenway

evolved from the environmental movement in the late 1960s and early 1970s. In 1967 Governor Tom McCall called for a revitalized river with a public greenway on its banks, to reverse the trend of neglect (Erickson 2006). The proposal was further developed by the Governor's Willamette River Greenway Committee, members of the public, and the Willamette River Greenway Task Force (State of Oregon 1967).

The project was formalized in Oregon's statewide Planning Policy in 1975 as Goal 15. Goal 15 defined the creation of the "Willamette River Greenway". It required local governments to develop plans for the lands adjacent to the river, including providing adequate public access along the river, protecting significant habitat for wildlife, and enhancing and protecting the river's vegetation (City of Portland Bureau of Planning 1987).

In the two decades after the adoption of the 1987 Willamette Greenway Plan, the plan proved flexible, adapting to the changing physical, regulatory, legal and economic landscape within federal, state, regional, city and inter jurisdictional contexts.

However, many changes occurred along the Willamette River, and by 2000 a broad review and update of the Willamette River Greenway Plan was due. Recently, building on the River Renaissance Vision (City of Portland Bureau of Planning 2001), the River Renaissance Strategy (City of Portland 2004), and River Concept (City of Portland Bureau of Planning 2006) documents, the River Plan was announced in 2011 as an update to the Willamette Greenway Plan (Figure 2).

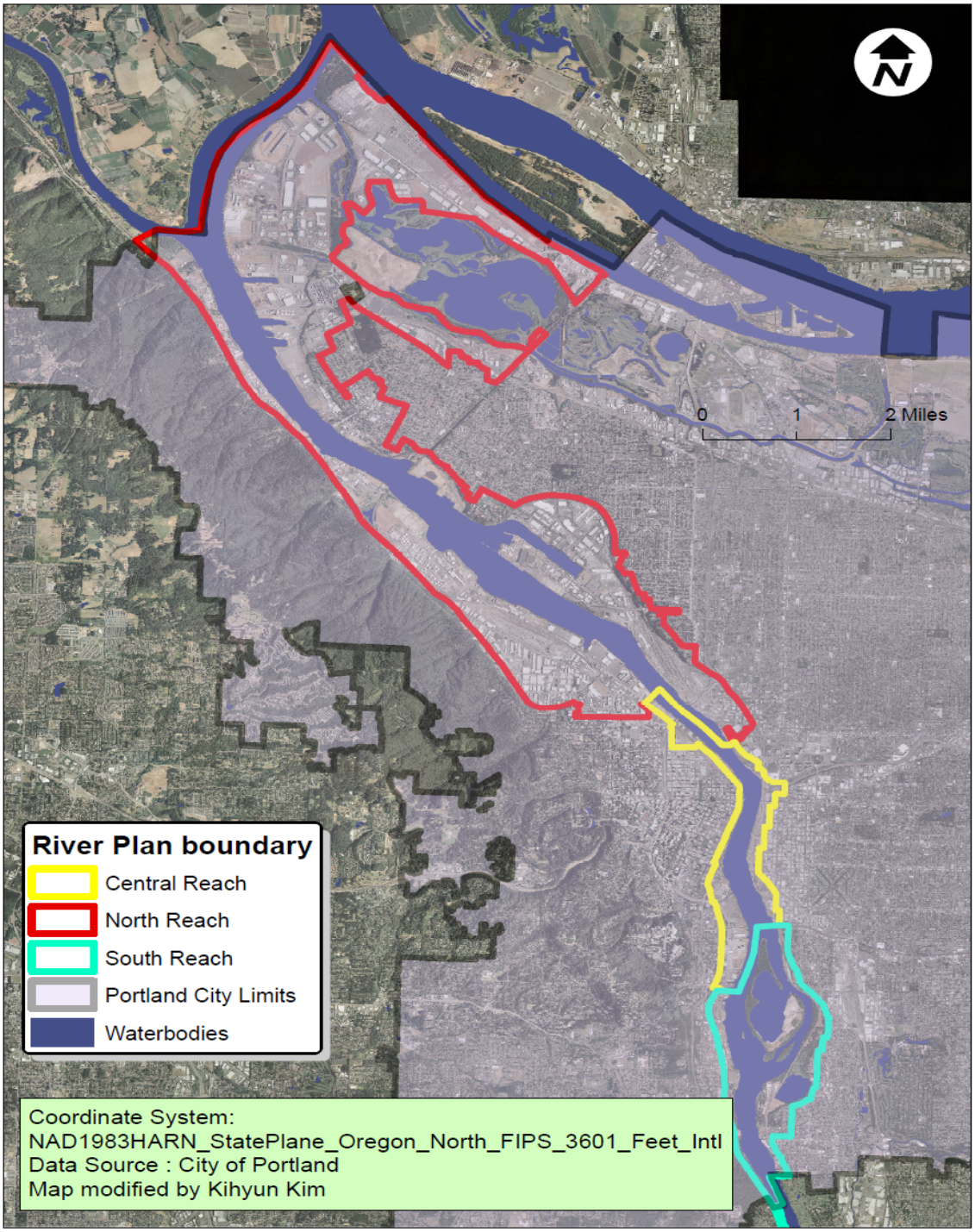


Figure 2. The River Plan boundary (North/Central/South Reach) in Portland.

The North Reach section of the River Plan was completed in 2011. The Central Reach section was scheduled to be completed toward the end of 2013. Planning for the South Reach section had not yet begun with no timeline established for completion (Buono 2011, personal communication). River Plan objectives included supporting river-dependent and river-related uses, providing access to the river, and protecting and restoring natural resources' functions (City of Portland Bureau of Planning and Sustainability 2010b). In particular, as a way to maintain riparian areas, the Plan stressed wildlife protection, natural resource enhancement and habitat connectivity along the river. High and medium ranked resources included the river, streams, wetlands and adjacent woody vegetation and important wildlife habitats and corridors (City of Portland Bureau of Planning and Sustainability 2010a).

The American River is the second largest tributary to the Sacramento River, a critical component of the San Francisco Bay/Sacramento-San Joaquin Delta system that provides drinking water to two-thirds of the state and irrigation water to half of California's agriculture industry. The lower American River is a particularly valuable asset within the Sacramento region, providing important fish and wildlife habitat, a high-quality water source, a critical floodway, and a spectacular regional recreational parkway (Water Forum 2004).

The American River Parkway stretches 23 miles from the confluence of the American and Sacramento Rivers to Nimbus Dam (County of Sacramento 2008). It preserves an open space greenbelt through a largely metropolitan area with a population of more than 1.3 million people. Also, it provides habitat for wildlife and a source of recreational opportunities for residents and visitors (Hayes 2005).

The beneficial uses of the river have suffered as a result of historical modifications to the American River watershed and the physical and operational constraints currently imposed on the river (Nance and Ueda 1977). Before 1850, riparian vegetation formed extensive, continuous forests in the river's floodplain, which in some places were 4 miles wide. The area supported an abundance of native vegetation and wildlife in the riparian habitat adjacent to the river. Historically, between 1849 and 1909, hydraulic gold mining in the watershed of the North and Middle forks of the American River caused an estimated 258 million cubic yards of sand, silt, and gravels to be deposited in the river, which resulted in extensive sand and gravel bars (Lower American River Task Force 2002). In addition, miners began scraping gravel bars to obtain rock materials for concrete production from the late 1800s (Water Forum 2005). This excavation drastically altered the surface features of the river and has had severe consequences to the vegetation by reducing the growth and regeneration of the riparian forest, affecting wildlife and habitat (Water Forum 2005).

As early as 1915, the City of Sacramento delineated a concept of the American River Parkway on a plan map. John Nolen, a Sacramento city planner submitted a study to support a city plan to meet future needs including an extensive park system along the American River. Though his plan was not the specific plan on which the current parkway was based, it was the first known reference (Hayes 2005). In 1929, Frederick Law Olmsted Jr. envisioned roads as attractive routes within the parkway plan, and in 1947, he updated his plan and included a more complete proposal for parkway development including development of recreational facilities (Hayes 2005). In 1985, the California Legislature acknowledged the American River Parkway's statewide significance by

adopting the American River Parkway Plan through passage of the Urban American River Parkway Preservation Act (Water Forum 2005). The Plan was intended to guide land use decisions while facilitating human enjoyment of the American River Parkway (Figure 3). The American River Parkway is an important regional recreation area that includes more than 4,600 acres of parkland with multi-use trails, picnic areas and a nature center. The American River corridor, with its natural beauty, proximity to an urban population, and recreational values, has been designated a "recreational river" in both the federal and state Wild and Scenic River systems and as a National Recreational Trail (Lower American River Task Force 2002).

However, in the decades after the plan was passed, bank erosion, channel degradation and creation of riprap revetments contributed to the decline of riparian vegetation, loss of soft bank and channel complexity and reduced amounts of large woody debris. In particular, there was a decrease in overhanging bank vegetation which provides multiple benefits to both fish and wildlife (Water Forum 2005).

In 2003, an update of the 20-year-old plan was initiated by the Sacramento County Planning Department with the establishment of an advisory committee representing a wide variety of interests (Water Forum 2005). The plan was developed and updated in 2008 (County of Sacramento 2008). The newly updated plan emphasized balanced management. It sought to preserve and enhance native vegetation and naturalistic open space and environmental quality, while contributing to the provision of recreational opportunities in the Sacramento Area (County of Sacramento 2008). It included goals to enhance and expand the American River Parkway's native vegetation by removing non-native trees while focusing on natural oak regeneration.

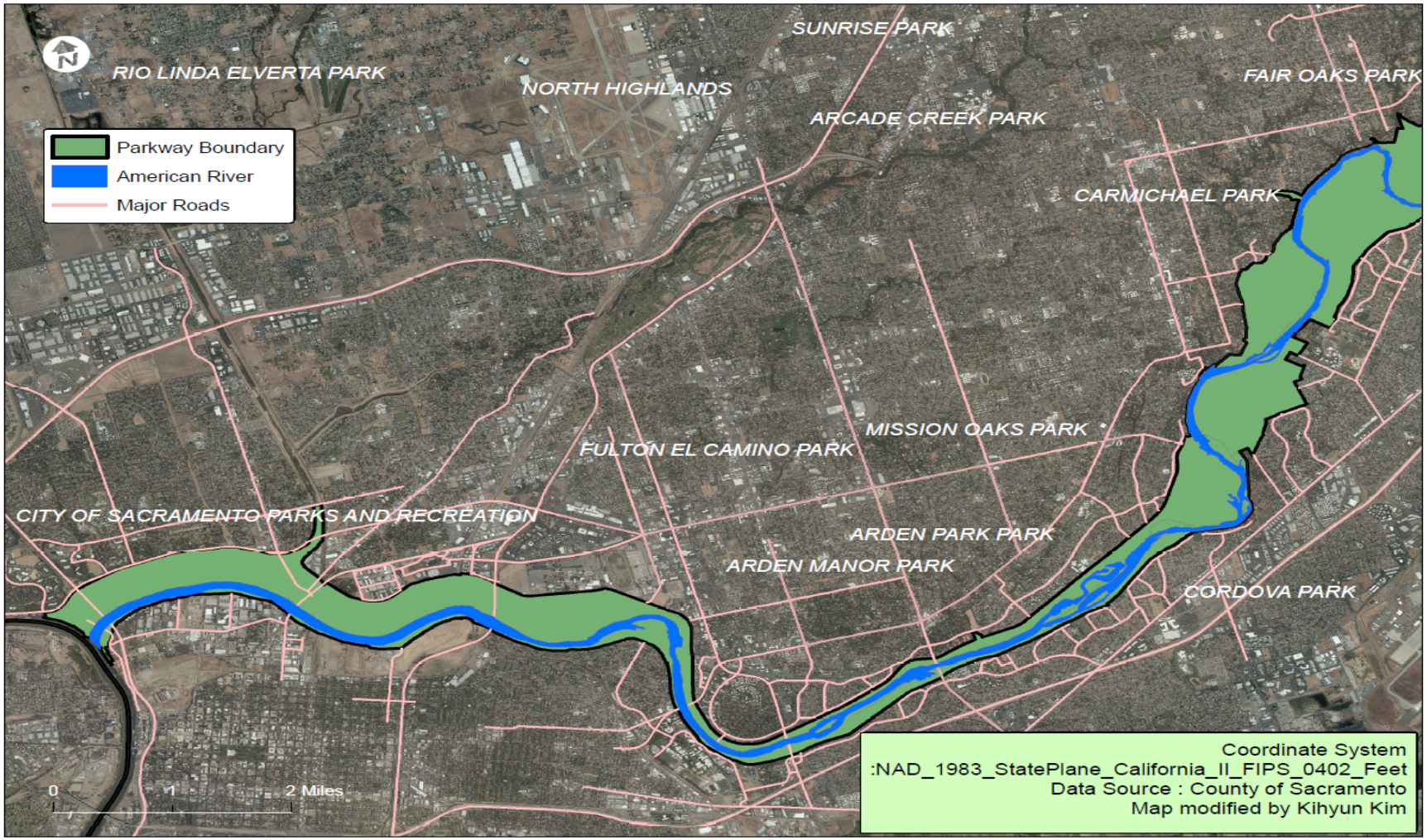


Figure 3. The American River and the boundary of the American River Parkway.

RESULTS

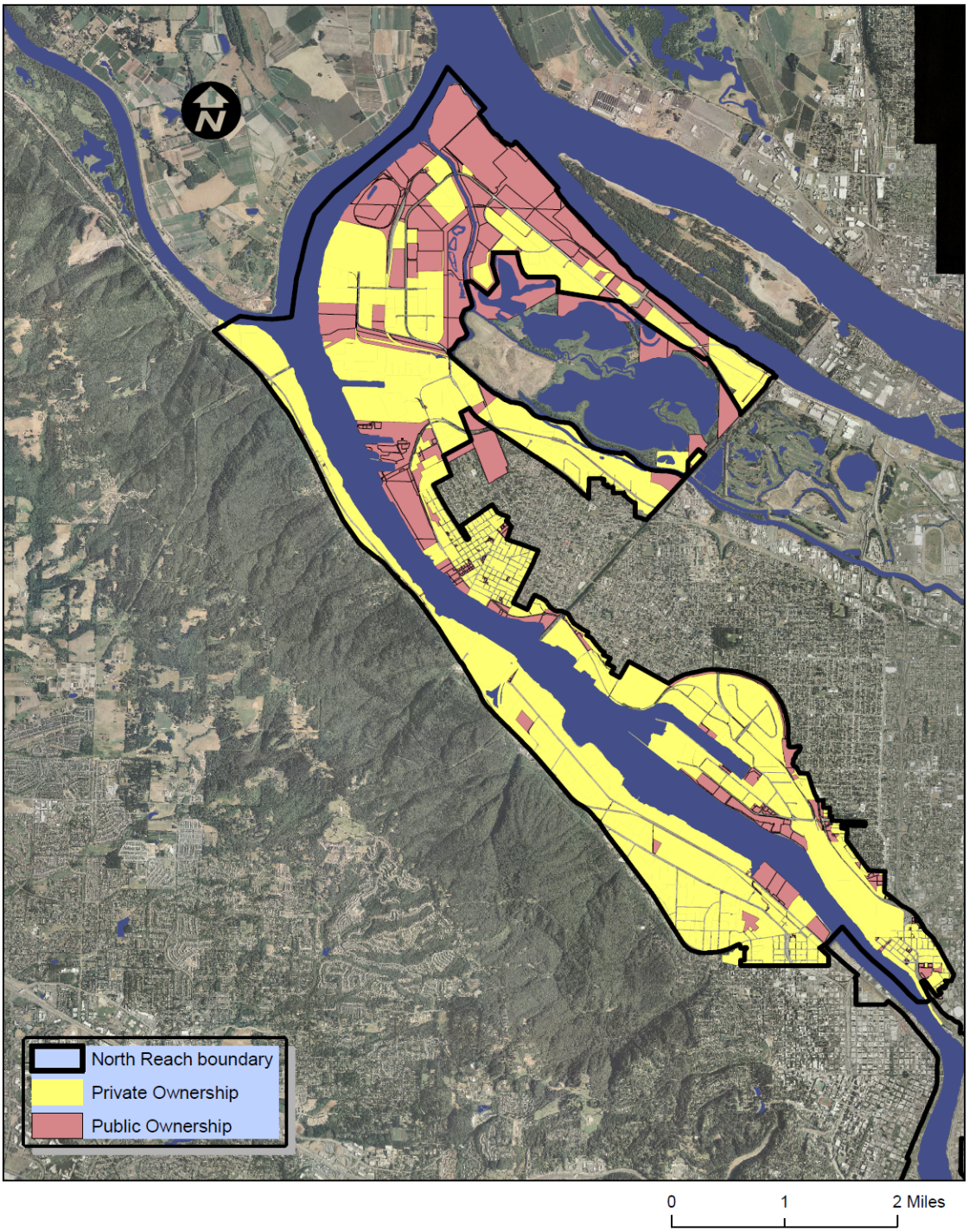
The two greenways were compared through analysis of their institutional structure, management, relationships with the public and funding. These aspects discussed in turn below.

Institutional Structure

Local government jurisdiction and land tenure, their partnerships with other organizations and their planning processes are indicative components of institutional structure. Both the Willamette River Greenway and the American River Parkway are managed by local government parks departments. In the case of the American River Parkway, Sacramento County's Regional Parks Department is principally responsible for management even though the American River Parkway crosses jurisdictional boundaries. In addition to Sacramento County, the cities of Sacramento, Rancho Cordova and Folsom are also involved. In contrast, the Willamette River Greenway lies entirely within the City of Portland and is managed by the Portland Parks and Recreation Department.

Land tenure differed significantly between the two case studies. In Sacramento, the land for the American River Parkway was purchased through a state bond initiative in 1972 (Sacramento County Regional Parks 2009). As a result, almost all of the land within the American River Parkway boundary is public and is managed by public agencies.

In contrast, the Willamette River Greenway has mixed ownership (Figure 4). In Portland, approximately 56 percent of the riverfront is in public ownership while the remaining 44 percent is privately held (City of Portland 2001).



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Data Source : City of Portland
Map analysis : Kihyun Kim

Figure 4. Land ownership of North Reach of the Willamette River in Portland.

Public areas of the Willamette River Greenway are managed by the Portland Department of Parks & Recreation, while some trails on private land are maintained by the landowners. Private landowners retain liability for the use of their trails (Horner 2010, personal communication). However, Portland Parks & Recreation is responsible for the review and approval of public trails built on private property (Portland Parks & Recreation 2006). Relationships with partner organizations are fundamental to greenway management on the American River Parkway. Non-governmental organizations assist the County Parks Department in coordinating volunteer activities for preservation and maintenance, for example by organizing public volunteer events such as clean-up days.

The American River Natural History Association joined the American River Parkway Foundation, Save the American River Association, and other stakeholders to create the American River Parkway Coalition in 2004 (American River Natural History Association 2011). The Coalition looks for ways to educate and involve the American River Parkway users in the ongoing quest for short and long-term funding. The American River Natural History Association further contributes funds to support the educational programs of Effie Yeaw Nature Center, an environmental and cultural educational center in the American River Parkway. The American River Parkway Preservation Society and Save the American River Association help inform public policy makers about current issues affecting the American River Parkway. Figure 5 depicts the institutional management structure, including the role of non-profit organizations assisting Sacramento County in managing the American River Parkway. In contrast, non-governmental organizations play a more limited role in management of the Willamette River Greenway.

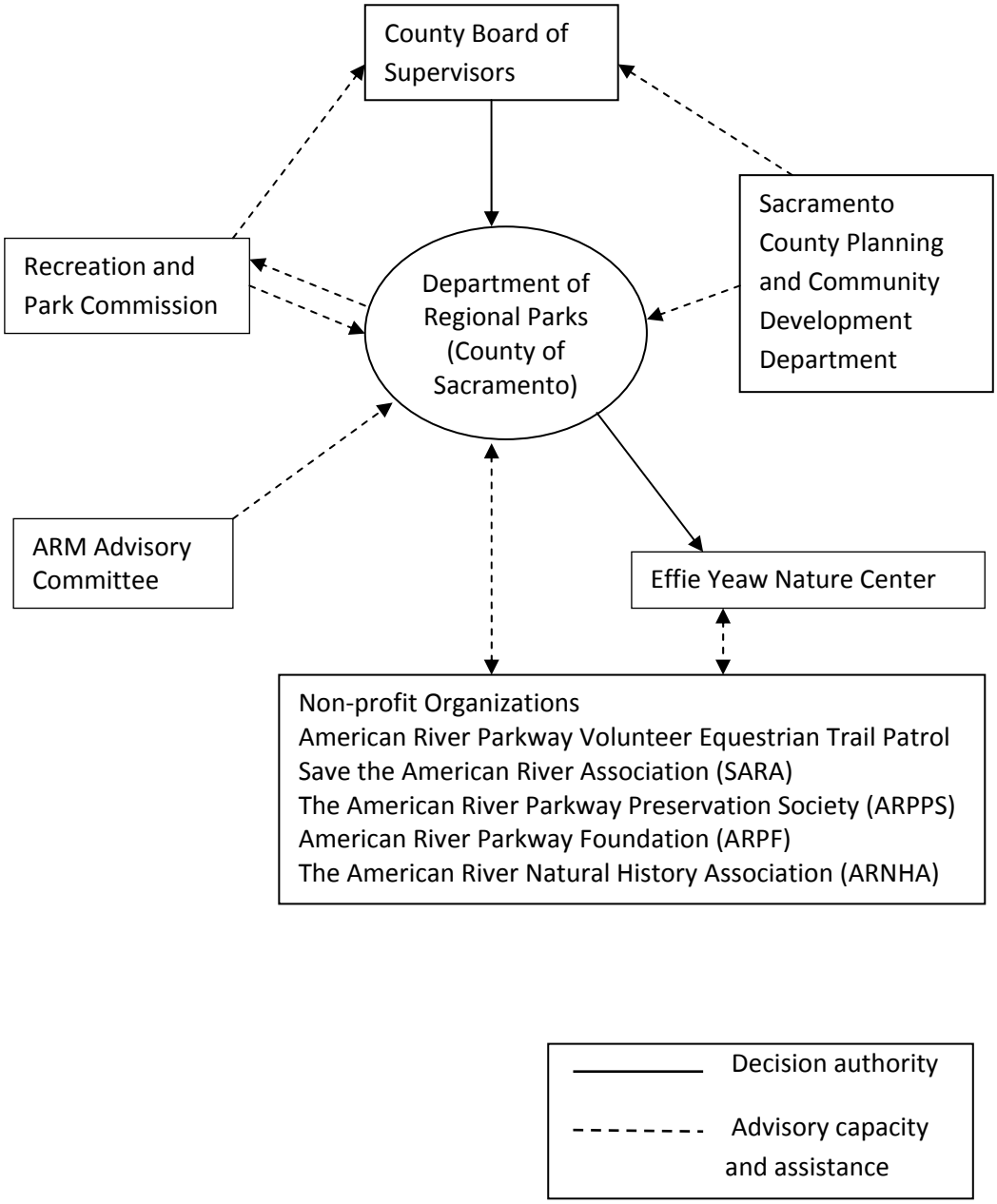


Figure 5. The structure of management and decision-making in the American River Parkway.

Planning is also handled differently on the two greenways. Sacramento County developed the comprehensive American River Parkway Plan in 1962. It was most recently updated in 2008. The purpose of this plan was not only to provide guidance for land use decisions affecting the American River Parkway but also to act as the management plan for addressing parkway preservation, use, development and administration for public access as well as public safety. It was a policy and action document that included goals for preservation of the natural environment while allowing limited development to facilitate multiple uses within the American River Parkway (County of Sacramento 2008). The American River Parkway Plan was developed by the Sacramento County Planning Department staff with the involvement of the Department of Regional Parks. Sacramento County adopted the American River Parkway Plan as a General Plan Element in 1962. Inclusion of the American River Parkway Plan in the County General Plan ensured consistency between City and County documents, and facilitated communications on the American River Parkway oversight and management issues.

In Portland, the initial Willamette Greenway Plan was included in Portland's Comprehensive Plan in 1988. The Willamette Greenway Plan addressed the quality of the natural and human environment along the river and defined the goals for the greenway to

> "protect, conserve, maintain, and enhance the scenic, natural, historical, economic, and recreational qualities of lands along the Willamette River" (Willamette Greenway Plan, City of Portland Bureau of Planning, 1987, page 1).

The Willamette Greenway Plan further delineated the plan boundary and discussed land use allocation, public access, and the design guidelines for trails and viewpoints. An update of the Willamette Greenway Plan began in 2001 with the River

Renaissance Vision. However, one of interviewees pointed out that these plans were not enough to contribute complete guidance for maintenance of the Willamette River Greenway. The River Plan for North Reach portion of the Willamette River was completed in 2010, two additional sections for the Central Reach and the South Reach were to follow (City of Portland Bureau of Planning and Sustainability 2010a).

Management

Greenway management encompasses day-to-day maintenance of facilities, monitoring, provision of public access for use, and maintenance of public safety.

The Department of Regional Parks housed in Sacramento County offices and the Department of Parks & Recreation in Portland oversaw maintenance, ranger services and special events for the greenways (Table 1). In particular, the Department of Parks & Recreation in Portland managed urban forestry and tree inspection services. Managers were responsible for maintaining the American River Parkway including 82 miles of trails. The facilities in the 4,614 acres of American River Parkway were inventoried in 2006 (The Dangermond Group 2006).

In Sacramento, recent budget cuts have been severe. Maintaining greenways was prioritized below other services (e.g. public health and safety). As a result, between 2007 and 2010, the number of staff was reduced by 75 percent, from 23 rangers to 11, and 8 maintenance workers to 4 (Baker 2010, personal communication). The reduction of maintenance staff influenced the quality of greenway management. Due to reduced frequency of day to day maintenance, an increase in user complaints resulted (Argentina 2010, personal communication).

Table 1. Services provided by park related departments in both cases.

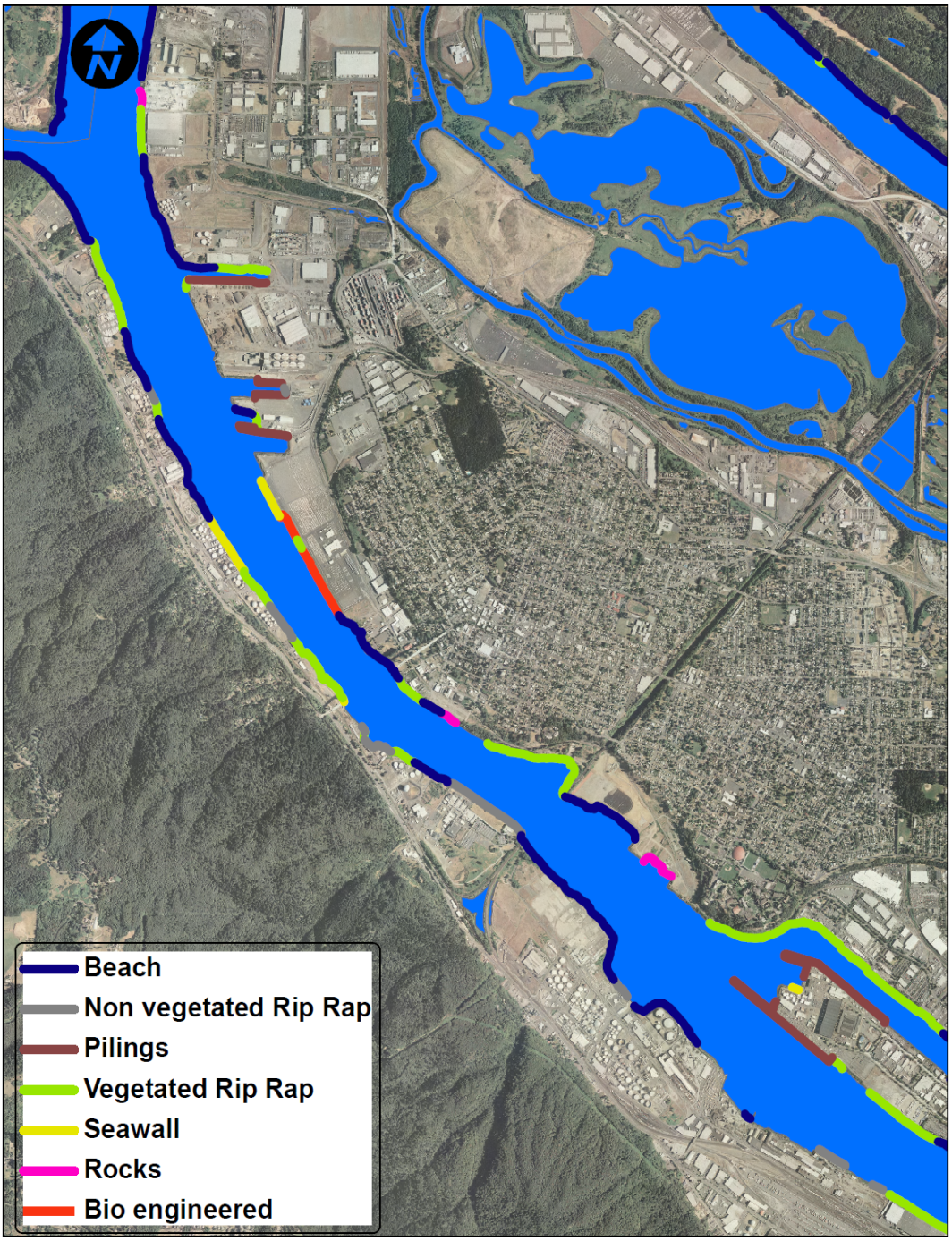
Park Maintenance Services	Routine maintenance of parks and facilities, tree maintenance, bike trail maintenance, special projects and project inspection.
Park Ranger Services	Law enforcement, collection of fees, resource protection, emergency response, user education for safe use of park areas.
Special Events Services	Managing concerts, marathons, and bicycle racing events.

Similarly, the Willamette River Greenway in Portland recently suffered $1.2 million in reduction. In particular, funding allocated to facility maintenance was reduced from 3.0% of Parks & Recreation budget to 1.0% in 2010 (County of Sacramento 2010).

As a crucial greenway management element, both Sacramento and Portland managers emphasized vegetation maintenance including enhancement of trees and native plants. Figure 6 shows the river bank in the Willamette River. According to GIS data analysis of data provided by the City of Portland, there was 5-mile reach of non-vegetated bank. Also, the American River Parkway and the Willamette River Greenway managers focused on removing invasive plants species and had lists of species recommended for re-vegetation projects. Only plants found on approved lists were allowed to be planted within the greenways in both areas. The Portland Plant List included two categories: the Native Plants List and the Nuisance Plants List (Portland Parks & Recreation 2004).

Native vegetation restoration and enhancement was a focus of the Willamette River Greenway (City of Portland Bureau of Planning and sustainability 2010c). The 2010 River Plan in Portland required that all properties in the North Reach have overall 15% vegetation cover (City of Portland Bureau of Planning and Sustainability 2010a).

In Sacramento, vegetation management work is strongly supported by partnerships with non-profit organizations. For example, the American River Parkway Foundation coordinated the Oak Mitigation Project, on behalf of Sacramento County. This was a three year program that began in April 2007 and ran until May 2010.



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Data Source : City of Portland
Map analysis : Kihyun Kim

Figure 6. River bank conditions of the Willamette River in Portland.

The American River Parkway Foundation was responsible for planting 1,200 new oak trees and 24,000 acorns in five main areas of the 23 miles of American River Parkway with 5,011 volunteer hours of community service. Each tree was caged to protect it from predators, and tagged in order for staff to monitor its progress (Poggetto 2010).

Neither the Sacramento Department of Regional Parks nor the Portland Parks & Recreation Department had comprehensive greenway monitoring plans for routine management or for long-term planning purposes. However, some management activities were monitored in Portland and Sacramento.

Sacramento Department of Regional Parks monitored the American River Parkway to ensure user safety, and to identify problem areas related to visitors. These included monitoring the American River Parkway locations where accidents frequently happened, or sites prone to illegal activities that impacted adjacent neighborhoods. Results from monitoring were reflected in policy changes that provided solutions to problems, such as relocating parking lots to more appropriate areas (Baker 2010, personal communication).

The American River Parkway Foundation reached out to, and collected feedback from the American River Parkway users or volunteers through social media (e.g. Facebook) or email. For example, the Foundation asked users why they came, and how they felt about visiting the American River Parkway, or what areas of the American River Parkway needed improvement and attention (Poggetto 2010, personal communication).

As a way of monitoring Willamette River Greenway resources, Portland took the opportunity to update the 20-year old Willamette Natural Resources Inventory in 2009.

The inventory included privately owned land. It was used to determine which lands might be suitable or necessary for inclusion within the greenway boundary and as a basis for resource management decisions and actions including protection, restoration, acquisition, stewardship and education (City of Portland Bureau of Planning 2007).

For example, it included GIS based modeling of the riparian corridor and wildlife habitat that was used to assign scores to map habitat patches based on their size, shape, and connectivity to other patches or water bodies (City of Portland Bureau of Planning 2007). Further, a data base was developed to facilitate ongoing monitoring. The data base made it possible to periodically update data from other sources, such as private lands.

In the 2010 River Plan, private landowners with parcels within the Willamette River Greenway were required to either meet development standards or undergo a discretionary land use review. During the course of a review, applicants were required to provide updated site assessment data pertaining to natural features. This information could be used not only for decisions pertaining to the specific development request, but also to supplement and update the Willamette River Greenway inventory database (City of Portland Bureau of Planning and Sustainability 2010a).

Managers interviewed emphasized public access as a critical component of greenway administration. They sought to balance increasing visitor numbers and enjoyment with safety and protection of greenway resources. One of the objectives of the Willamette Greenway Plan was to increase public access along the Willamette River (City of Portland Bureau of Planning 1987).

To strengthen river access and activities, new development was required to incorporate public access opportunities into project design. This included greenway trails,

formal viewpoints, and access connections (Figures 7, 8) (Portland Parks & Recreation 2006). Portland supported a diverse program of walking and biking along greenways (Figure 9). For example, the "Smart Trips" program, the "Ten Toe Express" and the "Senior Strolls" programs were all created to motivate residents to visit and facilitate public access to greenways (River Renaissance 2008).

It was notable that the extent of accessibility to greenways was related to the growth of non-motorized travel. Motor vehicle miles traveled per person in Portland from 1996 sharply decreased when compared to the United States average. In 2007 the average vehicle miles traveled in the United States was 23 miles per person while in Portland vehicle miles less than 20 miles (Blue Ribbon committee 2008). Along with improved provision of public transportation, this change has been attributed in part to increasing trails in greenways (Moore et al. 1992, Blue Ribbon Committee 2008). In Sacramento, vehicle miles traveled per capita were reduced from 9,544 miles in 2005 to 6,177 miles in 2006. In 2005, Portland was 14th and Sacramento, 45th in rank of non-motorized vehicle miles traveled among the largest U.S metropolitan areas (Puentes and Tomer 2008).

To increase the extent of public access, the Willamette Greenway Plan included bridge construction as an important element in the Willamette River Greenway. In Sacramento, the 1985 American River Parkway Plan noted that a proposed vehicle bridge (Route 143) was eliminated by voters because the bridge degraded the aesthetic and cultural value of the American River Parkway with noise, visual intrusion, pollution, damage to vegetation and indiscriminate access (County of Sacramento 2008). The 2008 American River Parkway Plan calls for expansion of non-automobile bridge crossings for bicycles, pedestrians and equestrians (County of Sacramento 2008).

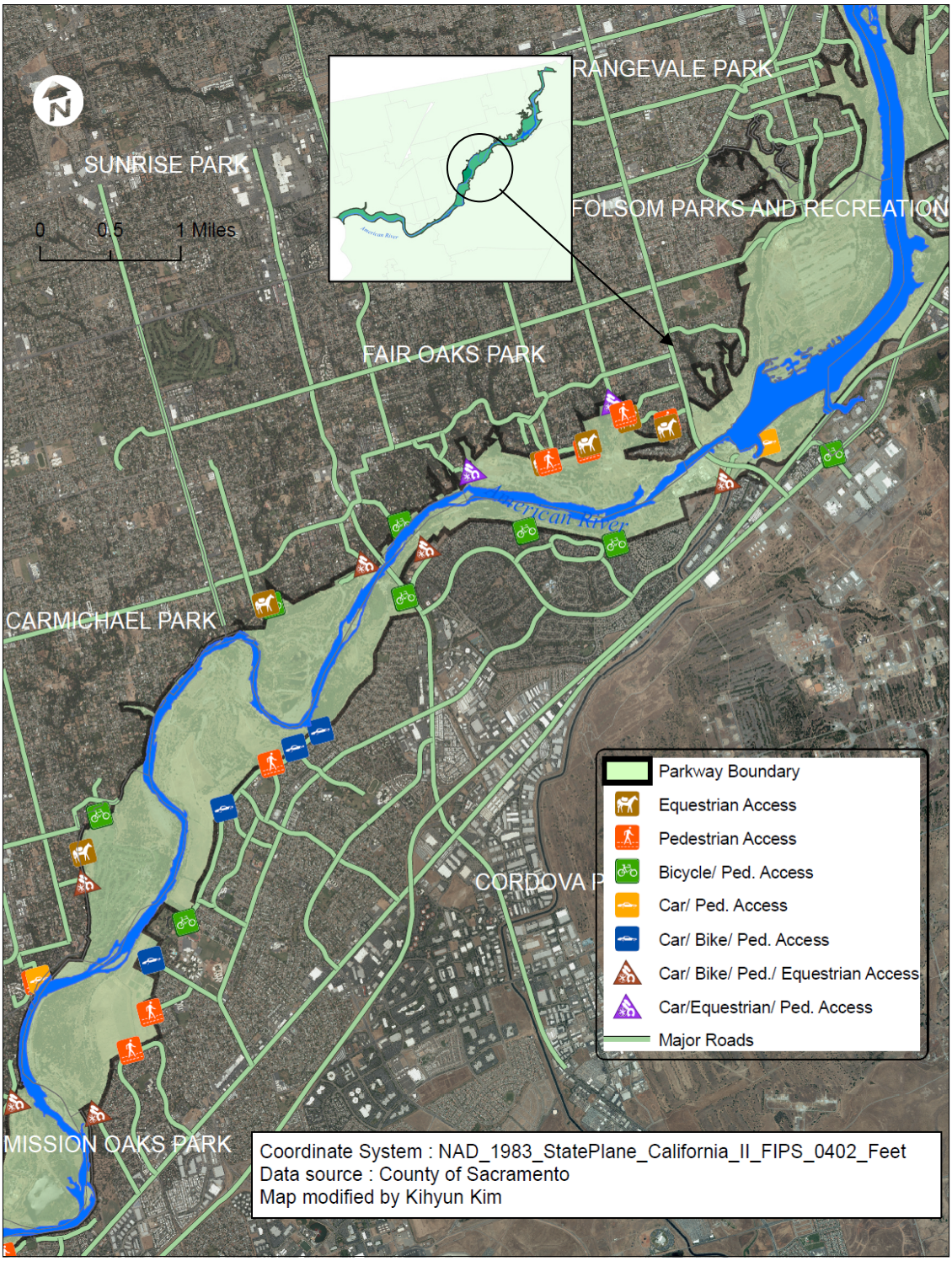

Figure 7. Access points and types in the American River Parkway.

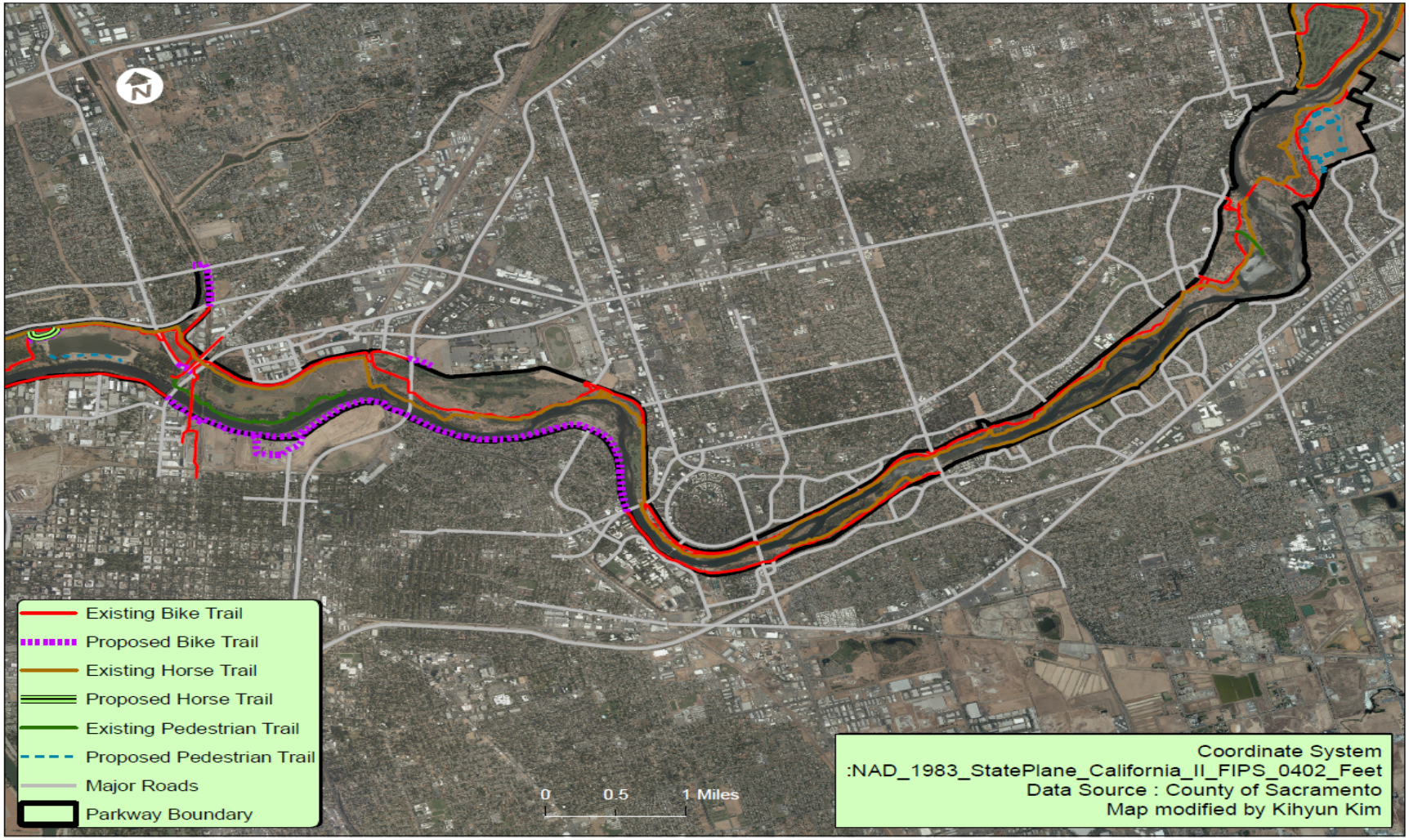

Figure 8. Trails for diverse activities in the American River Parkway.

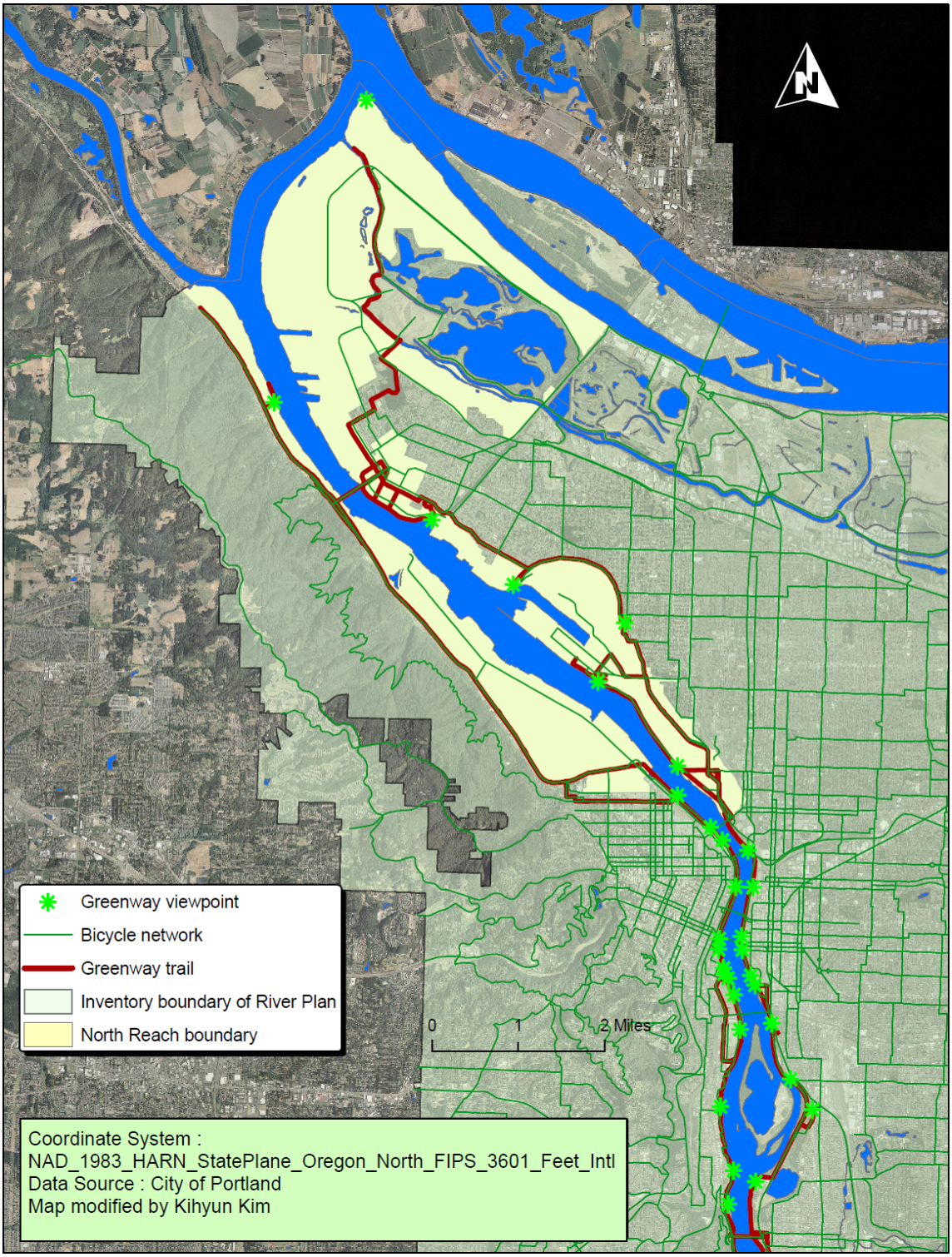

Figure 9. Viewpoints and trails in the Willamette River Greenway.

In both greenways, visitor access and activities were regulated by codes and ordinances (Sacramento County Ordinance Chapter 9.36, City of Portland Title 20 Park and Recreation code). Users were required to obtain a permit before conducting certain activities within the greenway, for example, special events or competitions, concerts, camping, and campfires. They could also reserve facilities. In order to obtain a permit, an event organizer had to file an application with the greenway manager demonstrating that the proposed activity was consistent with the standards for permit issuance (County of Sacramento 2008, City of Portland 2011).

In the American River Parkway, permitted activities fell into five categories (Table 2). The five access types were based on the needs of users and the American River Parkway's ability to absorb such use. In each category, permitted as well as incompatible activities were listed.

American River Parkway managers designated specific use areas that balanced environmental preservation and recreational needs, including avoiding conflicts between users such as bicyclists and equestrians (Figure 10). Each access point had a designation that corresponded to a user type (Table 3). Convenient access points for a majority of the American River Parkway users were available, and users were directed to the American River Parkway areas that could withstand intensive use (County of Sacramento 2008).

Table 2. Permitted activities and limitations in the American River Parkway.

Category	Activities	Limitation
Nature Appreciation	Nature study, walking, hiking, sightseeing	Permitted in the Nature Study, Protected Area, Limited Recreation and Developed Recreation areas
Trail Recreation	Recreational use of trails for walking, hiking, and bicycling	Nature Study areas limited to pedestrian and equestrian/hiking use
Recreational Enjoyment	Picnicking, day use and overnight camping	Limited facilities in size to minimize the impact and limited recreation and protected areas
Recreational Participation in Group	Team game field sports including soccer, football, rugby and similar games	Limited to fixed locations in accordance with predetermined rules
Aquatic Recreation	Swimming, fishing, boating, canoeing, kayaking, rafting, sailing, motor boating, and similar activities	In Protected Areas, all aquatic recreation activities are permitted except motorized boat launching.

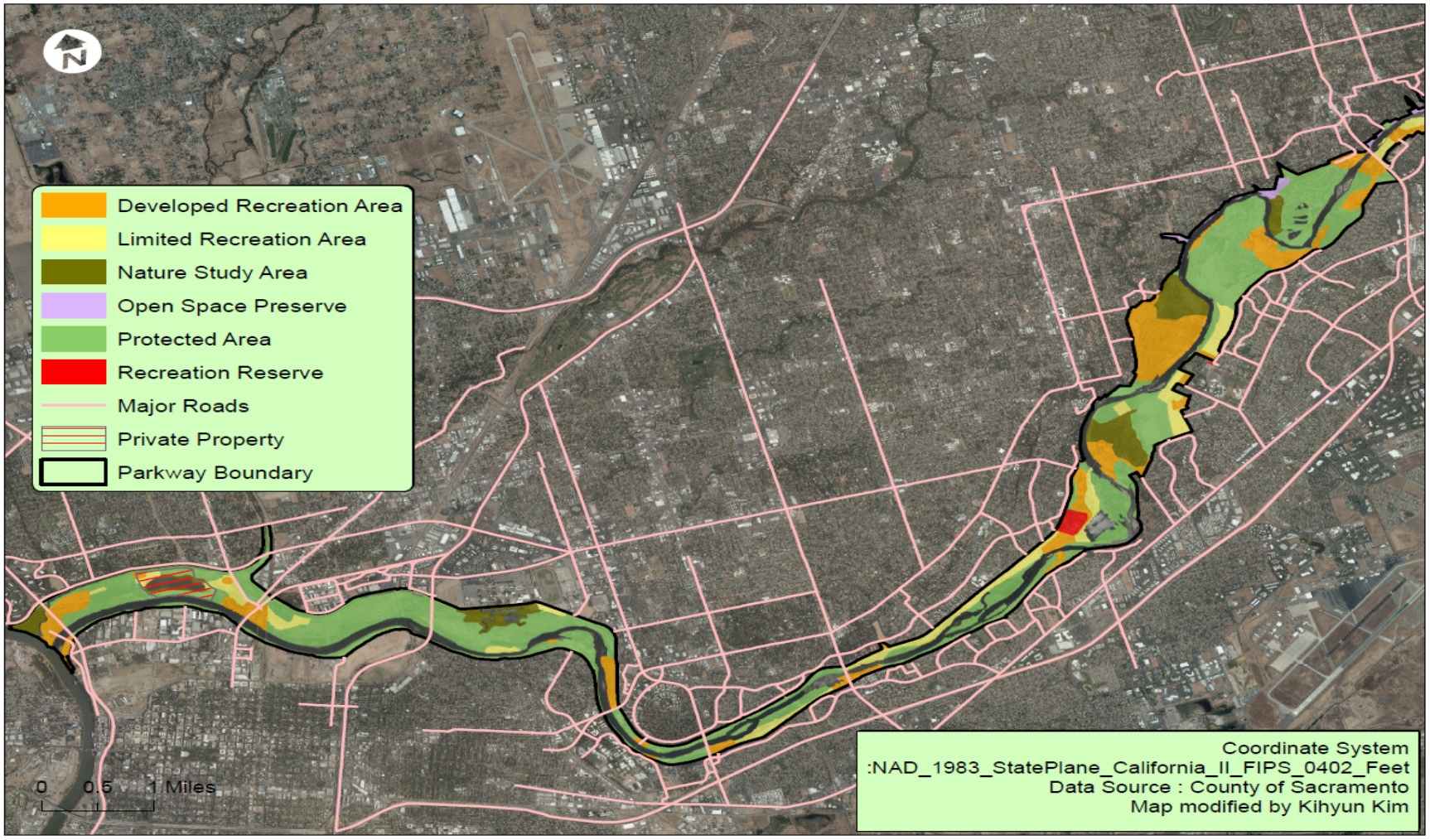

Figure 10. Designation of land uses in the American River Parkway.

Table 3. Access and associated user types permitted in the American River Parkway (County of Sacramento 2008).

Access type	Characteristics
Pedestrian	Access points in all land use categories except Open Space Preserve.
Pedestrian and bicycle	Access points in Protected, Limited Recreation, and Developed Recreation Areas. Parking not normally provided.
Equestrian and pedestrian	Located in Protected, Nature Study, Limited Recreation, and Developed Recreation Areas.
Vehicular and boating access	Vehicle access roads permitted in Developed Recreation, Limited Recreation and Protected areas. Parking inside or outside.
Fishing access	Permitted at many locations along the river accessible by vehicle or on foot.

In 2010, when these interviews were carried out, demands for new uses, and associated controversies related to permit activities were increasing in the American River Parkway. Addressing issues sometimes required changing current policy, e.g. rules for mountain bike users, or permitting new uses (Baker 2010, personal communication). For instance, in Sacramento, current regulations stipulated that all dogs should be on a leash within the American River Parkway to protect wildlife and deter dogs from accessing the water (Baker 2010, personal communication). A group of dog owners requested that an off-leash area be designated for dogs to play freely.

Park Rangers patrolled the park system year round and worked to make the parks safer and more enjoyable for all visitors. The Rangers were peace officers and had the same level of authority as a county sheriff or a city police officer with a mission of enforcing regulations regarding entry fees, keeping vehicles out of restricted areas, leash laws, and illegal camping. In Sacramento, patrolling results were issued as 'Monthly County Ranger Activity Reports' on law enforcement and violations.

Both greenways used park ranger patrols as a visitor safety measure. However, financial constraints led to 50 % cuts or seasonal reductions in park ranger staff from 2007-2010 (Baker 2010 personal communication, Horner 2010, personal communication). According to the American River Parkway Safety Coalition (2010), budgets resulted in the layoff of six Park Ranger personnel including five patrol rangers and one of the two Park Ranger Supervisors in the American River Parkway.

As result, in Sacramento, the American River Parkway went virtually unpatrolled (Adler 2010). In this situation, the American River Parkway Volunteer Equestrian Trail Patrol played an essential role in serving as additional "eyes and ears" for the American

River Parkway. This non-profit organization was formed to provide assistance to the public by conducting mounted equestrian patrols along the American River Parkway trails (Baker 2010, personal communication). The American River Parkway Safety Coalition was formed for this some purpose and to provide a communications link between user groups and law enforcement. An e-mail alert system was in place to pass along information about criminal behavior on a timely basis to user groups (County of Sacramento 2008).

As an additional public safety measure, access restrictions were implemented. In Sacramento, the American River Parkway was open from sunrise to sunset year-round. In Portland, greenways were closed between the hours of 12:01 a.m. and 5 a.m. After sunset, the park gates were closed for the night and parking was no longer available (Horner 2010, personal communication).

American River Parkway managers in Sacramento emphasized preventive measures and strong communication for safety. For example, if a bike trail were flooded, the American River Parkway manager worked with County and local City transportation staff to post flooded locations on the County Regional Parks website, and signage on the trail. Management would also notify local cycling groups of the flooding and available detours (County of Sacramento 2008).

Safety precautions were also taken to prevent users from becoming injured in the American River. A Sacramento County ordinance made it unlawful for any parent or guardian to allow children under 13 to enter public waters without wearing a personal floatation device (Sacramento County Ordinance 13.08.301(a)). In addition to preventive

regulation against accidents, the County of Sacramento "kids don't float" life preserver loaner program provided for temporary use at several locations along the American River.

Finally, illegal campsites were occasionally found in greenway riparian forest and woodlands and posed a potential threat to user safety. Above all, the presence of these illegal campers undermined other greenway visitors' sense of security and safety (Argentina 2010, personal communication, County of Sacramento 2008). To address this issue, the American River Parkway Foundation in Sacramento involved the homeless as volunteers to monitor the American River Parkway. This was found to be a way to enhance public safety, give citizens a sense of ownership, and build stewardship among people.

Relationships with the public

Greenway managers were clear that to get support for greenways, people have to realize that greenways exist, how greenways benefit them, and what opportunities are available to them to explore and enjoy greenways. They noted that this can be accomplished through developing effective relationships with the public s (Winternitz 2010, personal communication).

Both greenways use interpretive programs and diverse events to enhance relationships with the public. In the American River Parkway, managers worked to strengthen public outreach through a variety of methods with help from non-profit organizations. The centerpiece of the American River Parkway interpretive efforts was the Effie Yeaw Natural Center that offered educational events, programs, and publications directed towards deepening visitor appreciation for natural resources found

at the American River Parkway (Baker 2010, personal communication). Regarding the number of educational centers, local proponents noted that this was the only nature center in the 30-mile linear American River Parkway and that several more centers were needed close to communities (Lukenbill 2008).

The American River Parkway Preservation Society supported a daily blog providing public education and advocacy focused on the American River Parkway. The blog posted 3,716 individual messages concerning articles, reports, news items, and event information from 2005-2010 (American River Parkway Blog 2011). The American River Natural History Association's Facebook page informed people about upcoming important events and activities along the American River Parkway. Since 2004, the Association had issued a quarterly newsletter ('The Acorn') which featured articles by local naturalists and the American River Parkway advocates (County of Sacramento 2008).

The American River Parkway targeted a wide range of people and used various outreach methods according to each age group. For example, many senior citizens are not familiar with email, social media, or electronic newsletters, so the agency provided printed materials for senior citizens. For the younger generation, Facebook and email were used as primary methods of communication (Poggetto 2010, personal communication).

In Portland, a variety of education programs were implemented as part of the Willamette Greenway Plan update to inform people about the importance of the Willamette River including natural resource values, ecosystem management, and stewardship opportunities. Outreach detailed in the River Plan and River Renaissance

strategy included events, meetings and distributing announcements and updates through various electronic formats such as 'River Plan News'.

One manager indicated that relationships with the public can be strengthened by offering direct membership in events or programs. In his experience, flexible membership programs, with membership levels based on donation amount were not only effective ways to increase funds, but also to increase support for greenway management and additional stewardship donations (Poggetto 2010, personal communication).

Special events, such as the Salmon Festival in the American River Parkway, were organized to increase general public participation. Similarly in Portland, 'Riverfest' was held in 2008. It was the biggest celebration of the Willamette River in the city's history. The ceremony included 30 events such as waterfront concerts, the Oregon Trout Portland Triathlon, the Portland Paddle, a Willamette Chautauqua speaker series, and a riverbank clean-up. According to State of the River Report which profiled yearly accomplishments and identified future actions needed to assure a clean and healthy river, the event also engendered new public and private partnerships to advance the work needed to safeguard the river's health and the economic services (River Renaissance 2008).

Demonstrations can be a valuable education method. The American River Parkway Foundation, in partnership with Sacramento Suburban Water District and Carmichael Water District, created a native plant demonstration garden in 2007(Foley 2010, personal communication). The garden consisted of plants native to the American River Parkway region and illustrated to users the many benefits provided by native plants. Community campaigns also strengthened relationships with the public in Portland. For example, the 'Smart Trips' program was a comprehensive approach to reduce drive-alone

trips and increase biking and walking by using greenways. The ‘Ten Toe Express‘ and ‘Senior Strolls’ programs included a series of guided walks and a walking kit. These programs offered an intimate way to get to know the river by leading participants along the Willamette River Greenway (River Renaissance 2008).

In the American River Parkway, volunteer activities were primarily led by non-profit organizations (Foley 2010, personal communication). The primary organizations were the American River Natural History Association, the American River Parkway Foundation, and Save the American River Association (County of Sacramento 2008). These organizations contributed to greenway success through fundraising, education, and general support for preservation, protection and enhancement of the American River Parkway.

The American River Parkway Foundation played a leading role in volunteer organization and provided diverse programs and activities including Adopt-the-Parkway, trash cleanups, invasive plant management, Adopt-a-Grove, student internships, and other special events. Volunteer stewards of Adopt-the-Parkway, for example, each “adopted” a mile long section of the American River Parkway and committed to approximately 20 hours per quarter of clean-up and maintenance projects on their mile. Under the guidance of management, Volunteer Stewards provided about 3000 hours of service annually. Volunteers participating in these activities were covered by insurance provided by the Foundation (Poggetto 2010, personal communication). Supporters who did not wish to become involved in hands-on activities could become financial sponsors of the program. To do this, a sponsor had to make a two-year commitment to contribute $1,250 annually. These sponsors were recognized as stewards on an American River

Parkway sign locate along the paved trail of "their" mile (Poggetto 2010, personal communication). Another volunteer-based program, the Invasive Plant Patrol, allowed volunteers to adopt a section of the American River Parkway (consisting of 46 sections) and remove invasive plants.

An annual Cleanup Day program engaged volunteers to collect garbage along 23 miles along the American River Parkway. There were 18 sites available for clean up. Volunteers could select a preferred location on the Foundation website. Volunteer affiliations were diverse and the Foundation logged them by recreational interest. Groups of cyclists, scuba divers, equestrians, anglers, runners, and paddlers all gave time to greenway restoration (Poggetto 2010, personal communication). Local businesses, schools and service organizations also came out to volunteer for this event. In this and other events, in 2010, 2,028 volunteers participated in the cleanup of 23 miles of riverbanks, and collected 11,381 lbs of trash and 7,004 lbs of recyclables on the American River Parkway (American River Parkway Foundation 2010).

As noted in the previous section, the American River Parkway Volunteer Equestrian Trail Patrol founded in 1995, provided additional security services to the American River Parkway by conducting equestrian patrols along the American River Parkway trails. With the number of volunteers increasing, it was important to keep track of volunteers and performance. The participants in Adopt-a-Grove and Adopt-the-Parkway programs were required to submit a work form summary (Poggetto 2010, personal communication). This record of hours helped managers track community members' efforts and was useful when applying for funding as an 'in-kind' match. Summaries were also used to notify managers of any work projects that volunteers felt

needed to be conducted within their section. If there was a project that was larger in scope than a small group could manage, the American River Parkway Foundation would work to recruit volunteers to assist with the project (Poggetto 2010, personal communication).

The American River Parkway Foundation recognized outstanding volunteers for their performance on its website. Also, the Foundation staff routinely showed appreciation to volunteers through email or other methods (Poggetto 2010, personal communication).

Portland Parks & Recreation offered a variety of fun and rewarding volunteer opportunities at sites, for example, planting native vegetation and removing invasive species such as English ivy (Portland Parks & Recreation 2010). Total volunteer hours contributed was 463,000 hours. Also, hours of volunteer time as a percentage of paid staff hours increased from 26% in 2003 to 30% in 2008. Total hours contributed by Parks volunteers grew at twice the rate of population growth since 2003 (Portland Parks & Recreation 2009).

Funding

As previously noted both greenways have suffered from a significant funding crisis and faced uncertainties about continuous greenway operations and maintenance. As a consequence, facilities were becoming outdated or falling into disrepair (The Dangermond Group 2006). According to an interviewee, the Effie Yeaw Nature Center in Sacramento, a national model for outdoor education and habitat preservation in an urban area, was threatened with closure in 2010. The staff of the center was reduced from 25 to

6 employees. In 2010 the Center received about $200,000 a year from outside funds: $75,000 from the American River Natural History Association, $35,000 from County of Sacramento, and the rest from donations, classes and special programs (Baker 2010, personal communication, The Sacramento Bee 2010).

One interviewee noted that a permanent funding source should be considered as greenways are created. She noted that during times of uncertainty, governments prioritize necessities, like law enforcement or public health. When discretionary funds are distributed greenways are close to the bottom of the funding list (Argentina 2010, personal communication).

In Sacramento, the American River Parkway operations and maintenance depended on the County General Fund. In light of the current budget situation, program implementation and staff had been adversely affected. It was possible that the American River Parkway would have to close.

Figures 11 and 12 illustrate the allocation of general funds from 2005 to 2010 (County of Sacramento 2008). Figure 11 reveals how general fund dollars were allocated to regional parks in relation to revenue. Figure 12 shows the percentage of the County's discretionary funds allocated to the parks department over time.

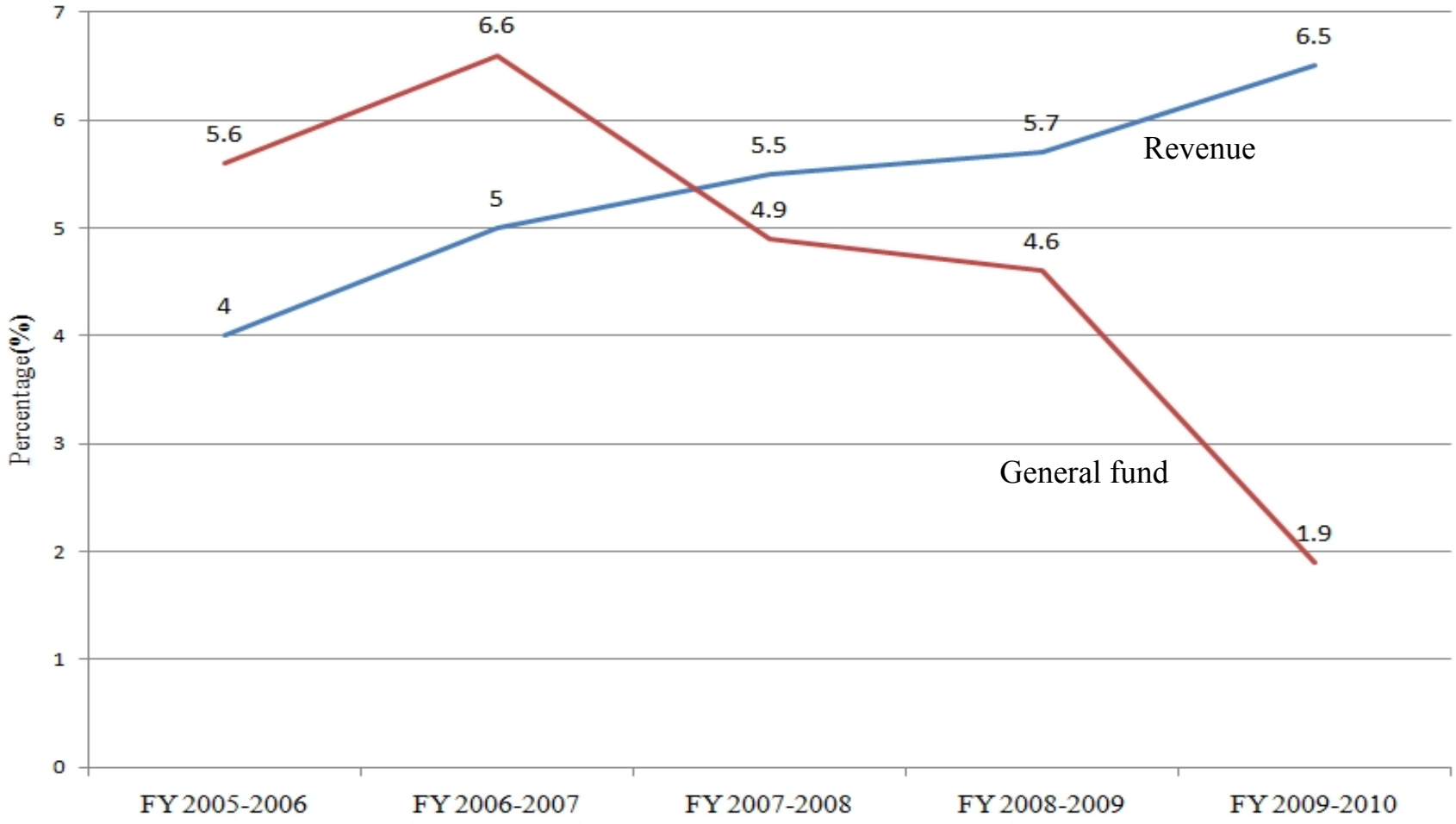

Figure 11. Historic Budget Overview of the American River Parkway (data from Sacramento County 2010).

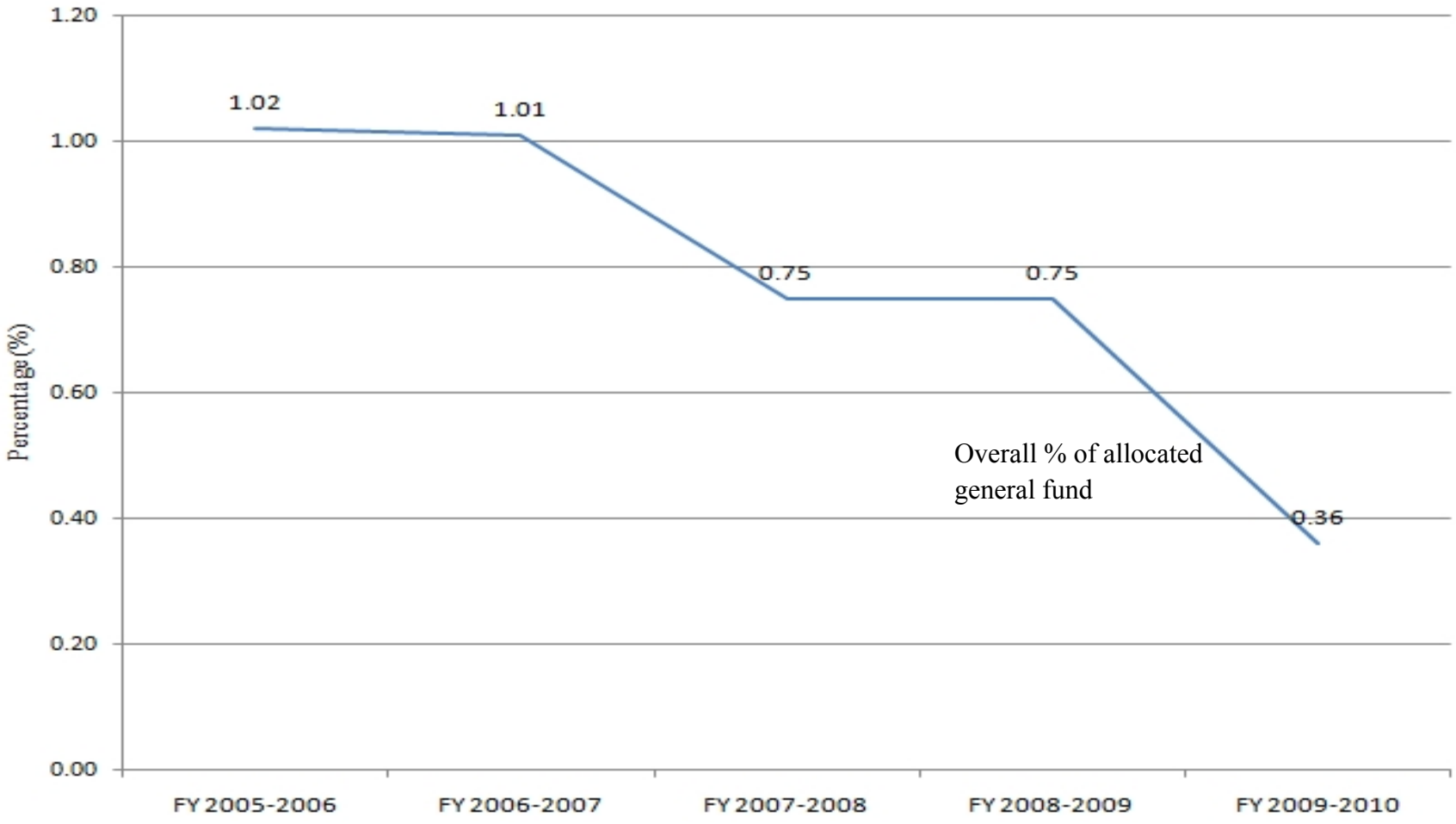

Figure 12. The Parks Department Share of Sacramento County's Discretionary General Fund (data from Sacramento County 2010).

Table 4 shows the budget summary from the American River Parkway financial needs study update that the gap between revenue, or income, and expenses was increasing and those revenues were not covering expenses. The Dangermond Group (2006) pointed out that current funding sources provided about 80% of the $7,401,361 Fiscal Year 2005-2006 operating budget that was needed to operate the American River Parkway (Table 5). It also identified that an annual average augmentation of $8,595,427 was needed to bring the American River Parkway budget up to an optimal level for general operations. Specifically, there was not enough money for equipment/facility repair, deferred maintenance, capital improvements and land acquisition (Table 6).

To cope with this serious financial situation, a financial study was carried out. The report's recommendations were that the American River Parkway seek to raise entrance fees, seek expanded support from the County General Fund, seek property owner support for the formation of a special assessment district and seek approval of a one-eighth cent sales tax increase (The Dangermond Group 2006).

However, the methods suggested above were impractical. For example, when it came to raising taxes, people near the American River Parkway argued that they did not use the parks, and they would be required to pay an additional tax on something that they did not benefit from (County of Sacramento 2010). Furthermore, people living in the North Sacramento area, adjacent to the American River Parkway had already been burdened by neighborhood crime and parkway degradation caused by illegal camping. They saw no value in having their taxes raised to support perceived failed policies (American River Parkway Preservation Society 2010).

Table 4. The American River Parkway division budget summary (The Dangermond Group 2006).

Fiscal Year	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Revenue ($) (A)	1,224,721	1,223,180	1,996,546	2,123,273	1,497,175	1,436,547
Expense ($) (B)	4,845,383	5,147,965	5,308,271	5,018,156	5,628,503	6,393,636
Net ($) (A)-(B)	-3,620,662	-3,924,785	-3,311,725	-2,894,883	-4,131,328	-4,957,089

Table 5. American River Parkway fiscal year 2005-2006, operating budget*.

Five Program Areas	Existing Budget($)	Augmentation Need ($)	Recommended Budget Total($)
Operations	2,604,245	280,996	2,885,241
Maintenance	1,450,006	1,097,714	2,547,720
Effie Yeaw Nature Center	632,336	96,531	728,867
Regional Programs/Leisure	48,837	39,546	88,383
Administrative Overhead	1,151,150	0	1,151,150
TOTAL	5,886,574	1,514,787	7,401,361

*The operating budget augmentation need was estimated using benchmark figures from similar facilities (The Dangermond Group 2006).

Table 6. American River Parkway ten-year general fund augmentation summary by budget category (Fiscal year 2005-2006).

Budget Category	Augmentation Need ($)
General Fund Operating Budget Shortfall	15,147,870
Equipment and Facility Repair/Replace	7,000,000
Deferred Maintenance	13,063,950
Capital Improvements	39,778,500
Land Acquisition	10,963,950
10-Year Augmentation Needs	85,954,270
Average Annual Augmentation Needs	8,595,427

As county funding declined, increased fundraising responsibilities were taken on by the American River Parkway Foundation. In addition, to address its budgetary constraints, Sacramento County sought state funding assistance through the Urban American River Parkway Preservation Act. Through the County's request, the American River Parkway gained the necessary recognition so that local planning efforts were eligible to receive grants (County of Sacramento 2008). However, these grant funds only contributed 1 percent of overall the American River Parkway funds (Figure 13).

In contrast to the financial crisis in the government sector, the American River Parkway Foundation was highly successful in fundraising. The Foundation provided grants for several programs such as education, and safety in the American River Parkway (Poggetto 2010, personal communication). In November 2010, the Foundation launched a funding campaign called 'CONNECT'. The goal of this campaign was to raise $2.5 million over the next five years (Poggetto 2010, personal communication). The Foundation also established the 'Circle of Giving', a funding program that allowed donors to become part of a specific group that decided how donations and funds would be allocated. The program was intended to allow participants to feel a direct connection to the process and give them a sense of ownership.

Meanwhile in Portland, the percentage of the city's budget that went to the Parks & Recreation Department accounted for 5.2%, or $94.5 million of $1.81billion in Fiscal Year 2010-2011 (City of Portland 2010). The Willamette River Greenway in Portland experienced a ten percent reduction in general funding support from 2008-2010.

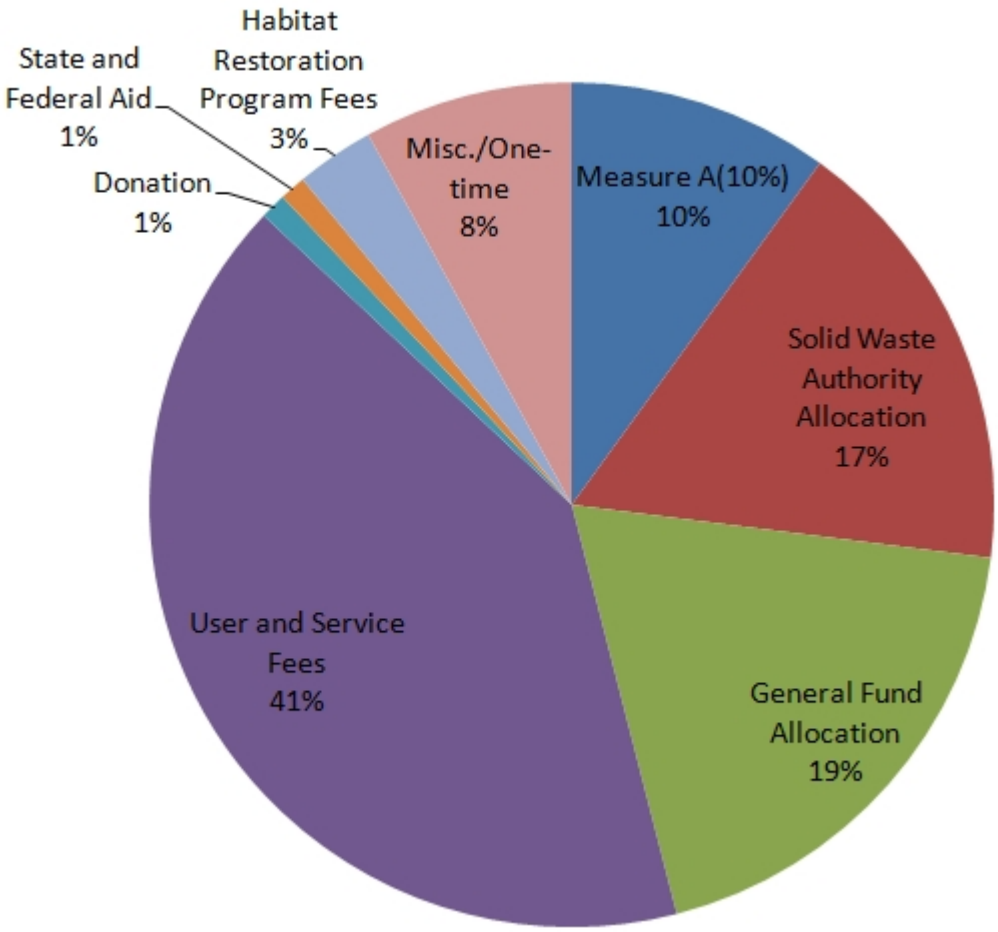

Figure 13. Revenues and general fund allocation FY 2009-2010 (County of Sacramento 2010).

* A strategy to generate additional, long-term and stable funding for the operation and maintenance of the American River Parkway Jedediah Smith Memorial Trail. The Department of Regional Parks was selected to receive $1 million each year for the next 30 years from the Sacramento Transportation Authority in 2009 through Measure A funds.

** The Sacramento Regional Solid Waste Authority (SWA) was formed in December 1992 to assume the responsibilities of solid waste, recycling and disposal needs in the Sacramento area.

Diverse additional funding sources were then sought. The Willamette River Greenway administrators requested funds from Portland's elected regional government, the 'Metro' and from the park district. None of these revenue sources were able to meet basic greenway maintenance needs (Wilson 2010, personal communication).

Managers indicated that above all, it was crucial to acquire ongoing funding for maintenance, not one time capital contributions (Argentina 2010, personal communication). Recently, in an attempt to understand funding options, the updated River Plan explored the funding opportunities and limitations for future projects. In this plan, funding feasibility for proposed programs, for example, watershed health was ranked as 'High', 'Medium', and 'Low' according to whether the necessary budget had been secured (City of Portland Bureau of Planning and Sustainability 2010a). For example, an important factor in the watershed health action of the Willamette Greenway was whether proposed sites for greenway expansion were previous industrial sites that might need expensive remediation before they could be made accessible to the public (City of Portland Bureau of Planning and Sustainability 2010a). Key points of comparison for management of the American River Parkway and the Willamette Greenway are summarized in Table 7.

Table 7. A comparison of key management factors for the American River Parkway, Sacramento, California and the Willamette River Greenway, Portland, Oregon.

American River Parkway	Willamette River Greenway
Institutional structure	
• Primarily managed by Sacramento County's Regional Parks Department • Almost all land public, purchased through a bond initiative in 1972. • Several non-governmental partner organizations participated in management providing volunteer assistance, patrolling, education, and fund raising (e.g. ARPF and ARNAH) • Managed based on the comprehensive American River Parkway Plan (2008) with detailed guidance on public access, safety and preservation strategies	• Primarily managed by the Portland Parks and Recreation Department. • Nearly half of the Willamette River Greenway (44%) under private ownership. Trails on private land managed by landowners • Relationships with non-profit partner organizations were weak. • The 1988 Willamette River Greenway Plan did not include detailed guidance for management. • A planning update was underway (River Plan) including a vision for the river but no detailed plans for management and maintenance.
Management: Maintenance	
• Experienced maintenance constraints due to budget limitations with reduced staff • Relatively detailed maintenance plan available • Emphasis on vegetation maintenance including invasive species removal • Nearly all maintenance activities were undertaken by the voluntary organizations and partnership (e.g. ARPF, Oak Mitigation Project)	• Suffered maintenance constraints due to budget limitations • No detailed maintenance plan available • Vegetation maintenance included invasive species removal, approved species lists • Tree cover maintenance requirement of 15% in the 2011 River Plan • NGO's did not play a leading role in maintenance

Table 7. A comparison of key management factors for the American River Parkway, Sacramento, California and the Willamette River Greenway, Portland, Oregon (continued).

American River Parkway	Willamette River Greenway
Management: Monitoring	
• No comprehensive routine or long term monitoring plan • The American River Parkway Foundation collected feedback from users and volunteers on website but not via direct surveys.	• Monitoring was not scheduled on a regular basis. • Users not monitored on regular basis. • Natural resources inventory was updated including development of a GIS database in 2011. • Inventory of natural resources on private lands updated when new development proposals occur.
Management: Public Access and Activities	
• Focused on increasing public access while maintaining a balance between recreational needs and natural resource conservation. • Restricted vehicle access; access points designated according to user type • Decreasing vehicle miles traveled • Recent plans to expand non-automibile bridges in the American River Parkway • Specifies area permitted for certain activities according to recreational use categories • Ordinance regulated access and activities in the American River Parkway as well as temporary closures for periodic restoration	• Focused on increasing public access in the Plan (e.g. Smart Trips, Ten Toe Express) • Connectivity with regional trail system increased public access and trail use with the result of decreasing vehicle miles traveled. • Bridges considered to be crucial infrastructure for public access in the Plan. • Certain recreation activities allowable by code.

Table 7. A comparison of key management factors for the American River Parkway, Sacramento, California and the Willamette River Greenway, Portland, Oregon (continued).

American River Parkway	Willamette River Greenway
Management: Public Safety	
• Ranger patrols with seasonal and part-time assistance due to budget cuts. • Volunteer organizations assisted rangers and established a coalition for safety with other NGOs • Ranger activity report issued monthly • Ordinance for Public safety (e.g. access restriction) • Preventative safety measures (e.g. life preserver loan program) • Illegal campers are encouraged to act as monitors	• Due to financial constraints, rangers patrol on a seasonal basis; seasons correspond to visitor activity rates • Code for public safety (e.g. hours of operation)
Relationships with the public	
• Education center with diverse programs and Demonstration gardens highlighting native plant importance • Non-profit organizations play a leading role in building relationships with the public (e.g. Newsletter "the Acorn") • Participatory events (e.g. Salmon Festival) and programs • Diverse volunteer activities including equestrian patrolling, Adopt-the-Parkway • Insurance coverage for volunteer • Allocating sections with sign of identity to volunteers with responsibility	• Provides a variety of events, and public programs (e.g. SmartTrips, River Fest, issuing River Plan News, outreach meetings) • Few volunteer organization for catalyzing activities • Emphasis on participatory events and programs (e.g. Ten Toe Express, Senior Strolls) • Increasing volunteer hours at twice the rate of population growth.

Table 7. A comparison of key management factors for the American River Parkway, Sacramento, California and the Willamette River Greenway, Portland, Oregon (continued).

American River Parkway	Willamette River Greenway
Funding	
• Decreasing general fund and gap between revenue and expense providing about 80% of operating budget. • Regular budget study was implemented to cope with financial issues (e.g. Financila Needs Study Update). • New methods (e.g. sales taxes, entrance fee) to secure funding were not effective to implement due to opposition. • Non-governmental organizations' successful to securing fund (e.g. CONNECT, Circle of Giving).	• 10% reduction in general funding recently • Several methods of funding were sought with little success in securing them. • Detailed analysis of possible funding sources for River Plan actions was implemented. • Ranking priorities considering level of funds secured for projects.

DISCUSSION

The analytical framework developed as a basis for comparing the two study cases provided a good basis for analyzing greenway management. Beyond specific responses to interview questions, greenway staff interviewed agreed that the key elements framework included need to be addressed in ongoing management. The focus on institutional structure, as defined by governance type, land tenure, partnerships and planning revealed key differences between the two cases. In terms of management operations, on the other hand, both cases have very similar management policies and both lack the type of maintenance planning that is recommended in the literature. However, it was clear that despite the lack of written maintenance guidelines, active monitoring, maintenance, public safety, public access and activities played significant roles in successful management for visitor access. It was also evident from the interviews that the greenways' day to day management was primarily for their recreational and educational value to visitors with little discussion or focus on maintaining the overall ecological values or environmental importance of greenways that was touted in the latest planning documents – the River Plan (City of Portland Bureau of Planning and Sustainability 2010a and the American River Parkway Plan (County of Sacramento 2008). Issues of greenway management of relationships with the public proved to be critically important to sustaining the greenway in one case and a relatively minor factor in the other. Funding in these times of severe budget cuts in both cases was a critical factor.

One of the most perplexing issues identified in the literature on creating greenways was establishing an institutional structure strong and flexible enough to

support greenway management for many generations (Flink and Searns 1993). The Willamette River Greenway is managed by a local government parks and recreation department. Plan development activities are undertaken by the Bureau of Planning and Sustainability. This institutional arrangement fits the common "Parks Agency Model" or possibly the "Joint Agency Model" of greenway administration (Flink and Searns 1993, Waterfront Trail 2007). The primary advantage of this model is that it ensures administration by a single established local government with appropriate expertise. This type of management avoids the lack of coordination across organizations that has been identified as one of the biggest impediments to effective management (Erickson 2006). At the same time, the weakness of this agency management model is that it is vulnerable to local government funding constraints (Flink and Searns 1993). This case was clearly born out in the American River Parkway.

The American River Parkway's current institutional structure evolved from a simple "Parks Agency model" (Flink and Stearns 1993) with Sacramento County's Department of Parks and Recreation as the local government agency in charge, into mixed management, in which the local government park agency collaborated with and relied heavily upon non-profit organizations. While local government retained oversight, increasingly significant management, education, maintenance and fundraising activities were conducted by non-profit partner organizations.

This administrative approach proved adaptive in the Sacramento budgetary climate. The American River Parkway Preservation Society (2010) indicated that it would like to further institutionalize this model and has proposed a non-profit conservancy solely chartered and dedicated for the American River Parkway

management and maintenance. The Society argued that a conservancy would be more likely to rise above the influence of narrow interests or declining government budgets.

Lukenbill (2005) argued that the American River Parkway needed management by a non-profit organization to ensure consistent funding to support management and provide visitor services in the long term. Creating a non-profit organization could indeed be a logical next step. On the other hand, Flink and Searns (1993) pointed out that this type of management requires competent, qualified people to carry out both administrative and day-to-day maintenance tasks. It could be that the current approach with county oversight and at least a base level of public funding combined with a more formal recognition of the non-governmental organizations' role would be most beneficial in the long run.

The city of Portland's management and maintenance model crosses public-private property lines. While the city manages the Willamette River Greenway, private property owners contribute public access to nearly half of the open space. Portland encourages the private sector to be directly involved in the building and maintenance of trails. This institutional approach reduces the cost of greenway maintenance to Portland. Flink and Searns (1993) supported this type of management. They noted that the opportunity to own land on a greenway might attract new owners to both residential and commercial developments. Many developers have learned that setting aside stream corridors, riverbank, or trails is not only environmentally sound, but also attracts business. Considering that intense competition for "green" amenities in congested countries are increasing (Wilson 2002), and that a growing percentage of such land is owned by private

entities, Portland's public-private approach to greenway establishment and management can be a lesson to other jurisdictions considering greenway development.

Both greenways have recently undergone plan revisions to address changing social, economic and environmental conditions. Plan updates play an important role in the evolution of management policies and provide an opportunity to re-examine the performance and responsibilities of various partners (Howard 2007). In both cases a steering committee of local staff and partners was formed. They reviewed a variety of issues and recommendations from the public. In Portland, in addition, GIS-based inventory data on natural resources were included in the review process.

Environmental and economic concerns drove the River Plan process in Portland. Key issues were: threats in the Willamette river system to fish such as Chinook salmon and steelhead trout listed as threatened under the Endangered Species Act; the designation of the Portland Harbor Superfund site, within a 6.2 mile stretch of the North Reach in 2000; and development pressure in Portland (City of Portland Bureau of Planning and Sustainability 2010a). In particular, the updated plan emphasized maintaining a continuous tree canopy to enhance livability in the city as well to maintain integrated watershed health which is important for water quality and quantity and had not been highlighted in the previous plan.

The American River Parkway Plan (Sacramento County 1985) was updated in 2008 in response to changes that occurred in the American River Parkway over the previous 20 years. In that time, the number of users increased dramatically. Further, new recreation activities emerged which were not previously permitted. With the increase in users, additional provisions for public safety were needed (Cirill 2006). A diverse range

of factors were addressed in the updated American River Parkway Plan. I will discuss here only a few. The controversial issue of the American River Parkway leash law that emerged in the process of updating the plan remained controversial in 2010. The Sacramento area dog owners group continued to be critical of the American River Parkway Plan as not having addressed all of its concerns, despite park managers' frustration at the large amount of time that had been devoted to the issue during the update (Cirill 2006). It is clear that sufficient consensus was not developed around this issue at the time to establish the authority of and trust in the final version of the American River Parkway Plan with this user group.

Both sites took almost 20 years to update their management plans. One would have hoped that they would be updated far more frequently considering the rapidly changing environment. In Sacramento, the American River Parkway's mandate called for an update every 5 years.

Functioning greenways provide opportunities for interactions between people and the natural environment (Labaree 1997). Consequently, no matter how well conceived or built, greenway facilities experience wear, show age, and receive abuse (Flink and Searns 1993, Johnson 1998). For this reason, good maintenance begins with sound planning of maintenance. Searns (2005) argued that workable operation and maintenance plans for greenways are a vital aspect of greenways management including day-to-day upkeep and the smooth functioning of greenways. However, despite repeated inquiries, I could find no operations and maintenance plan in either Portland or Sacramento for scheduled activities such as weed control, tree trimming, inspection, cleaning, and trash collection on regular basis.

Another reason to have a sound maintenance plan relates to the increasing number of greenway users. Although greenway managers interviewed sought to provide access to transformative recreational and educational experiences for visitors while maintaining greenways' ecological resilience, it should be noted that systematic and well supported maintenance programs are required as the number of visitors rises.

Annual visitors to the American River Parkway which were estimated to exceed 5 million in 2006 and were expected increase to 12.4 million by 2025 (Truitt 2006). Likewise, the number of visitors to the Willamette River Greenway appeared to be increasing as well. 73.1 % of Portland residents reported at least one trip to the Willamette River in 2006, indicating a 4 % increase since 2004 (River Renaissance 2008). Additional visitors can make facilities and environmental resources vulnerable to damage, therefore maintenance efforts with workable operation and maintenance plans are required in both sites.

One of main barriers to maintenance was budget cuts. These cuts to finances resulted in reducing staff and maintenance. In the case of the American River Parkway, the American River Parkway Foundation took part in events to carry out cleanup activities. It was notable that the Foundation maintained the American River Parkway with the help of volunteers, because it was not only more cost effective than hiring permanent staff, but also, volunteers were valuable advocates.

In addition to facilities, vegetation management is an important component of greenway maintenance (Hellmund and Smith 2006). Riparian forests are significant productive features of riparian greenways (Binford and Karty 2006, Flink and Searns 1993). Trees provide a number of ecosystem services including protecting air and water

quality, regulating the flow of stormwater, sequestering carbon, and supplying important habitats (Grey 1996). In recognition of the contribution of trees to sustaining ecological services, the Portland River Plan set tree canopy targets for watershed health on every property in the North Reach and required that an average canopy cover of 15% overall be maintained (City of Portland Bureau of Planning and Sustainability 2010a).

Once management plans are in place, monitoring to ensure that goals are being met is critical. Developing a comprehensive monitoring plan that clearly defines criteria and standards to monitor, evaluates and protects the greenways resources from overuse, and provides steps to be taken to restore areas that have been overused in both sites is required (Hellmund and Smith 2006, County of Sacramento 2008). The City of Portland carried out a natural resources inventory as part of a monitoring program while upgrading the greenway plan. It had been twenty years since the last inventory was taken. It should be noted that full-scale inventory monitoring may be quite expensive. To address this issue, the city of Portland required that development proposals on private land on the greenway contain a current natural resources inventory. This was a valuable contribution to keeping inventory data updated. Engaging people to monitor greenway resources can not only act to generate scientific information, but can also help foster a sense of ownership and commitment to the local environment, which in turn can spur community activism and action.

Monitoring also involves assessing community response to the implementation of the management option that has been chosen to achieve desired goals (Benedict and McMahon 2006). The results found in analyzing both cases suggested that efforts to periodically collect user responses to greenways would provide an early warning system

for management activities. As the greenways gain popularity in the community and region, user needs will change (e.g. the issue of the leash law for dogs in Sacramento). Conducting a user needs survey periodically can keep managers in touch with users, and point to needed changes, repairs or upgrades (Johnson 1998). Identifying and adapting to changes in user needs also should be strengthened. Greenway management has traditionally favored passive over active recreation to accommodate changing needs (American River Parkway Preservation Society 2010).

Both greenways have made an effort to open more areas to people in order to benefit residents and visitors by designing access points to the greenways. In particular, the Willamette Greenway Plan (City of Portland Bureau of Planning 1987) acknowledged the important role of bridges in crossings for pedestrians, bicycles and equestrians to provide good community access and a well connected trail system. As Flink and Searns (1993) pointed out, they can also provide trail users with safe passage over streams, slopes, and roadways while offering unique vantage points as well as non motorized travel.

On the other hand, providing diverse access types and creating community events to increase the rate of users can affect the greenway resources including trails, wildlife habitat, and visitor satisfaction. Therefore, when designating greenway access, it is essential to keep in mind the balance between environmental conservation and provision of recreational resources. Labaree (1997) suggested two approaches to minimize effects of recreation. One approach was avoiding sensitive areas and controlling trail and facility use. A natural resource inventory can identify sensitive areas which are not appropriate for heavy recreational use. Physical construction or signs can control use where it is

unavoidable. Some types of use are more damaging than others. Given similar numbers of users, walking is the most benign use while motorized all-terrain vehicles tend to be the most destructive (Labaree 1997). In this context, the American River Parkway managers' method of classifying users by activity and controlling activities and user numbers based on their environmental impact worked well. It is also an appropriate method in managing greenways in that it determines open spaces that are vulnerable to future exploitation.

Because of varied and new use demands over time, a balance will need to be struck between the overall management objectives and individual demands (Benedict and McMahon 2006). The way in which the issue of mountain biking was dealt with in Sacramento is notable. The American River Parkway Plan restricted mountain bicycles to designated paved bikeways. However, that restriction was changed in the updated parkway plan by permitting off-pavement bicycle use on existing or reconfigured maintenance and emergency roadways at the discretion of the American River Parkway manager. This demonstrated the importance of balancing new concerns and circumstances with established guidelines to allow greenways to adapt and evolve.

As this study revealed, public access in greenway management is a dilemma. In other words, managers should take into consideration how to increase users by providing convenient and safe facilities. At the same time, an increase in users can lead to public safety and quality of service issues, as well as wildlife habitat management concerns (Lime et al. 1996). A good security program begins with fair, thorough policies that govern the way a greenway can be entered and used and that defines the relationship that the greenway has to other adjacent land (Flink and Searns 1993). These policies involve

setting the hours of operation, defining greenway users, and which uses will be permitted or restricted.

Ordinances for greenway use can be an effective way to gain visitor awareness around safety issues. To focus attention toward safety rules, public education programs should be developed rather than merely posting signs. A good safety and security program includes publication of maps, pamphlets, and other literature that describe policies and regulations (Flink and Searns1993).

Experts on park management argue that in addition to passive visitor safety measures such as education through signs and brochures, preventative and active measures are required (Flink and Searns 1993, Lake Lifeguard Services 2010). Although accidents in most greenways are rare, an overriding fear of lawsuits and the rare mishap make liability a serious issue for greenway management (Flink and Searns 1993). The American River Parkway approach to providing a life preserver rental service addresses this problem very creatively.

For safety, it is understood that enforcement of regulations by parkway patrols is necessary. Also, parkway rangers' patrolling results issued by American River Parkway Safety Coalition monthly can be useful to track the trend of violations and support planning to prevent repetitive violations in the American River Parkway.

In both study sites, the number of rangers hired had decreased by half or staff worked a severely limited season. Park managers indicated that park rangers should be maintained at an appropriate level to meet greenway user demand. They saw dedicated park rangers as crucial, as their mission was to provide continuous patrol services in the

greenway, whereas general sheriff or police services only responded to calls on a case by case basis (Argentina 2010, personal communication).

Flink and Searns (1993) indicated that volunteer patrols represent an effective safety and security program that also involves the community. This was found to be true for the case of the American River Parkway. The American River Parkway's volunteer patrolling on horseback had both beneficial impacts on budgets and community-strengthening aspects.

Hellmund and Smith (2006) emphasized the importance of broad public support. The American River Parkway and the Willamette River Greenway have developed relationships with the public and communicate resource information through signage, exhibits and nature trails, guided walks and interpretive tours. The opportunities for interpretation are limitless, but a successful and productive program requires planning, coordination, funding and staffing (County of Sacramento 2008).

Effective methods to build relationships with the public are hard to measure; however, continuing communication with the public that ensures public awareness of greenways facilities and their benefits is paramount in gaining support for ongoing greenway maintenance, and volunteer programs (Howard 2007). The more people that visit and enjoy greenways in both sites, the more people will appreciate the services that 'their' greenway provides. In Sacramento, for example, the native plant garden not only provides an enjoyable aesthetic experience, it also fosters a sense of place, and pride in the regional landscape. This experience may promote future stewardship commitments and assumption of responsibility from the public (Benedict and McMahon 2006).

Jongman and Pungetti (2004) and Erickson (2006) argued that education stimulates public commitment and helps minimize reactionary opposition through ecological illiteracy. As educational tools, greenways can help people rethink relationships between themselves and nature (Hellmund and Smith 2006).

It has been noted that even without a formal education center or program, merely using greenways, can reveal to people the value in preserved ecological sites that surround them (Hellmund and Smith 2006). In this regard, as one interviewee put it, greenways themselves readily provided opportunities for informal, unstructured education. Even seemingly insignificant greenway activities helped people to understand their importance (Argentina 2010, personal communication).

The greenways analyzed here used several methods of engaging volunteers**.** Moore et al.(1992) emphasized the sense of ownership and responsibility that emerges in volunteers. It was notable that in the American River Parkway volunteer activities were publicized, organized and carried out by leading non-profit organization whereas the Willamette River Greenway had not developed strong relations with organizations that could muster the participation of volunteers. Also, many of the volunteers in the case of the American River Parkway were members of the organizations supporting the American River Parkway. This type of volunteer organizing can result in regular commitments to volunteer activities as well as long-term involvement. Successful volunteer programs engage volunteers with tasks that are meaningful and contribute to the effectiveness and successful of the program (Ilsley 1990, Martinez and McMullin 2004). Sacramento's Adopt-the -Parkway and Adopt-a-Grove stewardship programs provided care for greenways. The mile-long Adopt-the-Parkway sections were very

effective as participants' names were publicized and they were encouraged to feel pride and ownership for that mile (Poggetto 2010, personal communication). Other volunteers who did not want to do the physical work, took on the financial responsibility. Despite the recession, there were no vacant sponsorship sections in 2010.

Moore et al. (1992), Bussell and Forbes (2002) advocated fun as a measure of success for volunteer management and recruiting new members. On the American River Parkway, when allocating tasks, to enhance volunteer commitment, the volunteer coordinator talked to each applicant to find out what field they were interested in, and then allocated them their desired task. Manager's indicated that this tailored work would result in greater enjoyment for the volunteer, and a more successful volunteer program by bringing out the best in people and organizations.

Progress made through successful participation can yield more involvement of volunteers (Moore et al. 1992, Benedict and McMahon 2006).Volunteer coordinators in Sacramento often taught tree planting techniques, invasive species removal, and natural history. When volunteers planted trees, they could enjoy watching their trees grow and thrive over time. It has been noted that this instills a sense of success and knowledge in participants that they made a valuable contribution (Benedict and McMahon 2006).

Taking care of volunteers' safety is essential (Flink and Searns 1993). Volunteers need to be comfortable with their tasks and avoid unanticipated injuries that may take place at work sites. In Sacramento, volunteer injuries that occured onsite were covered under the American River Parkway Foundation's insurance. It is likely that this measure contributed to an enhanced confidence in the organization while giving volunteers a sense of safety and encouraging participants to volunteer again. Active participation and long-

term commitments from volunteers provided important services while building support for the greenway and its value to the community.

Budget constraints were significant in both cases. The lack of dedicated funding streams hurt the greenways, and placed them in the undesirable position of having to compete with more pressing public programs such as public safety and public health for annual funding (Lukenbill 2005). For example, with the reduction in staffing, one interviewee pointed out that people complained that there was less maintenance than there should have been.

Even though Sacramento sought a variety of funding methods, as an interviewee pointed out, they have either been seen as unfeasible as they do not meet long term needs, or have been met with opposition. I found in this study that non-profit organizations can play a leading role in securing funds. The American River Parkway Preservation Society demonstrated a non-coercive method of supplemental philanthropic fundraising, rather than relying on tax increases (American River Parkway Preservation Society 2010). It was also noteworthy that donations and funding within non-profit organizations were increasing despite the current economic climate. According to an interviewee, this success can be attributed to the fact that more donors were becoming aware of the Foundation's positive track record, and trusted that their contributions were being allocated more efficiently than governmental entities. The Foundation can raise funds and distribute grants more effectively than the County by avoiding certain governmental processes. Fundraising events are well organized and successful, for example, the Foundation holds fun, annual events such as 'The Parkway Half Marathon', 'REX Ride',

and ‘Clean-Up and Down River Day’. Current and new members consistently showed up for these events every year.

In addition to the non-profit model for securing funds, several other models are recommended for greenway management in other locations. First, the American River Parkway Preservation Society (2010) and Lukenbill (2008) suggested forming a Joint Powers Authority. The Joint Power Authority made up of local governments that coordinate planning and implementation efforts, provide balanced oversight for managing non-profits, and provide stable base funds. Second, a local conservancy could be created. There are existing local conservancies that could help in creating an American River Parkway Conservancy (Lukenbill 2005) – or a Willamette Greenway Conservancy.

Both cases have legacies of preserving open, public lands that form a foundation for contemporary greenway visions. Flink and Searns (1993) pointed out that these historic legacies can be capitalized upon to fund as well as protect and conserve linear corridors. For example, the American River Parkway could seek National Heritage Area status. Currently, the National Park Service provides technical assistance and some financial aid to a limited number of significant cultural areas that have been designated by Congress. Such a designation would raise the stature of the American River Parkway and the Willamette River Greenway and further strengthen and ensure federal funding streams long enough to develop endowment funding.

Rewarding donors that contribute to ongoing management and maintenance is crucial. For example, the ‘Circle of Giving’ program in Sacramento provided a way for passionate individuals to get involved in the decision-making process. The Circle of Giving was established by the Foundation to allow donors to become part of a specific

group that decided where and how funds would be allocated. Each group was limited to 100 people. People could select any of the categories for their funding preference. Managers believed that people felt rewarded in knowing that they were part of an influential group of stewards that were preserving a selected piece of greenway.

All managers of greenways argued that funding is an overwhelming challenge. Findings from this research indicated that diverse funding sources and events were preferable to single sources. It has been said that money tends to follows creative ideas and credibility (Erickson 2006, Waterfront Trail 2007). To this end, a prerequisite for greenway management should be building community commitment for reliable fundraising. Also, active fundraising participation by non-profit organizations can be successful as these organizations can take advantage of positive public image, and flexibility in fundraising techniques. As positive economic and environmental values of greenways become clear, support for future fundraising emerges (Erickson 2006). Also, government efforts to inform people of the visible and invisible benefits from greenways may help to reduce opposition to taxes and further motivate collaborative participation.

CONCLUSION

My study focused on applying a theoretical framework of key elements of institutional management of urban riparian greenways to two study sites of the Willamette River Greenway, in Portland, Oregon and the American River Parkway, in Sacramento, California. This study was undertaken because other research has focused on the planning and implementation framework of greenways, while little research has focused closely on the institutional settings for greenway management and maintenance post implementation.

Greenways are linear open spaces along natural or human-made features such as rivers. They are planned, designed, and managed to connect and protect ecological, scenic, recreational, and cultural resources. In fact, greenways may require more maintenance than a similar sized, nonlinear protected areas. The time it takes to design and implement a greenway may seem lengthy, but that time is in fact short when compared to the ongoing management and maintenance timeline once a greenway has been established. The same goals and vision used in the design and implementation process can also apply to management because both greenway planning and management are concerned with the same natural phenomena.

On the whole, the factors in the analytical framework that were drawn from the literature review proved useful as a basis for comparing case examples of greenways and highlighting lessons for other cases. My study was conducted by focusing on institutional analysis including both prominent, formal institutions, and a range of closely related routine behaviors and relationships among managers, volunteers, and recreational

users. Some differences between the two case studies were found while several findings regarding greenway management emerged from both, which may come from the fact that the administration of the greenways is fundamentally based on the park and recreation management process as well as its philosophy. Also, the comparative results feature unique institutions that were developed and implemented reflecting the circumstances within each area.

In particular, there was a strong contrast in institutional structure in these two cases. Almost all of the American River Parkway was owned by Sacramento County. Its management by the Sacramento County Parks Department was significantly, perhaps vitally, enhanced by the relationships the County developed with local non-governmental organizations that took on key roles in maintenance and management of volunteers as well as in fundraising and general relations with the public. In contrast, almost half of the Willamette River Greenway was privately owned. This ownership pattern reduced public management costs for the Willamette River Greenway, as the trails in the greenways in Portland were maintained to roughly equal degrees by private landowners and the city.

It was noteworthy that both greenways were managed and maintained as park facilities in local government parks departments. While their original planning documents had heralded the environmental and ecological significance of the greenways, in neither case was there much evidence of a focus beyond providing safe visitor access and recreation, perhaps with the exception of Portland's recent emphasis on retaining 15% canopy cover. Despite their overarching greenway plans, neither the Willamette River Greenway nor the American River Parkway had written management and maintenance level plans for day to day or strategic planning. The need for strong guidance through

planning documents was emphasized in the literature and it was surprising to not find them used to manage these well known and "successful" greenways.

In the recent past both greenways faced funding issues that posed a major barrier to management and maintenance. Even though Erickson (2006) asserted that financial issues are not necessarily a primary factor, interviewing other managers (as well as document analysis) confirmed the significant aftermath and continuing uncertainties from budget cuts. This financial issue influenced a range of issues including public safety, maintenance, monitoring, volunteers and even staff's confidence in management. Despite diverse efforts to secure funding, both greenways struggled to sustain themselves. One alternative could be to build an independent greenway organization instead of relying on fiscally weak local government. Another might be for local government to codify current relationships with non-governmental organizations while retaining leadership. In all cases, management agencies need to be able to convey the positive economic and environmental impacts of greenways. If a government agency can effectively relay the tangible and intangible benefits that greenways provide, it might be possible to reduce opposition to funding greenway management and maintenance through tax increases. This research highlighted that non-profit organizations can play a leading role in securing stable funding sources as well as overall management activities.

Because of funding constraints, the important role that volunteers play in greenway management is increasing. In the American River Parkway, their contributions seemed to have no limitation. From clean-up to funding, volunteers emerged as essential to long-term maintenance. Therefore, building collaborative relationships with the public and determining how to involve and organize volunteers has been vital to the American

River Parkway and may be a useful model for other greenways to pursue. To this end, a variety of programs were developed to empower volunteers and campaigns were created that increased greenway awareness. Involvement in the maintenance of greenways and linear parks provided people with the opportunity to learn about the complex relationships among politics, culture, and their living environment. Loyal volunteers were found to be likely to contribute funding, management and maintenance needs.

This study revealed that the number of greenway visitors was on the rise resulting in part from policy changes that promoted increased public access. However, with increasing numbers of users, visitor impacts on the environment may increase, and safety concerns may arise. This necessarily raises the issue of how to balance recreational activities with protecting valuable natural resources. Thus, in order to prevent damage from overuse, regular monitoring will be required to counteract deterioration of facilities, and resources degradation. While there were a few instances of monitoring, neither case studied here showed evidence of managers implementing regular, systematic monitoring of either biophysical resources or users.

On the whole, maintaining a system of greenways is an ongoing process. The effort is constantly evolving as landscapes change, populations grow, and human needs vary. Open space management, including greenways, is an adaptive process that requires strategic approaches to assure evolutionary success by learning from what is being done to reduce the uncertainty within institutional structures. The management of greenways can be a process to adjust to changing user and environmental circumstances. Greenway-related plans in both study sites did not explicitly refer to the concept of adaptive management. Yet, no amount of planning will anticipate all the adjustments required in

greenway management over the years. Careful monitoring and evaluation of the effects of activities will be required, which may lead to adjustment in how greenways are managed. The adaptability of institutions and their ability to perceive and respond to change will define successful long-term greenway management and the closely related fate of greenways themselves.

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Appendix A. Interview questions regarding greenway management

Greenway governance

1. What entity(s) owns the greenway?
2. What agencies or local government(s) have jurisdiction over the greenway?
3. What law, policy or formal agreements led to the establishment of the greenway and guide greenway management?
4. How are major decisions about greenway management made? (who makes these decisions)

Management and maintenance

1. Who/what organization or agency is responsible for greenway administration?
2. Who manages the greenway?
3. Do you have a greenway management plan?
4. What are its objectives?
5. How is staffing organized for management (with specialty)?
6. What kinds of maintenance programs are performed?
7. Who is responsible for maintenance of greenways/ each trails, trees, stream, overall greenways?
8. Have there been any significant changes in administration or management recently?
9. If yes, what have they been?
10. What is different now?
11. Is the greenway protected from other claims to land use over the long term?

Monitoring

1. What is monitored and why?
2. Who performs monitoring activities?
3. How are the results of monitoring used later? (Can you give examples?)

Public Access

1. Do you have a public access plan?
2. What challenges are associated with public access management?
3. How are these addressed?

4. Is the number of users stable? Increasing? Declining over time?
5. How have uses changed over time (if at all?)

Funding

1. What sources of funding are used to maintain the greenway?
2. Is it challenging to secure funding?
3. What is the trend of funding for the greenway? (stable, decreasing or increasing? why?)
4. Can I review a budget or list of expenditures for the greenway?

Relationship with the public

1. Is community support important for greenway management?
2. If yes, for what reasons?
3. What is your approach to public relations (strategy)?
4. What kinds of methods, if any, have been implemented to strengthen public relations?
5. Do you encourage volunteers to participate in management activities?

   If yes:

6. What activities do volunteers participate in and what is their role in maintenance?
7. What kinds of methods are used to get public support for maintenance?
8. Is the number of volunteers stable? Increasing or decreasing over time?

General questions

1. What are the main challenges of greenway management?
2. Is there strong political support for the greenway?
3. Have you had recent changes in management and maintenance approaches?

   If yes:

   1. Why were changes made?
   2. What changes were made?
   3. How is the new approach working?