Annotated Bibliography

March 15

2013

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Literature Review

1. Defining Green Infrastructure and Urban Ecology

1.1. Urban Ecology

1.1.1. Mostafavi, Mohsen, Gareth Doherty, and Harvard University, ed. 2010. *Ecological Urbanism*. 1st ed. Lars Müller Publishers.

1.1.1.1. **Introduction:** "Preamble-The world's population continues to grow, resulting in a steady migration from rural to urban areas. Increased numbers of people and cities go hand in hand with a greater exploitation of the world's limited resources. Every year, more cities are feeling the devastating impacts of this situation. What are we to do? What means do we have as designers to address this challenging reality? For decades now, reminders have come from many sources about the difficulties that face us and our environment. The Brundtland Report of 1987, scientific studies on the impact of global warming, and former U.S. Vice President Al Gore's passionate pleas have all made their mark. But a growing concern for the environment is matched by a great deal of skepticism and resistance. The United States has not only failed to ratify the Kyoto Protocol, it is also, along with Canada and many of the Gulf States, among the largest per capita users of energy resources. The failure of the Copenhagen Summit to produce a legally binding agreement further confirms the scale of the challenges that lie ahead. The concept of "one planet living" can only be a distant dream-and not just for the worst offenders, but for everyone else as well. Architects have been aware of the issues for some time, of course, but the proportion of those committed to sustainable and ecological practices has remained small. And until recently, much of the work produced as sustainable architecture has been of poor quality. Early examples were focused mainly around the capacities of simple technologies to produce energy and recycle waste. Sustainable architecture, itself rudimentary, often also meant an alternative lifestyle of renunciation, stripped of much pleasure. This has changed, and is changing still. Sustainable design practices are entering the mainstream of the profession. In the United States, LEED certification-the national standard for the evaluation of sustainable buildings-is being more widely applied. But there remains the problem that the moral imperative of sustainability and, by implication, of sustainable design, tends to supplant disciplinary contribution. Thus sustainable design is not always seen as representing design excellence or design innovation. This situation will continue to provoke skepticism and cause tension between those who promote disciplinary knowledge and those who push for sustainability, unless we are able to develop novel ways of design thinking that can contribute to both domains. The second issue concerns scale. Much of the work undertaken by sustainable architects has been relatively limited in scope. LEED certification, for example, deals primarily with the architectural object, and not with the larger infrastructure of the territory of our cities and towns. Because the challenges of rapid urbanization and limited global resources have become much more pressing, there is a need to find alternative design approaches that will enable us to consider the large scale differently than we have done in the past. The urban, as the site of complex relations (economic, political, social, and cultural), requires an equally complex range of perspectives and responses that can address both current conditions and future possibilities. The aim of this book is to provide that framework-a framework that through the conjoining of ecology and urbanism can provide the knowledge, methods, and clues of what the urban can be in the years to come." (Mostafavi et al. 2010, 12-13)

1.1.2. Pataki, Diane E, Margaret M Carreiro, Jennifer Cherrier, Nancy E Grulke, Viniece Jennings, Stephanie Pincetl, Richard V Pouyat, Thomas H Whitlow, and Wayne C Zipperer. 2011. "Coupling Biogeochemical Cycles in Urban Environments: Ecosystem Services, Green Solutions, and Misconceptions." *Frontiers in Ecology and the Environment* 9 (1) (February 1): 27–36. doi:10.1890/090220.

1.1.2.1. **Abstract:** Urban green space is purported to offset greenhouse-gas (GHG) emissions, remove air and water pollutants, cool local climate, and improve public health. To use these services, municipalities have focused efforts on designing and implementing ecosystem-services-based "green infrastructure" in urban environments. In some cases the environmental benefits of this infrastructure have been well documented, but they are often unclear, unquantified, and/or outweighed by potential costs. Quantifying biogeochemical processes in urban green infrastructure can improve our understanding of urban ecosystem services and disservices (negative or unintended consequences) resulting from designed urban green spaces. Here we propose a framework to integrate biogeochemical processes into designing, implementing, and evaluating the net effectiveness of green infrastructure, and provide examples for GHG mitigation, stormwater runoff mitigation, and improvements in air quality and health.

1.1.2.2. **Tertiary Key Words:** Climate Change

1.2. Marzluff, John M., Eric Shulenberger, Wilfried Endlicher, Craig ZumBrunnen, Ute Simon, Clare Ryan, Gordon Bradley, and Marina Alberti, eds. 2008. *Urban ecology: An International Perspective on the Interaction Between Humans and Nature*. New York: Springer.

1.2.1. **Abstract:** "Urban Ecology is the study of ecosystems that include humans living in cities and urbanizing landscapes. It is an emerging, interdisciplinary field that aims to understand how human and ecological processes can coexist in human-dominated systems and help societies with their efforts to become more sustainable. It has deep roots in many disciplines including sociology, geography, urban planning, landscape architecture, engineering, economics, anthropology, climatology, public health, and ecology. Because of its interdisciplinary nature and unique focus on humans and natural systems, the term "urban ecology" has been used variously to describe the study of humans in cities, of nature in cities, and of the coupled relationships between humans and nature. Each of these research areas is contributing to our understanding of urban ecosystems and each must be understood to fully grasp the science of Urban Ecology. Therefore, in *Urban Ecology: An International Perspective on the Interaction Between Humans and Nature*, we introduce students and practitioners of urban ecology to its roots, bases, and prospects by way of a diverse collection of historical and modern foundational readings. The editors are urban ecologists from the United States, Italy, and Germany who together view these readings as a fair representation of the importance of both natural and social sciences to Urban Ecology"

"This book presents important papers in the field of Urban Ecology that both set the foundations for the discipline and to illustrate modern approaches, from a variety of perspectives and regions of the world. The editors do this by reprinting important publications, filling gaps in the published literature with a few targeted original works, and translating several key works originally published in German. The aim of this collection is to provide students, practitioners, and professionals with a rich background in some of the core facets of Urban Ecology."

1.3. Green Infrastructure

1.3.1. Belanger, Pierre. "Landscape as Infrastructure." *Landscape Journal*. 28. no. 1 (2009).

1.3.1.1. **Abstract**: "According to a national report on brownfields redevelopment titled Recycling America's Land (USCM 2006), more than 400,000 sites with real or perceived environmental hazards dot the American landscape today. That legacy is estimated to be worth more than $2 trillion in devalued property. Underlying this legacy is a major network of post- war infrastructures—airports, harbours, roads, sewers, bridges, dikes, dams, power corridors, terminals, treatment plants—that is now suffering major decay from lack of repair and maintenance (ASCE 2008, Infrastructure Canada 2007–2008, Choate and Walter 1983). In revisiting a series of milestone events in the history of North America, this paper draws a cross- section through phases of industrialization in the 19th and 20th centuries in order to track how the necessity for infrastructure accidentally emerged from crisis and failure. A series of patterns and shifts are identified to expose the paradoxical, sometimes toxic relationship between pre-industrial landscape conditions and modern industrial systems. The underlying objective of this essay is to redefine the conventional meaning of modern infrastructure by amplifying the biophysical landscape that it has historically suppressed, and to reformulate landscape as a sophisticated, instrumental system of essential resources, services, and agents that generate and support urban economies. Three contemporary streams of development including urban ecologies, bio- industries, and waste economies are explored briefly to discuss future fields of practice."

1.3.1.2. **Tertiary Key Words**: Historic Values, Infrastructure

1.3.2. Calkins, Meg. 2012. The sustainable sites handbook : a complete guide to the principles, strategies, and practices for sustainable landscapes. Hoboken, N.J.: Wiley.

1.3.2.1. **Summary:** "This official reference guide to the Sustainable Sites Initiative Rating System contains information on principles, strategies, technologies, tools, and best practices for sustainable site design applicable to any type of designed landscape, with or without buildings, ranging from shopping malls, streetscapes, subdivisions, corporate and academic campuses, transportation corridors, parks and recreation areas, all the way to single family homes. Equally useful as a guide to achieving SSI credits, or as a guide to independent pursuit of sustainable sites, it offers in-depth coverage on important "green" topics"-- "This book will be the official reference guide to Sustainable Sites Initiative Rating System, the first national rating system for sustainable landscapes"-- Letter from SITES partners -- Sustainable site design defined / Meg Calkins -- Predesign: site selection, assessment, and planning / Heather Venhaus. Site selection ; Understanding the site ; Team development and planning strategies ; Developing project direction: principles, goals, and performance targets -- Site Design: Water / Alfred Vick, John Calabria, Stuart Echols, Michael Ogden, and David Yocca. Sustainable stormwater management ; Stormwater design approaches ; Water conservation ; Onsite wastewater treatment, disposal, and reuse -- Sight Design: Vegatation / Steve Windhager, Mark Simmons, and Jacob Blue. Vegetation and ecosystem services ; Vegetation protection techniques ; Sustainable planting design and management -- Site design: Soils / Nina Bassuk and Susan Day. Integrating soil into the design process ; Soils in the site assessment ; Soil characteristics and associated tests ; Managing soils for a sustainable site ; Soil replacement and specialized soils ; The soil management plan -- Site Design: Materials and Resources / Meg Calkins. The lifecycle of construction materials and products ; Environmental impacts of materials and products ; Human health impacts of materials ; Evaluating environmental and human health ; Impacts of materials ; Inventory and analysis for materials ; Resource efficiency ; Low-VOC materials and products ; Materials to minimize heat island impacts ; Concrete ; Aggregates and stone ; Asphalt ; Brick masonry ; Earthen materials ; Plastics ; Metals ; Bio-based materials ; Wood ; Site lighting -- Human Health and Well-Being for Sustainable Sites / Robert Ryan. Assessing the site's social setting ; Sustainability awareness and education ; Social equality in site development, construction, and use ; Site accessibility ; Site wayfinding ; Site safety ; Design for physical activity ; Restorative settings ; Design for social interaction and community building ; Preserving historic and cultural features -- Operations, Maintenance, Monitoring, and Stewardship / Amy Bellaire and David Yocca. Environmental and human health impacts of sustainable site operations, maintenance, and monitoring ; Incorporating operations, maintenance, and monitoring considerations into site design ; Monitoring to inform active and adaptive stewardship."

1.3.2.2. **Tertiary Key Words:** SITES Guide

1.3.3. Doyle, Martin, Emily Stanley, David Havlick, Mark Kaiser, George Steinbach, William Graf, Gerald Galloway, J Adam Riggsbee. 2009. "Aging infrastructure and ecosystem restoration." Science 319: 286-28. Accessed March 15, 2013. http://limnology.wisc.edu/personnel/ehstanley/files/doyle_et_al_science_2008.pdf

1.3.3.1. **Abstract:** "As a result of recent infrastructure failures, particularly the tragic failure of the Interstate-35 bridge in Minnesota, the US Senate passed the National Infrastructure Improvement Act (NIIA), which would create the National Commission on the Infrastructure of the USA. The commission's broad mandate would be to assess the nation's infrastructure and its ability to meet current and future demands. Such policy development coincides with ongoing efforts to manage and restore degraded ecosystems. This provocative intersection of aging infrastructure and environmental degradation provide unprecedented and largely unappreciated opportunities for ecosystem restoration."

1.3.3.2. **Tertiary Key Words:** Aging Infrastructure, Environmental Degradation

1.3.4. Forest Research. 2010. *Benefits of Green Infrastructure*. Forest Research, Farnham.

1.3.4.1. **Topics discussed:** green infrastructure definition and benefits, climate change, health and well-being, economic growth and investment, land regeneration, wildlife and habitats, stronger communities

1.3.5. Gill, S.E, J.F Handley, A.R Ennos, and S Pauleit. 2007. "Adapting Cities for Climate Change: The Role of the Green Infrastructure." *Built Environment* 33 (1): 115–133. doi:10.2148/benv.33.1.115.

1.3.5.1. **Abstract:** The urban environment has distinctive biophysical features in relation to surrounding rural areas. These include an altered energy exchange creating an urban heat island, and changes to hydrology such as increased surface runoff of rainwater. Such changes are, in part, a result of the altered surface cover of the urban area. For example less vegetated surfaces lead to a decrease in evaporative cooling, whilst an increase in surface sealing results in increased surface runoff. Climate change will amplify these distinctive features. This paper explores the important role that the green infrastructure, i.e. the greenspace network, of a city can play in adapting for climate change. It uses the conurbation of Greater Manchester as a case study site. The paper presents output from energy exchange and hydrological models showing surface temperature and surface runoff in relation to the green infrastructure under current and future climate scenarios. The implications for an adaptation strategy to climate change in the urban environment are discussed.

1.3.5.2. **Tertiary Key Words:** Climate Change

1.3.6. SWA Group (Firm), Ying-Yu Hung, Gerdo Aquino, Charles Waldheim, Julia Czerniak, Adriaan Geuze, Matthew Skjonsberg, and Alexander Robinson. 2011. *Landscape infrastructure : case studies by SWA*. Basel: Birkhäuser.

1.3.6.1. **Abstract:** "Infrastructure is currently a much discussed notion in the field of landscape architecture. It regards the entire urban and rural space as a network that calls for an integrated planning approach. Natural and man-made infrastructures are viewed as forming a single, overarching whole. The book examines this new and ecologically sustainable approach with essays by well-known experts in the field. It also documents thirteen international examples. The Infrastructure Research Initiative is part of the SWA Group, which was founded in 1957 by Peter Walker and Hideo Sasaki and has since developed into one of the largest and most important landscape planning agencies in the United States. Among the projects of the firm that have captured international attention are the technologically innovative roof domes for Renzo Piano's California Academy of Science in San Francisco (2008), which were planted with indigenous flora."

2. Methodology

2.1. Analysis

2.1.1. Defne, Apul. 2010. “Ecological design principles and their implications on water infrastructure engineering.” Journal of Green Building: Summer 2010 5(3): 147-164. doi: http://dx.doi.org/10.3992/jgb.5.3.147

2.1.1.1. **Abstract:** “Today's water infrastructures are the outcome of an industrial revolution-based design that are now at odds with the current sustainability paradigm. The goal of this study was to develop a vision for engineering sustainable water infrastructures. A list of 99 ecological design principles was compiled from eleven authors and grouped into three themes: (1) human dimension, (2) learning from nature (biomimicry), and (3) integrating nature. The biomimicry concept was further divided into six sub-themes; (1) complex system properties, (2) energy source, (3) scale, (4) mass and energy flows, (5) structure, and function, and (6) diversity and cooperation. The implications of these concepts on water infrastructure design suggested that water infrastructure should be conceptualized in a more holistic way by not only considering water supply, treatment, and storm water management services, but also integrating into the design problem other provisioning, regulating, cultural, and supporting ecosystem services. A decentralized approach for this integration and innovation in adaptive design are necessary to develop resilient and energy efficient water infrastructures.”

2.1.1.2. **Tertiary Key Words:** Decentralized Approach, Sustainability Paradigm

2.1.2. Gill, S.E, J.F Handley, A.R Ennos, and S Pauleit. 2007. “Adapting Cities for Climate Change: The Role of the Green Infrastructure.” *Built Environment* 33 (1): 115–133. doi:10.2148/benv.33.1.115.

2.1.2.1. **Abstract:** See *1.3.5.1*

2.1.2.2. **Tertiary Key Words:** Climate Change

2.1.3. Pataki, Diane E, Margaret M Carreiro, Jennifer Cherrier, Nancy E Grulke, Viniece Jennings, Stephanie Pincetl, Richard V Pouyat, Thomas H Whitlow, and Wayne C Zipperer. 2011. “Coupling Biogeochemical Cycles in Urban Environments: Ecosystem Services, Green Solutions, and Misconceptions.” *Frontiers in Ecology and the Environment* 9 (1) (February 1): 27–36. doi:10.1890/090220.

2.1.3.1. **Abstract:** See *1.1.2.1*

2.1.3.2. **Tertiary Key Words:** Climate Change

2.1.4. Riley, Ann L. 1998. *Restoring streams in cities : a guide for planners, policy makers, and citizens*. Washington, D.C.: Island Press.

2.1.4.1. **Abstract:** "Ann L. Riley describes an interdisciplinary approach to stream management that does not attempt to "control" streams, but rather considers the stream as a feature in the urban environment. She presents a logical sequence of land-use planning, site design, and watershed restoration measures along with stream channel modifications and floodproofing strategies that can be used in place of destructive and expensive public works projects. She features examples of effective and environmentally sensitive bank stabilization and flood damage reduction projects, with information on both the planning processes and end results. Chapters provide: history of urban stream management and restoration; information on federal programs, technical assistance, and funding opportunities; and in-depth guidance on implementing projects: collecting watershed and stream channel data, installing revegetation projects, protecting buildings from overbank stream flows."

2.1.4.2. **Tertiary Key Words:** Floodplain Restoration

2.1.5. Scott D. Struck, Ph.D.; Tom Jacobs, Ginny Moore, J.D., Robert Pitt, Ph.D., P.E., D.WRE; Michael A. Ports, P.E., D.WRE, Deborah O'Bannon Ph.D., P.E., Erich Schmitz P.E., Richard Field P.E., D.WRE. *Kansas City - Balancing Green Infrastructure with Traditional Approaches for CSO Control*. Kansas City: American Society of Civil Engineers. World Environmental & Water Resources Congress*,* 2009.

2.1.5.1. **Abstract**: The City of Kansas City Missouri is perfectly positioned for demonstrating the use and effectiveness of applying green infrastructure for combined sewer overflow (CSO) control. The Kansas City Water Services Department (WSD) provides wastewater collection and treatment for approximately 650,000 people, located within the City and in 27 tributary or "satellite" communities. Approximately 56 square miles within Kansas City, south of the Missouri River, are served by combined sewers. The City's combined sewers overflow to a number of receiving streams, including the Kansas River, the Missouri River, the Blue River and Brush Creek. Kansas City has also suffered from severe flooding issues. Lives have been lost and significant property damage has occurred as a result of flooding, in large part due to substantial increases in stormwater runoff from ever-increasing impervious surfaces.

Kansas City's WSD has conducted extensive modeling and economic studies of its combined sewer system over the last 5 years, in preparation for submittal of its long term control plan to EPA, in January 2009. These studies and recent funding opportunities have provided the impetus for selection of Kansas City as a case study location to demonstrate the efficacy and sustainability of green infrastructure approaches in an urban-core neighborhood served by a combined sewer system. The intent of this project is to compile data and demonstrate the water quality and quantity results from larger scale application of LID or micro-BMP retrofits in a subcatchment.

2.1.5.2. **Tertiary Key Words**: Combined Sewer Overflow, Kansas City

2.1.6. Strom, Steven, Kurt Nathan and Jake Woland. (2009). Site engineering for landscape architects. Hoboken, N.J.: John Wiley & Sons.

2.1.6.1. **Abstract:** See 3.3.18.1

2.1.7. USDA, and NRCS. 2008. "Rapid Watershed Assessment: Root River." United States Department of Agriculture and Natural Resources Conservation Service. Assessed January 16, 2013. http://www.ia.nrcs.usda.gov/technical/RWA/root.pdf.

2.1.7.1. Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land–owners and local leaders set priorities and determine the best actions to achieve their goals.

2.1.7.2. **Tertiary Key Words:** Conservation

2.1.8. "West Bottoms History", n.d. http://www.westbottoms.com/history.htm.

2.1.8.1. **Summary:** The West Bottoms was first used for trading grounds between the French Trappers and Kansas Indians. The area developed into a hub for trade from the Missouri River and Mexico via the Santa Fe Trail. With the building of the railroads, stockyards were established in 1871. City life quickly filled in, but with the flood of 1903, investment moved elsewhere. Other industry in the West Bottoms was responsible for Landing Craft Tank production in World War II. Stockyards remained in the West Bottoms, accounting for most of the economic growth of Kansas City until after World War II and finally moved with the flood of 1951. The economy crumbled within 5-6 years, with 50,000 lost jobs. The Kemper Center was built in 1974 by the American Royal to revitalize the West Bottoms.

2.1.8.2. **Tertiary Key Words:** West Bottoms, American Royal, Kansas City, Kemper Center, Santa Fe Trail

2.2. Case Study

2.2.1. Barata, Eduardo, Luis Cruz, and João-Pedro Ferreira. 2011. "Parking at the UC Campus: Problems and Solutions." *Cities* 28 (5) (October): 406–413. doi:10.1016/j.cities.2011.04.001.

2.2.1.1. **Abstract:** This study underscores the importance of adopting integrated parking management policies that ensure not only more rational use of the available parking spaces, evenly balancing supply and demand and bringing in revenues to cover the parking facilities costs, but also the improved attractiveness of alternative transportation modes. Parking supply and demand flows within the UC campus are estimated. The results indicate that the parking facility is underpriced and that there is overcrowding. To reflect critically on these issues and identify research areas to address their socioeconomic implications, a survey regarding the characterization of campus commuters and their travel options is presented. Logistic regression modeling is applied to determine the relative importance of UC campus commuters' attributes in their level of willingness to pay to have reserved parking on the campus. Finally, some policy proposals are discussed.

2.2.2. Bond, Alex, and Ruth Steiner. 2006. "Sustainable Campus Transportation Through Transit Partnership and Transportation Demand Management: A Case Study from the University of Florida." *Berkeley Planning Journal* 19 (1) (January 1). http://escholarship.org/uc/item/04b7c73h.

2.2.2.1. **Abstract:** "The University of Florida has established a long-term, sustainable partnership with the local transit system in Gainesville, Florida. This partnership provides over $5.2 million of annual funding to enhance transit services used by students at the university. Ridership on the system has grown by 284 percent between 1995 and 2003. These ridership gains were made possible through a comprehensive campus transportation demand management (TDM) system, which seeks to reduce automobile use in favor of more sustainable modes. The campus TDM system includes policies such as parking restriction, parking pricing, transit service enhancements, and unlimited-access transit."

2.2.2.2. **Tertiary Key Words:** Ridership

2.2.3. Brown, Rebekah. 2008. "Local institutional development and organizational change for advancing sustainable urban water futures." Environmental Management. February, 41(2): 221-233. Accessed March 15, 2013. http://www.ncbi.nlm.nih.gov/pubmed/18027015

2.2.3.1. **Abstract:** See *2.3.1.1*

2.2.3.2. **Tertiary Key Words:** Administrative Systems, Benchmarking

2.2.4. BRWG. 2009. "Swan River Restoration Project." *Blue River Watershed Group*. http://blueriverwatershed.org/overview/swan-river-restoration-project/.

2.2.4.1. **Abstract:** The Swan River Restoration Project proposes to restore over one mile of river through 50 acres of land owned by Summit County and the Town of Breckenridge near Breckenridge, Colorado. The property was heavily impacted by dredge boat mining in the early 1900's and is basically devoid of resource values. Although a few acres of vegetated terrain remain or have developed, the majority of the property is barren gravel and cobble left in stockpiles by the dredge boats after they extracted precious metals. The Swan River flows in a straight ditch adjacent to the county road on the north side of the property. In the upper half of the property, the river only flows at high water, and the remainder of the year is subsurface.   Human and wildlife use of the property is almost non-existent.

2.2.4.2. **Tertiary Key Words:** Water Quality

2.2.5. Chaudhari, Jaydeep, and Zhirui Ye. 2010. “GIS as a Sketch-Plan Tool to Replace Traditional Transit Route Planning Practice for College and University Communities.” *Planning for Higher Education* 39 (1) (December): 39–50.

2.2.5.1. **Abstract:** "Personal vehicles driven by young and relatively inexperienced drivers on university campuses nationwide create challenges that make it imperative to explore innovative solutions to mobility and parking issues. Because university authorities traditionally control campus land use, transit, and parking services, transportation plans that address these issues and identify solutions can be implemented easily. Auburn University - a prominent land-grant and comprehensive research institute in Alabama - is no exception to the need to grapple with transportation planning. Auburn launched its transit system (called "Tiger Transit") in 1997 to address the needs of student commuters and a shrinking parking supply… The objective of this study was to improve the effectiveness of the Tiger Transit system through better route planning, and a methodology using a geographic information system (GIS) as a route sketch-plan tool was proposed for this purpose."

2.2.5.2. **Tertiary Key Words:** Ridership

2.2.6. CNA. Channel News Asia. "A natural river in Bishan Park." Last modified 2012. Accessed November 25, 2012. http://www.channelnewsasia.com/stories/singaporelocalnews/view/1183121/1/.html.

2.2.6.1. **Abstract:** Located in Singapore, Bishan Park has been transformed into a natural river that makes the community space more vibrant. The National Park Board (NParks) talks about how the waterway flows right at the doorsteps of Bishan and the Ang Mo Kio. Bishan Park is part of the Active, Beautiful, Clean Water (ABC Waters) program to beautify Sinapore's waterscape.

2.2.6.2. **Tertiary Key Words:** Flood Storage and Floodplain Restoration

2.2.7. Davis, Amelie Y., Bryan C. Pijanowski, Kimberly Robinson, and Bernard Engel. 2010. “The Environmental and Economic Costs of Sprawling Parking Lots in the United States.” *Land Use Policy* 27: 255–261.

2.2.7.1. **Abstract:** Urban sprawl is considered by most environmental scientists and urban planners to be a serious environmental problem. However, public perception about parking availability often forces planning offices to recommend parking lot sizes that exceed daily demands. The recent trend of increasing the size of stores, churches and even schools comes with increasing the size of parking lots that service these buildings. The objective of this paper is to analyze space allocation of parking lots in a typical midwestern county and to estimate the supply of parking spaces to potential demand. We also estimate the loss of ecosystem services represented by the area of parking lots in this county.We found that parking lots cover 5.65km2 (1 397 acres) of Tippecanoe County, Indiana which implies that 0.44% of the county area is devoted to parking lots. Our results showthat there are approximately 2.2 parking spaces per registered vehicle, that parking lots make up more than 6.57% of the total urban footprint in this county, that the area of parking lots exceeded the area of parks in the city limits by a factor of three and that parking lot runoff and pollutants are significant compared to runoff and pollutants from these areas prior to their conversion to parking lots. As other authors have done before us we lament the poor use of land in urban regions of the United States, and encourage planners to think creatively about the use of land for parking.

2.2.8. Feyen, Jan, Kelly Shannon and Matthew Neville. eds. 2009 . Water and urban development paradigms. Boca Raton: CRC Press.

2.2.8.1. **Summary:** The book is a compilation of scholarly articles dealing urban development and water issues. The book discusses the need for innovation in water management, sustainable urban water management, water urbanism, and many other factors water in urban systems. The articles pertain to water issues throughout the world and helps to gain perspective on how other cultures are dealing with population growth and gradually and the depletion of water resources.

2.2.8.2. **Tertiary Key Words:** Environmental Planning, Sustainability Paradigm, Urban Design

2.2.9. Francis, Mark. 2001. "A Case Study Method for Landscape Architecture." *Landscape Journal* 20(1):15-29.

2.2.9.1. **Abstract**: Case studies are widely used in most professions, including medicine, law, engineering, business, planning, and architecture. This practice is becoming increasingly common in landscape architecture as well. The primary body of knowledge in landscape architecture is contained in the written and visual documentation—that is, stories—of projects, be it well-known one such as New York's Central Park, or more modest projects such as a small neighborhood park. Together, these cases provide the primary form of education, innovation, and testing for the profession. They also serve as the collective record of the advancement and development of new knowledge in landscape architecture. This article summarizes a research project commissioned by the Landscape Architecture Foundation (LAF) in 1997 to develop a case study method for landscape architecture. The project concludes that the case study method is a highly appropriate and valuable approach in landscape architecture. This article presents a case study methodology and format, and an example case study of Bryant Park in New York City. With increased rigor and funding, the case study method promises to be an increasingly common and effective form of analysis, criticism, and dissemination from landscape architecture research and practice

2.2.9.2. **Tertiary Key Words:** Methodology, Analysis, Case Study

2.2.10. Holmes, Damian. World Landscape Architecture. "Kallang River Bishan Park." Last modified 2012. Accessed November 25, 2012. http://worldlandscapearchitect.com/kallang-river-bishan-park-singapore-atelier-dreiseitl/.

2.2.10.1. **Abstract:** Bishan Park is one of Singapore's most popular parks in the heartlands of Singapore with more than 3 million visitors to the park annually. As part of a much-needed park upgrade and plans to improve the capacity of the Kallang River along the edge of the park, works were carried out simultaneously to transform the utilitarian concrete channel into a naturalized river, creating new spaces for the community to enjoy.

2.2.10.2. **Tertiary Key Words:** Flood Storage, Floodplain Restoration

2.2.11. Robinson, Alexander, and H. Myvonwynn Hopton. 2011. "Cheonggyecheon Stream Restoration Project". Landscape Architecture Foundation. http://lafoundation.org/research/landscape-performance-series/case-studies/case-study/382/pdf/.

2.2.11.1. **Abstract:** The City of Seoul is in the process of an important paradigm shift, changing from an autocentric development-oriented urban landscape to one that values the quality of life of its people and the importance of functioning ecosystems. By demolishing an elevated freeway and uncovering a section of the historic Cheonggyecheon Stream, the Cheonggyecheon Restoration Project created both ecological and recreational opportunities along a 3.6-mile corridor in the center of Seoul. The project has proven catalytic, spurring economic growth and development in an area of Seoul that had languished over the last several decades.

2.2.11.2. **Tertiary Key Words**: Channel Design and Flood Frequency

2.2.12. SEWRPC. 2012. "Root River Watershed Restoration Plan." *Southeastern Wisconsin Regional Planning Commission*. http://www.sewrpc.org/SEWRPC/Environment/Root-River-Watershed-Restoration-Plan.htm.

2.2.12.1. **Abstract:** The restoration plan for the Root River watershed will provide specific, targeted recommendations to address a set of focus issues related to conditions in the watershed. Through the input of the Root River Restoration Planning Group—which includes representatives from county and municipal governments within the watershed, MMSD, the Racine Wastewater Utility, the Wisconsin Department of Natural Resources, Sweet Water, Root-Pike WIN, and others representing a broad range of interests within the

watershed—four major focus areas emerged for this watershed restoration plan: water quality, recreational use and access, habitat conditions, and flooding.

2.2.12.2. **Tertiary Key Words**: Water Quality

2.2.13. Shannon, Tya, Billie Giles-Corti, Terri Pikora, Max Bulsara, Trevor Shilton, and Fiona Bull. 2006. "Active Commuting in a University Setting: Assessing Commuting Habits and Potential for Modal Change." *Transport Policy* 13 (3) (May): 240–253. doi:10.1016/j.tranpol.2005.11.002.

2.2.13.1. **Abstract:** "This paper describes the results of an online survey that examined commuting patterns, potential for change and barriers and motivators affecting transport decisions in a University population (*n*=1040 students, *n*=1170 staff). Overall, 21.5% of staff and 46.8% of students at The University of Western Australia regularly used active modes, and potentially an additional 30% of staff and students would switch to active modes. The results suggested that reducing barriers to using active modes, in particular reducing actual and perceived travel time by bus and bicycle would have the greatest impact on commuting patterns. Some policy applications appeared to hold particular promise, including an implementation of a subsidized public transport pass (U-Pass), increased student housing on or near campus, increased cost of parking, and improved bus services and cycle networks."

2.2.13.2. **Tertiary Key Words:** Ridership

2.2.14. Unknown. "10,000 Rain Gardens." http://c0133251.cdn.cloudfiles.rackspacecloud.com/Case_Study_Kansas_City_10000_Rain_Gardens_Initiative.pdf. (2005)

2.2.14.1. **Abstract**: The 10,000 Rain Gardens initiative began in the fall of 2005 to address existing stormwater and overflow control issues. As the name suggests, the primary goal of the initiative was to install 10,000 rain gardens across the metropolitan, bi-state area. With preliminary activities beginning in 2005, the public-private initiative intended to promote and implement rain gardens over the next three years. According to the program's goals, 1,000 rain gardens and/or green solutions were to be implemented in the first year, followed by an additional 4,000 in 2007, and the final 5,000 in 2008. By July 2008, at the drafting of Kansas City, Missouri's Overflow Control Plan, a total of 303 rain gardens had been registered on the programs official website

2.2.14.2. **Tertiary Key Words**: Kansas City, Rain Garden

2.2.15. USDA, and NRCS. 2008. "Rapid Watershed Assessment: Root River." United States Department of Agriculture and Natural Resources Conservation Service. Assessed January 16, 2013. http://www.ia.nrcs.usda.gov/technical/RWA/root.pdf.

2.2.15.1. **Abstract:** See *2.1.7.1*

2.2.16. Witter, Jonathan D., Jessica L. D'Ambrosio, and Andy Ward. 2011. "Considerations for Implementing Two-stage Channels". University and the Ohio NEMO Program. http://greatlakeswater.uwex.edu/sites/default/files/library/outreach-and-education/implementing-fv.pdf.

2.2.16.1. **Abstract:** "Drainage channels are traditionally designed using a trapezoidal cross-section to serve as an outlet for subsurface tiles draining adjacent lands and to move that water downstream efficiently. Trapezoidal drainage channels lack floodplains and can experience bank erosion and excessive buildup of sediments as the channel attempts to regain a balance between sediment transport and supply. Two-stage channels are designed take advantage of the benefits of active floodplains. At the first stage, a small channel allows for enough velocity to minimize sediment deposition during normal or lower flows. The second stage provides bank stability, an outlet for subsurface drains, and capacity to drain the flow from larger storm events. This approach can be considered one type of in-stream best management practice and, if properly designed, should require little or no maintenance."

2.2.16.2. **Tertiary Key Words:** Channel Design

2.2.17. Wood, Graham. 2003. "Modelling the Ecological Footprint of Green Travel Plans Using GIS and Network Analysis: From Metaphor to Management Tool?" *Environment and Planning B: Planning and Design* 30 (4): 523 – 540. doi:10.1068/b12995.

2.2.17.1. **Abstract:** "The author explores the use of ecological-footprint analysis for evaluating and communicating the environmental implications of transport alternatives within a company travel plan. From a case study of the Vodafone headquarters in Newbury, a component ecological footprint methodology is developed that employs geographic information systems (GIS) and network analysis to model the impacts of commuting activity prior to and after implementation of the company's `green travel plan'. Having provided an in-depth exploration of the footprint approach, the author considers the extent to which ecological footprinting may be used as a management tool for formulating, implementing, and refining company travel plans, in addition to its well-established role as a metaphor for communicating the consequences of consumption."

2.2.18. Xiao, Qingfu, E. Greg Mcpherson, Center for Urban Forest Research, and USDA Forest Service. 2009. "Testing a Bioswale to Treat and Reduce Parking Lot Runoff." http://www.fs.fed.us/psw/programs/uesd/uep/products/psw_cufr761_P47ReportLRes_AC.pdf.

2.2.18.1. **Abstract:** A bioswale integrating Davis Soil (a mixture of Lava Rock and regular soils) and trees was installed in a parking lot on the University of California Davis's campus to

evaluate the system's effectiveness on reducing storm runoff and pollutant loading from the parking lot and supporting tree growth. The control and treatment (best management practices or BMP) sites each had 8 parking spaces. These two sites were adjacent to one another and identical with the exception being that there was no Davis soil bioswale retrofit for the control site. A tree was planted at both sites. Storm runoff, pollutant loading, and tree growth were measured and monitored during February 2007 thru October 2008. There were 50 total storm events with a total precipitation of 563.8 mm (22.2 in) during this period. Compared with the runoff from the control site, the BMP site reduced amount of surface runoff by 88.8%. The loading reduction for nutrients, metals, organic carbon, and solids were 95.3%, 86.7%, 95.5%, and 95.5%, respectively. The total loading reduction was 95.4%. Petroleum hydrocarbons (i.e., gas, diesel, and motor oil) from both sites were below the laboratory detectable limit. The nature of Davis soil proved a better aeration and drainage system for tree roots during high moisture season. The performance of this BMP demonstrated its potential use for reducing runoff from parking lot and supporting tree growth.

2.2.18.2. **Tertiary Key Words:** Bioswale

2.2.19. Yu, Kongjian. 2011. "Stormwater Park for a Water Resilient City." *Topos: European Landscape Design Magazine.* Munchen (77): 72–77.

2.2.19.1. **Abstract:** Contemporary cities are not resilient when faced with inundations of surface water. Landscape architecture can play a key role in addressing this problem. This project demonstrates a Stormwater park that acts as a green sponge, cleansing and storing urban stormwater and can be integrated with other ecosystem services including the protection of native habitats, aquifer recharge, recreational use, and aesthetic experience, in all these ways fostering urban development.

2.2.19.2. **Tertiary Key Words:** Flood Storage

2.2.20. Zhang, Yi, Shweta Singh, and Bhavik Bakshi. "Accounting for Ecosystem Services in Life Cycle Assessment, Part I: A Critical Review." *Environmental Science Technology*. 44. no. 7 (2010): 2232-2242. http://pubs.acs.org/doi/abs/10.1021/es9021156?ai=54taf=R (accessed November 25, 2012).

2.2.20.1. **Abstract:** If life cycle oriented methods are to encourage sustainable development, they must account for the role of ecosystem goods and services, since these form the basis of planetary activities and human well-being. This article reviews methods that are relevant to accounting for the role of nature and that could be integrated into life cycle oriented approaches. These include methods developed by ecologists for quantifying ecosystem services, by ecological economists for monetary valuation, and life cycle methods such as conventional life cycle assessment, thermodynamic methods for resource accounting such as exergy and emergy analysis, variations of the ecological footprint approach, and human appropriation of net primary productivity. Each approach has its strengths: economic methods are able to quantify the value of cultural services; LCA considers emissions and assesses their impact; emergy accounts for supporting services in terms of cumulative exergy; and ecological footprint is intuitively appealing and considers biocapacity. However, no method is able to consider all the ecosystem services, often due to the desire to aggregate all resources in terms of a single unit. This review shows that comprehensive accounting for ecosystem services in LCA requires greater integration among existing methods, hierarchical schemes for interpreting results via multiple levels of aggregation, and greater understanding of the role of ecosystems in supporting human activities. These present many research opportunities that must be addressed to meet the challenges of sustainability.

2.3. Design Manual

2.3.1. Brown, Rebekah, Nina Keath and Tony Wong. 2009. "Urban water management in cities: historical, current and future regimes." Water Science and Technology 59(5): 847-855. Accessed March 15, 2013. http://www.ncbi.nlm.nih.gov/pubmed/19273883.

2.3.1.1. **Abstract:** "Drawing from three phases of a social research programme between 2002 and 2008, this paper proposes a framework for underpinning the development of urban water transitions policy and city-scale benchmarking at the macro scale. Through detailed historical, contemporary and futures research involving Australian cities, a transitions framework is proposed, presenting a typology of six city states, namely the 'Water Supply City', the 'Sewered City', the 'Drained City', the 'Waterways City', the 'Water Cycle City', and the 'Water Sensitive City'. This framework recognises the temporal, ideological and technological contexts that cities transition through when moving towards sustainable urban water conditions. The aim of this research is to assist urban water managers with understanding the scope of the hydro-social contracts currently operating across cities in order to determine the capacity development and cultural reform initiatives needed to effectively expedite the transition to more sustainable water management and ultimately to Water Sensitive Cities. One of the values of this framework is that it can be used by strategists and policy makers as a heuristic device and/or the basis for a future city state benchmarking tool. From a research perspective it can be an underpinning framework for future work on transitions policy research."

2.3.1.2. **Tertiary Key Words:** Transistions Framework, Water Sensitive Case Studies

2.3.2. City of Portland Environmental Services. How to manage stormwater: Rain Barrels. Design Manual, Portland: City of Portland.

2.3.2.1. **Abstract:** This is a user's guide to rain barrel design. The ideal location of a rain barrel is determined by its location to a downspout, the amount of water coming from that downspout, where the water will overflow to, and the size of the system. Other design techniques are suggested and maintenance procedures such as gutter cleaning, water flow observation, and mosquito prevention. This design manual should be used to help define suitability, develop a basic design, and suggest management of the result.

2.3.2.2. **Tertiary Key Words:** Stormwater Harvesting, Rain Barrel

2.3.3. City of Seattle. *Stormwater Manual Vol. 3: Stormwater Flow Control & Water Quality Treatment Tecnical Requrements Manual.* Design Manual, Seattle: Seattle Public Utilities Department of Planning & Development, 2009.

2.3.3.1. **Abstract:** "In addition to meeting the specific stormwater needs of the City of Seattle (City), the Stormwater Code also meets certain requirements of the City's National Pollutant Discharge Elimination System (NPDES) Phase I General Permit for Discharges from Municipal Separate Storm Sewers. Issued to the City under the federal Clean Water Act by the Washington State Department of Ecology (Ecology), one of the conditions of this permit requires Seattle to regulate activities that impact the quality and quantity of stormwater runoff. This is accomplished, in large measure, through the Stormwater Code and its associated Directors' Rules, which Ecology has determined to be equivalent to the minimum requirements contained in the City's Phase I NPDES permit as well as the Stormwater Management Manual for Western Washington (Ecology 2005). The Stormwater Code contains regulatory requirements that provide for and promote the health, safety, and welfare of the general public. The provisions of the Stormwater Code are designed to accomplish the following purposes: 1. Protect, to the greatest extent practicable, life, property and the environment from loss, injury, and damage by pollution, erosion, flooding, landslides, strong ground motion, soil liquefaction, accelerated soil creep, settlement and subsidence, and other potential hazards, whether from natural causes or from human activity; 2. Protect the public interest in drainage and related functions of drainage basins, watercourses, and shoreline areas; 3. Protect receiving waters from pollution, mechanical damage, excessive flows and other conditions in their drainage basins which will increase the rate of downcutting, streambank erosion, and/or the degree of turbidity, siltation and other forms of pollution, or which will reduce their low flows or low levels to levels which degrade the environment, reduce recharging of groundwater, or endanger aquatic and benthic life within these receiving waters and receiving waters of the state; 4. Meet the requirements of state and federal law and the City's municipal stormwater NPDES permit; Volume 3 — Flow Control and Water Quality Treatment Technical Requirements Manual Preface xiv November 2009 5. Protect the functions and values of environmentally critical areas as required under the state's Growth Management Act and Shoreline Management Act; 6. Protect the public drainage system from loss, injury, and damage by pollution, erosion, flooding, landslides, strong ground motion, soil liquefaction, accelerated soil creep, settlement and subsidence, and other potential hazards, whether from natural causes or from human activity; and 7. Fulfill the responsibilities of the City as trustee of the environment for future generations Also included are 4 additional manuals to guide in implementation of the codes: Volume 1: the Source Control Technical Requirements Manual Volume 2: the Construction Stormwater Control Technical Requirements Manual

Volume 3: the Stormwater Flow Control and Water Quality Treatment Technical Requirements Manual Volume 4: the Stormwater Code Enforcement Manual"

2.3.3.2. **Tertiary Key Words:** Bioswale, Constructed Wetland, Green Roof, Stormwater Harvesting.

2.3.4. Doyle, Martin, Emily Stanley, David Havlick, Mark Kaiser, George Steinbach, William Graf, Gerald Galloway, J Adam Riggsbee. 2009. "Aging infrastructure and ecosystem restoration." Science 319: 286-28. Accessed March 15, 2013.

2.3.4.1. **Abstract:** See 1.3.3.1

2.3.5. University of Arkansas Community Design Center. *LID Low Impact Development: a design manual for urban areas*. Fayetteville: University of Arkansas Press, 2010.

2.3.5.1. **Abstract**: This design manual offers a range of LID (Low Impact Development) practices for stormwater runoff management in urban environments. Compiled by the University of Arkansas Community Design Center, the manual explains the biological and ecological benefits of constructing LIDs to capture, treat, and detain stormwater as opposed to conventional sewer systems. Twenty-one LID practices are compared by their level of treatment (quality), level of volume reduction (quantity), level of service (benefit), and location. Although the manual does not cover engineering details, it provides a framework from which landscape architects and city planners can comfortably incorporate appropriate sustainable stormwater management practices into urban design.

2.3.5.2. Tertiary Key Words: Low Impact Development, Best Management Practices

2.4. Education

2.4.1. Bergman, Mark; Jonides, John; and Kaplan, Stephen. 2008. "The Cognitive Benefits of Interacting with Nature." *Psychological Science* 19(12):1207-1212.

2.4.1.1. **Abstract:** We compare the restorative effects on cognitive functioning of interactions with natural versus urban environments. Attention restoration theory (ART) provides an analysis of the kinds of environments that lead to improvements in directed-attention abilities. Nature, which is filled with intriguing stimuli, modestly grabs attention in a bottom-up fashion, allowing top-down directed-attention abilities a chance to replenish. Unlike natural environments, urban environments are filled with stimulation that captures attention dramatically and additionally requires directed attention (e.g., to avoid being hit by a car), making them less restorative.We present two experiments that show that walking in nature or viewing pictures of nature can improve directed-attention abilities as measured with a backwards digit-span task and the Attention Network Task, thus validating attention restoration theory.

2.4.1.2. **Tertiary Key Words:** Environmental Education, Nature Benefits

2.4.2. Gobster, Paul H. 2007. “Urban Park Restoration and the ‘Museumification’ of Nature.” *Nature and Culture* 2(2):95-114.

2.4.2.1. **Abstract:** Ecological restoration is becoming an increasingly popular means of managing urban natural areas for human and environmental values. But although urban ecological restorations can foster unique, positive relationships between people and nature, the scope of these interactions is often restricted to particular activities and experiences, especially in city park settings. Drawing on personal experiences and research on urban park restorations in Chicago and San Francisco, I explore the phenomenon of this “museumification” in terms of its revision of landscape and land use history, how it presents nature through restoration design and implementation, and its potential impacts on the nature experiences of park users, particularly children. I conclude that although museum-type restorations might be necessary in some cases, alternative models for the management of urban natural areas may provide a better balance between goals of achieving authenticity in ecological restorations and authenticity of nature experiences.

2.4.2.2. **Tertiary Key Words:** Authenticity, Ecological Restoration, Environmental Education, Landscape Criticism, Nature Benefits, Urban Parks

2.4.3. Mell, Ian. (2008). “Green infrastructure: concepts and planning.” FORUM Ejournal. June 2008: 69-80. Accessed March 15, 2013. http://www.urbanspaces.eu/files/Green-Infrastructure-Newcastle.pdf

2.4.3.1. **Abstract:** “Green infrastructure planning has grown in prominence since it was first discussed in the late 1990’s. Since the President’s Council on Sustainable Development discussed the concept researchers and academics from across the globe, though predominantly the UK, Western Europe and North America, have championed the process. Acknowledging its ability to deliver a number of diverse benefits in different urban and urban-fringe landscapes, green infrastructure has been discussed as enabling planners to develop multi-functional, innovative and sustainable places.The aim of this paper is to examine a number of diverse research areas that have attributed value to the ideas underpinning green infrastructure planning. Using the subjects of urban regeneration and health, and climate change green infrastructure will be discussed as a multi-faceted planning approach for constantly changing landscapes. A review will also be made assessing the antecedents of the concept and how historical exemplar projects are still prominent to the green infrastructure concept. Finally, this paper will conclude by suggesting that with further funding and development green infrastructure planning can develop a more mainstream profile. Through this, an evidence base and a set of criteria can be developed to provide planning solutions for health, climate change, regeneration or environmental sustainability.”

2.4.3.2. **Tertiary Key Words:** Environmental Education, Infrastructure, Urban Design

2.4.4. Riley, Ann L. 1998. *Restoring streams in cities : a guide for planners, policy makers, and citizens*. Washington, D.C.: Island Press.

2.4.4.1. **Abstract:** See *2.1.4.1*

2.5. History

2.5.1. "West Bottoms History", n.d. http://www.westbottoms.com/history.htm.

2.5.1.1. **Summary:** See *2.1.8.1*

2.6. Master Planning

2.6.1. SWA Group (Firm), Ying-Yu Hung, Gerdo Aquino, Charles Waldheim, Julia Czerniak, Adriaan Geuze, Matthew Skjonsberg, and Alexander Robinson. 2011. *Landscape infrastructure : case studies by SWA*. Basel: Birkhäuser.

2.6.1.1. **Abstract:** See *1.3.6.1*

2.7. Performance Benefits

2.7.1. Hale, Chris A. 2011. "New approaches to strategic urban transport assessment." *Australian planner* 48 (3): 173–182. doi:http://dx.doi.org/10.1080/07293682.2011.592505.

2.7.1.1. **Abstract:** "Most transport assessment is generally based on incremental analysis of individual projects with pre-existing planning and political support. Unfortunately, this approach to transport decision-making is unlikely to result in cities being able to meet a comprehensive range of desired urban objectives on a broader-scale over time. Project analysis is generally based on benefit-cost analysis and intermediate metrics (vehicle kilometres travelled, time savings and road user costs). But additional metrics and attributes may be needed to assess goals and performance relating to broader transport outcomes in a metropolitan region and its society, environment and economy. 'Higher level' strategic urban transport analysis offers the opportunity of a more strategic platform for metropolitan region-wide transport policy discussion, assessment, planning and network improvements. It may also assist to demonstrate mass transit, walking and cycling's unique opportunities to contribute to better city futures through economic development, sustainability, and lifestyle improvements. In the realm of mass transit improvements can be delivered by targeted changes in policy, infrastructure and network enhancements, improved service characteristics, better network utilisation, and stronger system financial performance. Performance of passenger rail networks, corridors and proposals is a substantial research focus, but improvements to rail over time should ultimately be reflected in a wider set of outcomes and measurables. This paper reviews established literature and research on transport analysis approaches, to identify key performance indicators at an urban or metropolitan level, metrics on the utilisation and effectiveness of rail mass transit, accessibility indicators, and a handful of broader social, economic and environmental performance indicators."

2.7.2. Pincetl, Stephanie, and Elizabeth Gearin. 2005. "The Reinvention of Public Green Space." *Urban Geography* 26 (5) (August 1): 365–384. doi:10.2747/0272-3638.26.5.365.

2.7.2.1. **Abstract:** Much attention has been paid to preserving land at the urban fringe, and to the negative effects of sprawl and its costs. There is increasing recognition that enhancing green, public open spaces in cities provides a strategy to make those cities more sustainable, more livable, and more equitable. This involves a new approach to public spaces that integrates infrastructure needs, takes equity into account, and reexamines the range of uses public spaces offer. We consider the potential for urban greening through a case study in the dense inner core of Los Angeles that probed local resident attitudes and values toward a more inclusive strategy, and that measured the potential value of nature's services in the urban fabric using a GIS program.

2.7.2.2. **Tertiary Key Words:** Ecological Benefits

2.7.3. Wang, Wei, and Lin-sen Zhao. 2007. "Evaluation Method of the Ecological Benefits of Urban Green Spaces and Application Conditions." *Forestry Studies in China* 9 (3): 213–216. doi:10.1007/s11632-007-0034-y.

2.7.3.1. **Abstract:** "The importance of ecological benefit analyses about green space systems has been widely discussed on the basis of a perceived bias towards the landscaping effect of green spaces to be built in urban areas as opposed to the perception of comprehensive ecological benefits of designed plant communities. Given the basic principle of ecological benefit analyses and evaluation methods widely applied today, the methodology to calculate ecological benefits and to model the expansion of urban green spaces by CITYgreen 5.0 and its conditions for application were explored. We propose that aerial images can be substituted by AutoCAD graphics of a green space containing detailed information of plant dispositions by digitizing the key features during the working process in order to evaluate the ecological benefits quickly and to offer proper guidance to the establishment of small scale green spaces in urban areas. The theoretical foundation, potential application range and prospects for extension of the method are introduced by using the analysis of ecological benefits of the green spaces on the campus of Southwest Forestry College, Kunming, as an example."

2.7.3.2. **Tertiary Key Words:** Ecological Benefits

2.7.4. Xiao, Qingfu, E. Greg Mcpherson, Center for Urban Forest Research, and USDA Forest Service. 2009. "Testing a Bioswale to Treat and Reduce Parking Lot Runoff." http://www.fs.fed.us/psw/programs/uesd/uep/products/psw_cufr761_P47ReportLRes_AC.pdf.

2.7.4.1. **Abstract:** See *2.2.18.1*

2.8. Policy

2.8.1. National Research Council (U.S.). Committee on Reducing Stormwater Discharge Contributions to Water Pollution, & National Academies Press (U.S.). 2009. Urban stormwater management in the United States. Washington, D.C.: National Academies Press.

2.8.1.1. **Abstract:** The rapid conversion of land to urban and suburban areas has profoundly altered how water flows during and following storm events, putting higher volumes of water and more pollutants into the nation's rivers, lakes, and estuaries. These changes have degraded water quality and habitat in virtually every urban stream system. To help address this problem, Congress in 1987 amended the Clean Water Act, expanding the U.S. Environmental Protection Agency's (EPA) oversight from about 100,000 point source permittees (wastewater discharged from industries and sewage treatment plants) to more than 500,000 permittees in order to encompass stormwater discharges from municipal areas, industry, and construction sites. Adding to the challenge of more permittees, it is much more difficult to collect and treat stormwater than wastewater. In light of these challenges, EPA asked the National Research Council to review its stormwater program. The report finds that the program will require significant changes if it is to improve the quality of the nation's waters. This report calls for an entirely new permitting structure that would put authority and accountability for stormwater discharges at the municipal watershed level. A number of additional actions, such as conserving natural areas, reducing hard surface cover (e.g., roads and parking lots), and retrofitting urban areas with features that hold and treat stormwater, are recommended.

2.8.1.2. **Tertiary Key Words:** Ecological Restoration, Environmental Protection Agency, Infrastructure, Water Qualtiy

3. Stormwater

3.1. Flood Storage

3.1.1. Barthens, Julia, Susan D Day, J Roger Harris, Joseph E Dove, and Theresa M Wynn. *Can Urban Tree Roots Improve Infi ltration through Compacted Subsoils for Stormwater Management?* Technical Report, Blacksburg: American Society of Agronomy, 2008.

3.1.1.1. **Abstract:** " Global land use patterns and increasing pressures on water resources demand creative urban stormwater management. Strategies encouraging infiltration can enhance groundwater recharge and water quality. Urban subsoils are often relatively impermeable, and the construction of many stormwater detention best management practices (D-BMPs) exacerbates this condition. Root paths can act as conduits for water,

but this function has not been demonstrated for stormwater BMPs where standing water and dense subsoils create a unique environment. We examined whether tree roots can penetrate compacted subsoils and increase infiltration rates in the context of a novel infiltration BMP (I-BMP). Black oak (Quercus velutina Lam.) and red maple (Acer rubrum L.) trees, and an unplanted control, were installed in cylindrical planting sleeves surrounded by clay loam soil at two compaction levels (bulk density = 1.3 or 1.6 g cm^{-3}) in irrigated containers. Roots of both species penetrated the more compacted soil, increasing infiltration rates by an average of 153%. Similarly, green ash (Fraxinus pennsylvanica Marsh.) trees were grown in CUSoil (Amereq Corp., New York) separated from compacted clay loam subsoil (1.6 g cm^{-3}) by a geotextile. A drain hole at mid depth in the CUSoil layer mimicked the overflow drain in a stormwater I-BMP thus allowing water to pool above the subsoil. Roots penetrated the geotextile and subsoil and increased average infiltration rate 27-fold compared to unplanted controls. Although high water tables may limit tree rooting depth, some species may be effective tools for increasing water infiltration and enhancing groundwater recharge in this and other I-BMPs (e.g., raingardens and bioswales) (Barthens, et al. 2008).

3.1.1.2. **Tertiary Key Words:** Urban Trees.

3.1.2. Riley, Ann. 1998. "Managing Floodplains." In Restoring Steams in Cities: A Guide for Planners, Policymakers, and Citizens, 211-297. Washington DC: Island Press.

3.1.2.1. **Summary:** See 4.3.1.1

3.2. Stormwater Management

3.2.1. Albanese, Brett, and Glenn Matlack. 1999. "Utilization of Parking Lots in Hattiesburg, Mississippi, USA, and Impacts on Local Streams." *Environmental Management* 24 (2): 265–271. doi:10.1007/s002679900231.

3.2.1.1. **Abstract:** Utilization of parking lots around Hattiesburg, Mississippi, USA, was examined to suggest mechanisms for reducing runoff into local streams. Stream health was assessed by a census of fish communities. We found that most parking lots were used well below capacity, even in the peak shopping period before the Christmas holiday. Levels of utilization were primarily determined by shopping center age and parking availability relative to the size of businesses served. Streams receiving runoff had high undercut banks and heavy sediment loads. Their fish faunas were depauperate compared with a similar-sized stream in a nearby rural area. To moderate the impact of runoff, we recommend that lot size be carefully calibrated to actual parking demand. New businesses should be encouraged to establish in existing, unused parking lots rather than constructing new parking areas.

3.2.2. Belt, G.H., and J. O'Laughlin. 1994. "Buffer Strip Design for Protecting Water Quality and Fish Habitat." *Western Journal of Applied Forestry.* 1994 (2) (April 1): 41–44. http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=7201650.

3.2.2.1. **Abstract:** Buffer strips are protective areas adjacent to streams or lakes. Among other functions, they protect water quality and fish habitat. A typical buffer strip is found in western Oregon, where they are called Riparian Management Areas (RMAs). The authors use the term buffer strip to include functional descriptions such as filter, stabilization, or leave strips, and administrative designations such as Idaho's Stream Protection Zone (SPZ), Washington's Riparian Management Zone (RMZ), and the USDA Forest Service's Streamside Management Zone (SMZ). They address water quality and fishery protective functions of buffer strips on forestlands, pointing out improvements in buffer strip design possible through research or administrative changes. Buffer strip design requirements found in some western Forest Practices Act (FPA) regulations are also compared and related to findings in the scientific literature.

3.2.2.2. **Tertiary Key Words:** Riparian Buffer

3.2.3. Bedan, Erik S, and John C Clausen. "Stormwater Runoff Quality and Quantity from Traditional and Low Impact Development Watersheds." Journal of the American Water Resources Association, 2009: 998-1008.

3.2.3.1. **Abstract: "**Development continues at a rapid pace throughout the country. Runoff from the impervious surfaces in these watersheds continues to be a major cause of degradation to freshwater bodies and estuaries. Low impact development techniques have been recommended to reduce these impacts. In this study, stormwater runoff and pollutant concentrations were measured as development progressed in both a traditional development, and a development that used low impact development techniques. Increases in total impervious area in each watershed were also measured. Regression relationships were developed between total impervious area and stormwater runoff/pollutant export. Significant, logarithmic increases in stormwater runoff and nitrogen and phosphorus export were found as development occurred in the traditional subdivision. The increases in stormwater runoff and pollutant export were more than two orders of magnitude. TN and TP export after development was 10 and 1 kg ha−1 yr−1, respectively, which was consistent with export from other urban/developed areas. In contrast, stormwater runoff and pollutant export from the low impact subdivision remained unchanged from pre-development levels. TN and TP export from the low impact subdivision were consistent with export values from forested watersheds. The results of this study indicate that the use of low impact development techniques on a watershed scale can greatly reduce the impacts of development on local waterways"

3.2.3.2. **Tertiary Key Words:** Water Quality, Low-Impact Development.

3.2.4. Black & Veatch. "Missouri River NID/Turkey Creek Project Area - Preliminary Improvement Scenarios, Technical Memorandum." City of Kansas City, Missouri. (2008)

3.2.4.1. **Summary:** The Turkey Creek basin of Kansas City, Missouri, is one of seven basins within Kansas City's combined sewer system. During the drafting of the Overflow Control Plan, engineering company Black & Veatch was hired by the City to develop stormwater management alternatives to reduce the occurrence of overflows in Turkey Creek Basin. A variety of stormwater runoff technologies, both conventional and green, were evaluated by Black & Veatch and stakeholders. Technologies which had the ability to store, convey, and treat the large overflow volumes and provide multiple benefits were retained for additional performance analysis. Upon analyzing the applicable technologies, three basin-wide alternative solutions were proposed. Each alternative included a deep tunnel system that could detain millions of gallons of stormwater runoff before being pumped to water treatment facilities. Other suggested improvements included in-line storage, combined sewer separation, and the installation of larger sewer pipes. The 66-acre sewer separation improvement near Penn Valley Park was the only solution proposed by Black & Veatch.

3.2.4.2. **Tertiary Key Words:** Combined Sewer Overflow, Kansas City, Turkey Creek

3.2.5. Brown, Rebekah, Nina Keath and Tony Wong. 2009. "Urban water management in cities: historical, current and future regimes." Water Science and Technology 59(5): 847-855. Accessed March 15, 2013. http://www.ncbi.nlm.nih.gov/pubmed/19273883.

3.2.5.1. **Abstract:** See *2.3.1.1*

3.2.5.2. **Tertiary Key Words:** Transistions Framework, Water Sensitive Case Studies

3.2.6. BRWG. 2009. "Swan River Restoration Project." *Blue River Watershed Group*. http://blueriverwatershed.org/overview/swan-river-restoration-project/.

3.2.6.1. **Abstract:** See *2.2.4.1*

2.2.21. CNA. Channel News Asia. "A natural river in Bishan Park." Last modified 2012. Accessed November 25, 2012. http://www.channelnewsasia.com/stories/singaporelocalnews/view/1183121/1/.html.

2.2.21.1. **Abstract:** See *2.2.6.2*

3.2.7. Connery, Kevin. 2009. "Biodiversity and Urban Design: Seeking an Integrated Solution." *Journal of Green Building* 4(2):23-38.

3.2.7.1. **Summary:** See 6.1.2.1

3.2.8. Corrigan, Jay R., Kevin J. Egan, and John A. Downing. 2007. "Aesthetic Values of Lakes and Rivers."

http://economics.kenyon.edu/corrigan/publications/Aesthetic%20Values%20of%20Lakes%20and%20Rivers.pdf.

3.2.8.1. **Abstract:** See *9.1.1.1*

3.2.9. Curtis, Kiran and Cooper, Jonathan. 2009. "Designing for Flood Risk." Royal Institute of British Architects. http://www.architecture.com/findoutabout/sustainabilityandclimatechange/flooding/designguide.aspx

3.2.9.1. **Summary:** See 4.2.1.1

3.2.10. Defne, Apul. 2010. "Ecological design principles and their implications on water infrastructure engineering." Journal of Green Building: Summer 2010 5(3): 147-164. doi: http://dx.doi.org/10.3992/jgb.5.3.147

3.2.10.1. **Abstract:** See 2.1.1.1

3.2.11. Dunne, Thomas and Luna Leopold. 1978. Water in environmental planning. San Francisco: W. H. Freeman.

3.2.11.1. **Abstract:** "In this book we show how a knowledge of hydrology, fluvial geomorphology, and river quality is useful in planning. Many specialists in such disciplines as biology, engineering, forestry, geography, geology, hydrology, landscape architecture, and regional planning have taken up the challenge of applying their knowledge to the avoidance or solution of environmental problems. In developing nations, many scientists originally trained in a specialized discipline find themselves in the position of advising their governments on a wide range of scientific issues, including the assessment and management of natural resources and the maintenance of the environmental quality during development. We refer to all these people as "planners," …"

3.2.11.2. **Tertiary Key Words:** Environmental Planning, Fluvial Geomorphology

3.2.12. Ferguson, Bruce. 1994. Stormwater infiltration. Boca Raton: Lewis Publishers.

3.2.12.1. **Abstract:** "Stormwater infiltration is the most complete approach to stormwater management. Only infiltration can simultaneously solve problems of water quality, flood control, streambank erosion, aquifer recharge, and maintenance of downstream base flows and wetland hydroperiods. Stormwater Infiltration is the first book to explain the principles of natural science on which infiltration is based, how to apply infiltration to any region of the country, and what kinds of results can be expected. It brings into one publication the complete range of necessary information on soils, vegetation, infiltration, hydrology, design criteria, site layout, construction process for surface and subsurface basins, porous paving materials, feasibility, maintenance, and performance. It draws more than half a century's actual experiences from all over the United States to place stormwater management in a context of environmental balance and quality for human life."

3.2.12.2. **Tertiary Key Words:** Flood Storage, Water Quality

3.2.13. Feyen, Jan, Kelly Shannon and Matthew Neville. eds. 2009 . Water and urban development paradigms. Boca Raton: CRC Press.

3.2.13.1. **Summary:** See 2.2.8.1

3.2.14. Franklin, John. "Kansas City, Missouri Overflow Control Plan Overview." The City of Kansas City, January 30, 2009.

3.2.14.1. **Summary:** The traditional American water system is hidden and not appreciated for its importance to survival, hence combined sewers. Impervious surfaces increase pollution in the soil and river and sewer systems currently only prolongs the path to the rivers and groundwater. The use of conveyance and combined sewers must be updated to harvest and appreciate water as an importance to life cycles.

3.2.14.2. **Tertiary Key Words:** Combined Sewer Overflow, Groundwater

3.2.15. Holmes, Damian. World Landscape Architecture. "Kallang River Bishan Park." Last modified 2012. Accessed November 25, 2012. http://worldlandscapearchitect.com/kallang-river-bishan-park-singapore-atelier-dreiseitl/.

3.2.15.1. **Abstract:** See *2.2.10.1*

3.2.16. Moore, Trisha L.C., and William F. Hunt. 2012. "Ecosystem Service Provision by Stormwater Wetlands and Ponds – A Means for Evaluation?" *Water Research* (0). doi:10.1016/j.watres.2011.11.026. http://www.sciencedirect.com/science/article/pii/S004313541100710X.

3.2.16.1. **Abstract:** "Stormwater control measures (SCMs) such as constructed stormwater ponds and constructed stormwater wetlands (CSWs) are designed to regulate runoff hydrology and quality. However, these created ecosystems also provide a range of other benefits, or ecosystem services, which are often acknowledged but rarely quantified. In this study, additional ecosystem services, including carbon sequestration, biodiversity, and cultural services, were assessed and compared between 20 ponds and 20 CSWs in North Carolina, USA. Carbon sequestration was estimated through the carbon content of pond and wetland sediments across a gradient of system age. Biodiversity was quantified in terms of the richness and Shannon diversity index of vegetative and aquatic macroinvertebrate communities. Cultural services were qualitatively assessed based on the potential for recreational and educational opportunities at each site. Ponds and wetlands were found to support similar levels of macroinvertebrate diversity, though differences community composition arose between the two habitat types. CSWs demonstrated greater potential to provide carbon sequestration, vegetative diversity, and cultural ecosystem services. This assessment provides an initial framework upon which future assessments of ecosystem service provision by SCMs can build.

3.2.16.2. **Other Secondary Key Words:** Biodiversity, Carbon Sequestration

3.2.17. National Research Council (U.S.). Committee on Reducing Stormwater Discharge Contributions to Water Pollution, & National Academies Press (U.S.). 2009. Urban stormwater management in the United States. Washington, D.C.: National Academies Press.

3.2.17.1. **Abstract:** See 2.8.1.1

3.2.18. Strom, Steven, Kurt Nathan and Jake Woland. (2009). Site engineering for landscape architects. Hoboken, N.J.: John Wiley & Sons.

3.2.18.1.

Abstract: "The Leading Guide To Site Design And Engineering— Revised And UpdatedSite Engineering for Landscape Architects is the top choice for site engineering, planning, and construction courses as well as for practitioners in the field, with easy-to-understand coverage of the principles and techniques of basic site engineering for grading, drainage, earthwork, and road alignment. The Sixth Edition has been revised to address the latest developments in landscape architecture while retaining an accessible approach to complex concepts.The book offers an introduction to landform and the language of its design, and explores the site engineering concepts essential to practicing landscape architecture today—from interpreting landform and contour lines, to designing horizontal and vertical road alignments, to construction sequencing, to designing and sizing storm water management systems. Integrating design with construction and implementation processes, the authors enable readers to gain a progressive understanding of the material.This edition contains completely revised information on storm water management and green infrastructure, as well as many new and updated case studies. It also includes updated coverage of storm water management systems design, runoff calculations, and natural resource conservation. Graphics throughout the book have been revised to bring a consistent, clean approach to the illustrations.Perfect for use as a study guide for the most difficult section of the Landscape Architect Registration Exam (LARE) or as a handy professional reference, Site Engineering for Landscape Architects, Sixth Edition gives readers a strong foundation in site development that is environmentally sensitive and intellectually stimulating."

3.2.18.2. **Tertiary Key Words:** Infiltration, Infrastructure, Urban Design

3.2.19. United States of America v. City of Kansas City, Missouri. CA 4:10-cv-0497. D.C. of MO. http://www.kcmo.org/idc/groups/water/documents/waterservices/complaint.pdf. (2002)

3.2.19.1. **Abstract**: On behalf of the United States government, the Environmental Protection Agency (EPA) filed a civil action against the City of Kansas City, Missouri for illegal discharges of untreated sewage and pollutants into the Kansas and Missouri rivers. The civil action required the City to take necessary actions to resolve the presented danger to the public's health. The injunction also required the City to pay $600,000 in civil penalties to the United States for violations. The EPA recorded over 138 discharges from Kansas City's sewers with an estimated total discharge of 4.6 million gallons of raw sewage into nearby bodies of water. Additionally, at least 766 incidents were recorded where raw sewage was discharged onto public and private property, including streets, yards, public parks and playground areas, and into buildings, including homes. The civil action led to the creation of Kansas City's comprehensive Overflow Control Plan to address storm sewer overflow.

3.2.19.2. **Tertiary Key Words:** Combined Sewer Overflow, Environmental Protection Agency, Kansas City

3.2.20. SEWRPC. 2012. "Root River Watershed Restoration Plan." *Southeastern Wisconsin Regional Planning Commission*. http://www.sewrpc.org/SEWRPC/Environment/Root-River-Watershed-Restoration-Plan.htm.

3.2.20.1. **Abstract:** See *2.2.12.1*

3.2.21. SWA Group (Firm), Ying-Yu Hung, Gerdo Aquino, Charles Waldheim, Julia Czerniak, Adriaan Geuze, Matthew Skjonsberg, and Alexander Robinson. 2011. *Landscape infrastructure : case studies by SWA*. Basel: Birkhäuser.

3.2.21.1. **Abstract:** See *1.3.6.1*

3.2.22. Water Services Department. "Overflow Control Plan." City of Kansas City, Missouri. http://www.kcmo.org/idc/groups /water/documents/ckcmowebassets/plan_full.pdf. (2009)

3.2.22.1. **Abstract**: The Overflow Control Plan provides basin-specific proposals for each basin to develop a city-wide overflow control plan. Basins with combined sewer systems were found to only capture 45% of wet weather flow, resulting in an overflow volume of 6.38 billion gallons a year. The City discussed nearly 300 alternative solutions during the development of the plan, each of which was evaluated by cost, feasibility, ability to control overflows, and multi-benefit potential. For Kansas City's 58-square miles of combined sewer system, a combination of conventional sewer systems and green infrastructure was explored as a means of reducing combined sewer overflows. The Plan went through a

series of modifications between 2002 and 2008 while suggestions and cost estimates were being explored. Although each basin had unique requirements, the ultimate goal was to provide similar or multi-basin solutions to create a comprehensive Master Plan. Final estimates indicate the Plan will cost approximately $2.4 billion and take between 25 and 33 years to fully implement.

3.2.22.2. **Tertiary Key Words:** Combined Sewer Overflow, Kansas City, Turkey Creek

3.2.23. Xiao, Qingfu, E. Greg Mcpherson, Center for Urban Forest Research, and USDA Forest Service. 2009. "Testing a Bioswale to Treat and Reduce Parking Lot Runoff." http://www.fs.fed.us/psw/programs/uesd/uep/products/psw_cufr761_P47ReportLRes_AC.pdf.

3.2.23.1. **Abstract:** See *2.2.18.1*

3.2.24. Yu, Kongjian. 2011. "Stormwater Park for a Water Resilient City." *Topos: European Landscape Design Magazine.* Munchen (77): 72–77.

3.2.24.1. **Abstract:** See *2.2.19.1*

4. Stream

4.1. Flood Storage

4.1.1. Curtis, Kiran and Cooper, Jonathan. 2009. "Designing for Flood Risk." Royal Institute of British Architects. http://www.architecture.com/findoutabout/sustainabilityandclimatechange/flooding/designguide.aspx

4.1.1.1. **Summary:** See 4.2.1.1

4.1.2. Witter, Jonathan D., Jessica L. D'Ambrosio, and Andy Ward. 2011. "Considerations for Implementing Two-stage Channels". University and the Ohio NEMO Program. http://greatlakeswater.uwex.edu/sites/default/files/library/outreach-and-education/implementing-fv.pdf.

4.1.2.1. **Abstract:** See *2.2.16.1*

4.2. Flooding

4.2.1. Curtis, Kiran and Cooper, Jonathan. 2009. "Designing for Flood Risk." Royal Institute of British Architects. http://www.architecture.com/findoutabout/sustainabilityandclimatechange/flooding/designguide.aspx

4.2.1.1. **Summary:** Kiran Curtis and Jonathan Cooper's document Designing for Flood Risk, explained the differences between the types of flooding. The most crucial flood type for the region of Kansas City was fluvial flooding. This type of flooding was said to occur when blockages from debris were created and increased in precipitation. The manmade sewer system and infrastructure system also caused flooding; separate sewer systems were a better approach. Other infrastructure systems were subject to failure in flooding. The level of predictability, the rate of onset of a flood, the speed and depth of the water, and the duration of the flood were identified as important determining affects by the authors. Flood defense systems limited the amount of discharge from a river and disconnected rivers from their floodplains. The reconnection of these systems was vital to the future health of a stream. The self-sufficiency and stability factors of raising the flood plain created problems down stream and were only a short-term solution.

4.2.1.2. **Tertiary Key Words:** Combined Sewer Overflow, Erosion Control, Flood Risk, Floodplain Restoration, Kansas City, Peak Discharge

4.2.2. Riley, Ann. 1998. "Managing Floodplains." In Restoring Steams in Cities: A Guide for Planners, Policymakers, and Citizens, 211-297. Washington DC: Island Press.

4.2.2.1. **Summary:** See 4.3.1.1

4.3. Stream Restoration

4.3.1. Riley, Ann. 1998. "Managing Floodplains." In Restoring Steams in Cities: A Guide for Planners, Policymakers, and Citizens, 211-297. Washington DC: Island Press.

4.3.1.1. **Summary:** Floodplain management, by Ann L Riley in Restoring Streams in Cities, took a crucial look at the flow of streams, land use change affects on stream flow, floodplain boundaries, velocity of floods, stream flow data, weather data, flood frequencies, and historical data. Identifying the ways urbanization impacted the overall watershed is important. The volume of storm water runoff, peak flood discharge, flood stage elevations, and valley area that will be flooded were important inventory analysis pieces to consider when looking at flood storage capacity. Riley discussed the affects of urbanization on a watershed. An increased peak discharge occurred during storm events. Cutting down the riparian buffer gave a higher peak discharge because there was less infiltration capacity.

4.3.1.2. **Tertiary Key Words:** Flood Frequency, Floodplain Restoration, Flow Velocity, Peak Discharge, Riparian Buffer

4.3.2. Riley, Ann L. 1998. *Restoring streams in cities : a guide for planners, policy makers, and citizens*. Washington, D.C.: Island Press.

4.3.2.1. **Abstract:** See *2.1.3.1*

4.3.3. Robinson, Alexander, and H. Myvonwynn Hopton. 2011. “Cheonggyecheon Stream Restoration Project”. Landscape Architecture Foundation. http://lafoundation.org/research/landscape-performance-series/case-studies/case-study/382/pdf/.

4.3.3.1. **Abstract:** See *2.2.11.1*

4.3.4. Witter, Jonathan D., Jessica L. D’Ambrosio, and Andy Ward. 2011. “Considerations for Implementing Two-stage Channels”. University and the Ohio NEMO Program. http://greatlakeswater.uwex.edu/sites/default/files/library/outreach-and-education/implementing-fv.pdf.

4.3.4.1. **Abstract:** See *2.2.16.1*

4.3.5. Yu, Kongjian. 2011. “Stormwater Park for a Water Resilient City.” *Topos: European Landscape Design Magazine.* Munchen (77): 72–77.

4.3.5.1. **Abstract:** See *2.2.19.1*

4.4. Urban Stream

4.4.1. Francis, R. 2012. “Positioning Urban Rivers Within Urban Ecology.” *Urban Ecosystems* 15 (2) (June): 285.

4.4.1.1. **Abstract:** Rivers are important components of many urban systems, and research into urban rivers is increasing internationally, both in scope and intensity. As an introduction to a special section on urban rivers, this short article briefly highlights some key trends in urban river research based on a survey of published articles from Web of Knowledge, before summarizing the contributions made by the special section papers. In particular, there has been a general increase in work on urban rivers since the 1990s, with a more dramatic increase from 2001. Most published research has concentrated on water quality and its wider environmental implications; ecologically, many studies have focused on autecology, community ecology or river restoration/rehabilitation, with the main emphasis on macroinvertebrates or fish. Geographically, most studies have taken place in North America (mainly the US) and Asia (mainly China). In the large majority of cases research has been on relatively small rivers within urbanized catchments rather than large, heavily urbanized systems within major towns or cities. Given the wide range of topics and studies relating to urban river research, a detailed meta-analysis of the urban river ecology literature would be a useful endeavour. The six papers included in the special section of this issue provide a sample of some of key and emerging themes within recent urban river research, and originate from a session on the understanding and management of urban rivers held at the Royal Geographical Society (with IBG) Annual Meeting in 2010, at Imperial College London.

4.4.2. Walsh, Christopher J., Allison H. Roy, Jack W. Feminella, Peter D. Cottingham, Peter M. Groffman, and Raymond P. Morgan. 2005. “The Urban Stream Syndrome: Current Knowledge and the Search for a Cure.” *Journal of the North American Benthological Society* 24 (3): 706–723. doi:10.1899/04-028.1.

4.4.2.1. **Abstract:** "The term “urban stream syndrome” describes the consistently observed ecological degradation of streams draining urban land. This paper reviews recent literature to describe symptoms of the syndrome, explores mechanisms driving the syndrome, and identifies appropriate goals and methods for ecological restoration of urban streams. Symptoms of the urban stream syndrome include a flashier hydrograph, elevated concentrations of nutrients and contaminants, altered channel morphology, and reduced biotic richness, with increased dominance of tolerant species. More research is needed before generalizations can be made about urban effects on stream ecosystem processes, but reduced nutrient uptake has been consistently reported. The mechanisms driving the syndrome are complex and interactive, but most impacts can be ascribed to a few major large-scale sources, primarily urban stormwater runoff delivered to streams by hydraulically efficient drainage systems. Other stressors, such as combined or sanitary sewer overflows, wastewater treatment plant effluents, and legacy pollutants (long-lived pollutants from earlier land uses) can obscure the effects of stormwater runoff. Most research on urban impacts to streams has concentrated on correlations between instream ecological metrics and total catchment imperviousness. Recent research shows that some of the variance in such relationships can be explained by the distance between the stream reach and urban land, or by the hydraulic efficiency of stormwater drainage. The mechanisms behind such patterns require experimentation at the catchment scale to identify the best management approaches to conservation and restoration of streams in urban catchments. Remediation of stormwater impacts is most likely to be achieved through widespread application of innovative approaches to drainage design. Because humans dominate urban ecosystems, research on urban stream ecology will require a broadening of stream ecological research to integrate with social, behavioral, and economic research."

5. Transportation

5.1. Parking

5.1.1. Albanese, Brett, and Glenn Matlack. 1999. “Utilization of Parking Lots in Hattiesburg, Mississippi, USA, and Impacts on Local Streams.” *Environmental Management* 24 (2): 265–271. doi:10.1007/s002679900231.

5.1.1.1. **Abstract:** *3.2.1.1.*

5.1.2. Barata, Eduardo, Luis Cruz, and João-Pedro Ferreira. 2011. “Parking at the UC Campus: Problems and Solutions.” *Cities* 28 (5) (October): 406–413. doi:10.1016/j.cities.2011.04.001.

5.1.2.1. **Abstract:** See 2.2.1.1

5.1.3. Bean, E Z, W F Hunt, and D A Bidelspach. "Field survey of permeable pavement surface infiltration rates." *Journal of Irrigation and Drainage Engineering 133*, 2007: 247-255.

5.1.3.1. **Abstract:** " The surface infiltration rates of 40 permeable pavement sites were tested in North Carolina, Maryland, Virginia, and Delaware. Two surface infiltration tests (pre- and postmaintenance) were performed on 15 concrete grid paver lots filled with sand. Maintenance was simulated by removing the top layer of residual material (13–19mm) . Simulated maintenance significantly ($p<0.007$) improved the surface infiltration rate. The median site surface infiltration rate increased from 4.9cm/h for existing conditions to 8.6cm/h after simulated maintenance. Fourteen permeable interlocking concrete pavers (PICP) and eleven porous concrete (PC) sites were also tested. PICP and PC sites built in close proximity to disturbed soil areas had surface infiltration rates significantly ($p<0.0014$ and $p<0.0074$, respectively) less than stable landscape sites. Median PICP surface infiltration rates of each condition were 80cm/h and 2,000cm/h , respectively. Median PC surface infiltration rates with and without fines were 13cm/h and 4,000cm/h , respectively. This study showed that: (1) the location of permeable pavements; and (2) maintenance of permeable pavements were critical to maintaining high surface infiltration rates."

5.1.3.2. **Tertiary Key Words:** Infiltration.

5.1.4. Bond, Alex, and Ruth Steiner. 2006. “Sustainable Campus Transportation Through Transit Partnership and Transportation Demand Management: A Case Study from the University of Florida.” *Berkeley Planning Journal* 19 (1) (January 1). http://escholarship.org/uc/item/04b7c73h.

5.1.4.1. **Abstract:** See *2.2.2.1*

5.1.4.2. **Tertiary Key Words:** Ridership

5.1.5. Davis, Amelie Y., Bryan C. Pijanowski, Kimberly Robinson, and Bernard Engel. 2010. “The Environmental and Economic Costs of Sprawling Parking Lots in the United States.” *Land Use Policy* 27: 255–261.

5.1.5.1. **Abstract:** See *2.2.7.1*

5.1.6. Dueker, Kenneth, James Strathman, and Martha Bianco. 1998. “Strategies to Attract Auto Users to Public Transportation.” *World Transit Research* (January 1). http://www.worldtransitresearch.info/research/2966.

5.1.6.1. **Abstract:** This report will be of interest to transportation and urban planners and to local decision makers. The effectiveness of automobile parking strategies as a means of increasing transit ridership was analyzed. Eight strategies affecting the price and availability of parking and transit service levels were examined, alone and in combination, to assess their effects on travel mode choice, particularly transit. The study concludes that no single strategy is both effective and politically feasible enough to warrant implementation throughout a metropolitan area. Rather, the researchers recommend that policy-makers implement combinations of parking strategies, in response to the policy and transportation objectives of specific geographical areas. The final chapter of the report, an implementation guide, provides forms, examples, and other information to assist agencies in selecting combinations of parking strategies that will be appropriate for local needs.

5.1.7. Litman, T. 1999. "Pavement-Buster's Guide. Why and How to Reduce the Amount of Land Paved for Roads and Parking Facilities" (March 12). http://trid.trb.org/view.aspx?id=496986.

5.1.7.1. **Abstract:** "This guide describes ways to reduce the amount of land required for roads and parking facilities. It examines factors that result in overgenerous road and parking capacity standards. It summarizes various costs of paving land for roads and parking facilities, including the opportunity costs of land, direct financial costs, a number of environmental impacts, reduced housing affordability, and increased automobile dependency. Due to these costs, society would benefit from marginal reductions in road and parking, provided that mobility and access are not severely reduced. A number of strategies are described for reducing parking requirements."

5.1.7.2. **Tertiary Key Words:** Cost

5.1.8. Revell, John, and Richard Rich. 2001. "Calculating your parking needs." *The American City & County* 116 (7) (May): 50–54.

5.1.8.1. **Abstract:** "Parking planning can play a direct role in the success of a city's traffic management, the health of its businesses and the level of satisfaction experienced by residents and visitors. Poor parking planning can have disastrous results: Traffic can become gridlocked, urban businesses may have trouble competing with suburban companies, in-town residents can get fed up with searching for parking spaces every time they return home, and, in the worst cases, municipal credit ratings can suffer. Conversely, cities that can provide sufficient parking spaces will create satisfied residents and businesses. Calculating where to locate parking spaces, how many spaces are needed, and how much to charge parkers is a complex process involving multiple variables, planners can draw on a number of resources."

5.1.9. Shoup, Donald C. 1995. "An Opportunity to Reduce Minimum Parking Requirements." *Journal of the American Planning Association* 61 (1): 14–28. doi:10.1080/01944369508975616.

5.1.9.1. **Abstract:** Employer-paid parking subsidizes about a third of all automobile travel in the United States, and about two-thirds of all automobile travel during the morning peak hours. To reduce traffic congestion and air pollution, California has recently enacted legislation requiring employers who subsidize employee parking to offer employees the option to take the cash value of the parking subsidy, in lieu of the parking itself. The legislation also requires cities to reduce the parking requirements for developments that implement a parking cash-out program. This study estimates how the option to cash out employer-paid parking will reduce commuter parking demand, and recommends a corresponding reduction in minimum parking requirements. To deal with spillover parking problems that may occur if cities reduce parking requirements, the article concludes with a proposal to create "Parking Benefit Districts" where the revenues from market-priced curb parking are dedicated to paying for neighborhood public services. At market parking prices, curb parking revenue could easily exceed the current residential property tax revenue in neighborhoods subject to spillover parking.

5.1.10. Shoup, Donald. 1997. "The High Cost of Free Parking." *Tri-State Transportation Campaign*. www.tstc.org.

5.1.10.1. **Abstract:** The matter of parking is largely taken for granted, until you're circling the block looking for that elusive space. Even for many transportation professionals and urban planners, parking tends to be little more than an afterthought. But a major new treatise by UCLA professor Donald Shoup makes a strong case for more attention to parking. Shoup determines that in the United States, off-street parking consumes an area roughly the size of Connecticut. If global car ownership rates catch up with those in the U.S., and assuming just one off-street space per car, an area the size of England would need to be paved to house the world's car fleet (during the 95 percent of the day when it's not on the road).

Shoup contends that many of the woes associated with America's car culture can be linked directly to the lack of rational attention to parking. More specifically, he argues that the oversupply of free parking (he estimates 99 percent of parking in the U.S. is free) is an enormous public subsidy that makes driving less expensive than it should be, further skewing travel choices. In fact, transportation suffers from the same "tragedy of the commons" relative to parking observed with regard to fisheries and other free and un-owned resources. Zoning requirements for overly-abundant off-street parking and failure to charge appropriately for curb parking result in extra air pollution, higher oil consumption, traffic congestion, and sprawl.

Less obviously, parking requirements increase the cost of housing, as well as goods and services. For urban areas, Shoup summarizes these effects quoting Mumford: "The right to have access to every building in the city by private motorcar in an age when everyone possesses such a vehicle, is actually the right to destroy the city."

For those who don't have the time to read *The High Cost of Free Parking's* hefty 700 pages, we have summarized Shoup's major findings into three sections following the outline of his book: zoning codes' influence on the proliferation of free parking, the cruising-for-parking phenomenon, and Shoup's policy recommendations

5.1.11. Wood, Graham. 2003. "Modeling the Ecological Footprint of Green Travel Plans Using GIS and Network Analysis: From Metaphor to Management Tool?" *Environment and Planning B: Planning and Design* 30 (4): 523 – 540. doi:10.1068/b12995.

5.1.11.1. **Abstract:** See *2.2.17.1.*

5.1.12. Zhang, Ming, Katie Mulholland, Jane Zhang, and Ana J. Gomez-Sanchez. 2012. *Getting the Parking Right for Transit-oriented Development*. Final Report.

5.1.12.1. **Abstract:** Increasingly MPOs in Texas are incorporating Transit-Oriented Development (TOD) or similar concepts into their long-range plans for the purpose of achieving sustainable transportation. One major challenge to implementing these TOD-type strategies is parking. The conventional parking policies likely produce excessive parking, undermining the expected community benefits of TOD and could even cause the TOD initiative to fail. Getting the parking right is essential to ensure the desirable form and functionality of TOD. There are few studies of the topic on Texas cities. The main objective of this study is to report the state-of-the-knowledge on parking regulations and practice influencing the planning, design, and implementation of TOD. The first generation of TOD analyses focus on physical-design elements such as walkable communities, connectivity, and pedestrian-friendly designs. Parking was viewed as one more design feature that needs to be considered when building walkable communities. Despite the rich literature on TOD physical-design and parking, few studies addressed the human dimension of TOD as it relates to parking standards. Best practices for TOD-Parking include: 1) Reductions: Parking requirements can typically be reduced around 20 and up to 50% in areas with good transit. Deregulate parking to allow developers to assess parking demand, provide market-priced parking to meet average demand, and use shared parking to accommodate peaks. 2) Design: Designing for pedestrians is an important component to parking. 3) Location: Parking should not be located near station, but out of sight and/or farther away (5-7 minute walk). 4) Management: To develop parking policies, cities need parking databases to understand supply and demand and to develop programs that allow the city to track the impacts of adjustments. 5) Pricing: Pricing can be used to improve monitoring, increase enforcement, reduce spillover, and make improvements in parking district. 6) General: Parking at TODs in suburban areas can be used to land bank but it can't be a sea of parking. The report provides an annotated bibliography of TOD-Parking studies. Appendix 1 assembles parking regulations and practice policies in selected cities in the Austin-Round Rock Metropolitan Statistical Area.

5.2. Public Transit

5.2.1. Bond, Alex, and Ruth Steiner. 2006. "Sustainable Campus Transportation Through Transit Partnership and Transportation Demand Management: A Case Study from the University of Florida." *Berkeley Planning Journal* 19 (1) (January 1). http://escholarship.org/uc/item/04b7c73h.

5.2.1.1. **Abstract:** See *2.2.2.1*

5.2.1.2. **Tertiary Key Words:** Ridership

5.2.2. Chaudhari, Jaydeep, and Zhirui Ye. 2010. "GIS as a Sketch-Plan Tool to Replace Traditional Transit Route Planning Practice for College and University Communities." *Planning for Higher Education* 39 (1) (December): 39–50.

5.2.2.1. **Abstract:** See *2.2.5.1*

5.2.2.2. **Tertiary Key Words:** Ridership

5.2.3. Dueker, Kenneth, James Strathman, and Martha Bianco. 1998. "Strategies to Attract Auto Users to Public Transportation." *World Transit Research* (January 1). http://www.worldtransitresearch.info/research/2966.

5.2.3.1. **Abstract:** See *5.1.6.1*

5.2.4. Guerre, Erick, and Robert Cervero. 2012. "Cost of a ride: the effects of densities on fixed-guideway transit ridership and costs." *Journal of the American Planning Association* 77 (3): 267–290.

5.2.4.1. **Abstract:** Problem: High costs and low ridership are the bane of fixed-guideway transit investments. The net capital and operating cost per passenger mile of recent investments ranged from $0.22 to over $10 in 2008. A better understanding of characteristics of the most successful transit investments can help inform future investment policy and improve the performance of existing transit systems.

Purpose: We evaluated the ridership, operating costs, and capital costs of recent transit investments and identified job and population densities that can support more cost-effective fixed-guideway transit service.

Methods: Combining investment and station-level data from over 50 American fixed-guideway transit investments with time-series data on 23 transit systems and surrounding land uses, we modeled the influence of job and population densities on transit ridershi and capital and operating costs. Based on these results, we estimated the marginal costs per passenger mile of increasing transit ridership through system expansion, increased service, and decreased fares.

Results and Conclusions: Controlling for neighborhood, regional, and transit service attributes, population and job density are positively correlated with both ridership and capital costs. As density increases, so do capital costs and ridership. Density, however, has an inverse relationship to capital cost per rider and total costs per passenger mile. Higher densities tend to improve transit's cost effectiveness, in spite of higher capital costs

Takeaway for practice: Job and population densities around transit stations are frequently below minimum thresholds needed for cost-effective transit investments and operation. This contributes to high costs per passenger mile on many transit systems. We generate density guidelines for cities and towns to use as a point of comparison and a potential target for zoning around existing and proposed transit stations based on actual or projected capital costs.

5.2.4.2. **Tertiary Key Words:** Cost, Ridership

5.2.5. Hale, Chris A. 2011. "New approaches to strategic urban transport assessment." *Australian planner* 48 (3): 173–182. doi:http://dx.doi.org/10.1080/07293682.2011.592505.

5.2.5.1. **Abstract:** See *2.7.1.1.*

5.2.6. Shannon, Tya, Billie Giles-Corti, Terri Pikora, Max Bulsara, Trevor Shilton, and Fiona Bull. 2006. "Active Commuting in a University Setting: Assessing Commuting Habits and Potential for Modal Change." *Transport Policy* 13 (3) (May): 240–253. doi:10.1016/j.tranpol.2005.11.002.

5.2.6.1. **Abstract:** See *2.2.13.1*.

5.2.6.2. **Tertiary Key Words:** Ridership

5.2.7. Wood, Graham. 2003. "Modelling the Ecological Footprint of Green Travel Plans Using GIS and Network Analysis: From Metaphor to Management Tool?" *Environment and Planning B: Planning and Design* 30 (4): 523 – 540. doi:10.1068/b12995.

5.2.7.1. **Abstract:** See *2.2.17.1.*

5.2.8. Zhang, Ming, Katie Mulholland, Jane Zhang, and Ana J. Gomez-Sanchez. 2012. *Getting the Parking Right for Transit-oriented Development*. Final Report.

5.2.8.1. **Abstract:** *4.2.1.1*

6. Habitat

6.1. Biodiversity

6.1.1. Abell, Robin A., David M. Olson, Eric Dinerstein, and Patrick T. Hurley. 2000. *Freshwater Ecoregions of North America: a Conservation Assessment*. Washington, D.C.: Island Press.

6.1.1.1. **Abstract**: "North America's freshwater habitats and the extraordinary biodiversity they contain are facing unprecedented threats from a range of sources, including flow alteration, habitat fragmentation, introduced species, and overall land use changes. With nearly every freshwater system suffering from some degree of degradation and conservation resources limited, there is an urgent and practical need to set priorities. As an initial step in identifying those areas where protective and restorative measures should be implemented first, World Wildlife Fund-US assembled a team of leading scientists to conduct a conservation assessment of freshwater ecoregions. "Freshwater Ecoregions of North America" presents that assessment and outlines measures that must be taken to conserve, and in many cases restore, native biodiversity. The book: identifies freshwater ecoregions that support globally outstanding biological diversity assesses the types and immediacy of threats to North American ecoregions identifies gaps in information that hamper an accurate evaluation of biodiversity provides a broad-scale framework for conservation activities. In addition, it offers appendixes that provide detailed descriptions of methodologies, raw scores and statistical analysis of results, and an integrated biological distinctiveness and conservation status index. Also included are 21 full-color maps."Freshwater Ecoregions of North America" is an authoritative reference on a subject of vital importance, and will be an essential tool for scientists, conservation professionals, students, and anyone interested in the conservation of North America's freshwater systems."

6.1.2. Connery, Kevin. 2009. "Biodiversity and Urban Design: Seeking an Integrated Solution." *Journal of Green Building* 4(2):23-38.

6.1.2.1. **Summary:** The paper, "Biodiversity and Urban Design: Seeking an Integrated Solution" in The Journal of Green Building by Kevin Connery took an approach to stormwater management rooted in living infrastructure. Connery discussed researching global stormwater systems and applying it at the local scale. The use of a localized living system composed of large patches and riparian buffers lowers the impacts of flooding and allows for growth and movement within patches.

6.1.2.2. **Tertiary Key Words:** Patches, Riparian buffer, Urban Design

6.1.3. Miller, J. R. 2008. "Conserving Biodiversity in Metropolitan Landscapes: A Matter of Scale (But Which Scale?)." *Landscape Journal* 27 (1) (April 1): 114–126.

6.1.3.1. **Abstract:** More than half of the world's people live in metropolitan areas and this number will only increase. Because more and more people will have most of their direct contact with nature in urban settings, the biodiversity that remains there will assume ever greater importance. In many ways, the prospects for biodiversity in more remote areas will depend on the values and attitudes of city-dwellers. Native species and the habitats or ecosystems that support them provide an array of services that people value and need. Recognizing that biodiversity is threatened by urbanization and yet also contributes to the quality of life in cities, it is important that we place greater emphasis on designing the places where we live and work in ways that accommodate the needs of other species and highlights the interdependence between people and the natural world. Achieving these objectives will require a balance between consideration of the broader patterns and flows that provide context for a given site, and careful attention to site ecology. The greatest chance for success rests in our ability to find "win-win" scenarios in which both people and biodiversity benefit. This article describes a number of possibilities for this type of synergy, and suggests ways that landscape architects might join with ecologists and other environmental professionals in this important work.

6.1.4. Sandström, U.G., P. Angelstam, and G. Mikusiński. 2006. "Ecological Diversity of Birds in Relation to the Structure of Urban Green Space." *Landscape and Urban Planning* 77 (1–2) (June 15): 39–53. doi:10.1016/j.landurbplan.2005.01.004.

6.1.4.1. **Abstract:** "A functional network of green space is important for the maintenance of the ecological dimension of a sustainable urban landscape. We used avian ecological diversity as a proxy for evaluating the functionality of different types of urban green space. The urban landscape of the municipality of Örebro in Sweden was stratified into four strata (City centre, Residential, Greenway and Periphery). Bird species found in these strata were classified into four ecological groups with decreasing degree of specialisation (woodpeckers, hole-nesters, forest birds and urban birds). Overall there was lower bird species richness in the City centre and Residential areas compared to the Greenway and Periphery. Woodpeckers, hole-nesters and forest birds showed an increasing trend in the number of species as well as individuals from the City centre to the Periphery while urban birds showed the opposite trend. The amount and quality of green space as well as natural vegetation increased from the City centre to the Periphery. Species richness of woodpeckers, forest birds and hole-nesters were positively correlated with tree density while urban birds showed an inverse correlation. There was no dead wood in City centre, Residential and Greenway in contrast to the Periphery, which held some dying trees, stumps and old windthrows. Our findings emphasise the importance of urban green space with natural structures to maintain high ecological diversity. Finally, we discuss how conflicts between habitat for biodiversity maintenance and other functions of green space could be handled by zoning."

6.2. Ecosystems

6.2.1. Corvalan, Carlos F, Simon Hales, and Anthony McMichael. 2005. *Ecosystems and human well-being a report of the millennium ecosystem assessment*. Geneva: World Health Organization. http://www.who.int/globalchange/ecosystems/ecosys.pdf.

6.2.1.1. **Abstract:** The Millennium Ecosystem Assessment was carried out between 2001 and 2005 to assess the consequences of ecosystem change for human well-being and to establish the scientific basis for actions needed to enhance the conservation and sustainable use of ecosystems and their contributions to human well-being. The MA responds to government requests for information received through four international conventions—the Convention on Biological Diversity, the United Nations Convention to Combat Desertification, the Ramsar Convention on Wetlands, and the Convention on Migratory Species—and is designed to also meet needs of other stakeholders, including the business community, the health sector, nongovernmental organizations, and indigenous peoples. The sub-global assessments also aimed to meet the needs of users in the regions where they were undertaken.

6.2.1.2. **Tertiary Key Words:** Human Well-being

6.2.2. Miller, J. R. 2008. "Conserving Biodiversity in Metropolitan Landscapes: A Matter of Scale (But Which Scale?)." *Landscape Journal* 27 (1) (April 1): 114–126.

6.2.2.1. **Abstract:** See *6.1.3.1*

6.2.3. Zhang, Yi, Shweta Singh, and Bhavik Bakshi. "Accounting for Ecosystem Services in Life Cycle Assessment, Part I: A Critical Review." *Environmental Science Technology*. 44. no. 7 (2010): 2232-2242. http://pubs.acs.org/doi/abs/10.1021/es9021156?ai=54taf=R (accessed November 25, 2012).

6.2.3.1. **Abstract:** See *2.2.20.1*

6.3. Education

6.3.1. Bergman, Marc; Jonides, John; and Kaplan, Stephen. 2008. "The Cognitive Benefits of Interacting with Nature." *Psychological Science* 19(12):1207-1212.

6.3.1.1. **Abstract:** See 2.4.1.1

6.3.2. Gobster, Paul H. 2007. "Urban Park Restoration and the 'Museumification' of Nature." *Nature and Culture* 2(2):95-114.

6.3.2.1. **Abstract:** See 2.4.2.1

6.3.3. Hollander, Justin; Niall Kirkwood; and Julia Gold. 2010. *Principles of Brownfield Regeneration.* Washington DC: Island Press.

6.3.3.1. **Summary:** See 8.1.2.1

6.3.4. Hung, Ryan. 2007. "Educating For and Through Nature: A Merleau-Pontian Approach." *Springer Science + Business Media* 27:355-367.

6.3.4.1. **Abstract:** This paper aims to explore the relationship between humans and nature and the implied intimacy, so-call 'ecophilia,' in light of the French philosopher Maurice Merleau-Ponty. It is revealed from the Merleau-Pontian view of body and nature that there may be a more harmonious relationship between humankind and nature than the commonly assumed, and an alternative understanding of education may thus arise. Following an introduction, this paper falls into three parts: an exploration of the meaning of nature, the corporeality of the body as central to our encounter with nature and the educational implications. The introduction argues that central to one's understanding of nature is one's understanding of oneself and the world. To some extent, our current environmental problems are related to a negative understanding of nature. The meaning of nature and our relationship with it will be elaborated by the exploration of the key significance of body to be found in Merleau-Ponty's philosophy. It will be argued that overall, our understanding of the body may be central to reconnecting humankind and nature. Such a re-conceiving of the part played by the body in our relationship with nature may re-orient education towards a love of nature: ecophilia.

6.3.4.2. **Tertiary Key Words:** Environmental Education

6.3.5. Jackson, Lucinda. 2001. "Beyond Clean-Up of Manufactured Sites: Remediation, Restoration and Renewal of Habitat." In *Manufactured Sites,* 35-42. London: SponPress.

6.3.5.1. **Summary**: See 8.3.5.1

6.4. Habitat Restoration

6.4.1. BRWG. 2009. "Swan River Restoration Project." *Blue River Watershed Group*. http://blueriverwatershed.org/overview/swan-river-restoration-project/.

6.4.1.1. **Abstract:** See *2.2.4.1*

6.4.2. Hollander, Justin; Niall Kirkwood; and Julia Gold. 2010. *Principles of Brownfield Regeneration.* Washington DC: Island Press.

6.4.2.1. **Summary:** See 8.1.2.1

6.4.3. Robinson, Alexander, and H. Myvonwynn Hopton. 2011. “Cheonggyecheon Stream Restoration Project”. Landscape Architecture Foundation. http://lafoundation.org/research/landscape-performance-series/case-studies/case-study/382/pdf/.

6.4.3.1. **Abstract:** See *2.2.11.1*

6.4.4. 2012. “Root River Watershed Restoration Plan.” *Southeastern Wisconsin Regional Planning Commission*. http://www.sewrpc.org/SEWRPC/Environment/Root-River-Watershed-Restoration-Plan.htm.

6.4.4.1. **Abstract:** See *2.2.12.1*

7. Vegetation

7.1. Carbon Sequestration

7.1.1. Follett, R.F. 2001. “Soil Management Concepts and Carbon Sequestration in Cropland Soils.” *Soil & Tillage Research* 61: 77–92.

7.1.1.1. **Abstract:** One of the most important terrestrial pools for carbon (C) storage and exchange with atmospheric CO_2 is soil organic carbon (SOC). Following the advent of large-scale cultivation, this long-term balance was disrupted and increased amounts of SOC were exposed to oxidation and loss as atmospheric CO_2 . The result was a dramatic decrease in SOC. If amounts of C entering the soil exceed that lost to the atmosphere by oxidation, SOC increases. Such an increase can result from practices that include improved: (1) tillage management and cropping systems, (2) management to increase amount of land cover, and (3) efficient use of production inputs, e.g. nutrients and water. Among the most important contributors is conservation tillage (i.e., no-till, ridge-till, and mulch-tillage) whereby higher levels of residue cover are maintained than for conventional-tillage. Gains in amount of land area under conservation tillage between 1989 and 1998 are encouraging because of their contributions to soil and water conservation and for their potential to sequester SOC. Other important contributors are crop residue and biomass management and fallow reduction. Collectively, tillage management and cropping systems in the US are estimated to have the potential to sequester 30-105 million metric tons of carbon (MMTC) yr ^-1 . Two important examples of management strategies whereby land cover is increased include crop rotations with winter cover crops and the conservation reserve program (CRP). Such practices enhance SOC sequestration by increasing the amount and time during which the land is covered by growing plants. Crop rotations, winter cover crops, and the CRP combined have the potential to sequester 14-29 MMTC yr ^-1 . Biomass production is increased by efficient use of production inputs. Optimum fertility levels and water availability in soils can directly affect quantity of crop residues produced for return to the soil and for SOC sequestration. Nutrient inputs and supplemental irrigation are estimated to have the potential to sequester 11-30 MMTC yr ^ -1 . In the future, it is important to acquire an improved understanding of SOC sequestration processes, the ability to make quantitative estimates of rates of SOC sequestration, and technology to enhance these rates in an energy-and input-efficient manner. Adoption of improved tillage practices and cropping systems, increased land cover, and efficient use of nutrient and water inputs are examples where such information is necessary.

7.1.2. Lal, R. 2004. "Soil Carbon Sequestration to Mitigate Climate Change." *Geoderma* 123 (1–2) (November): 1–22. doi:10.1016/j.geoderma.2004.01.032.

7.1.2.1. **Abstract:** The increase in atmospheric concentration of CO_2 by 31% since 1750 from fossil fuel combustion and land use change necessitates identification of strategies for mitigating the threat of the attendant global warming. Since the industrial revolution, global emissions of carbon (C) are estimated at 270±30 Pg (Pg=petagram=10^{15} g=1 billion ton) due to fossil fuel combustion and 136±55 Pg due to land use change and soil cultivation. Emissions due to land use change include those by deforestation, biomass burning, conversion of natural to agricultural ecosystems, drainage of wetlands and soil cultivation. Depletion of soil organic C (SOC) pool have contributed 78±12 Pg of C to the atmosphere. Some cultivated soils have lost one-half to two-thirds of the original SOC pool with a cumulative loss of 30–40 Mg C/ha (Mg=megagram=10^6 g=1 ton). The depletion of soil C is accentuated by soil degradation and exacerbated by land misuse and soil mismanagement. Thus, adoption of a restorative land use and recommended management practices (RMPs) on agricultural soils can reduce the rate of enrichment of atmospheric CO_2 while having positive impacts on food security, agro-industries, water quality and the environment. A considerable part of the depleted SOC pool can be restored through conversion of marginal lands into restorative land uses, adoption of conservation tillage with cover crops and crop residue mulch, nutrient cycling including the use of compost and manure, and other systems of sustainable management of soil and water resources. Measured rates of soil C sequestration through adoption of RMPs range from 50 to 1000 kg/ha/year. The global potential of SOC sequestration through these practices is 0.9±0.3 Pg C/year, which may offset one-fourth to one-third of the annual increase in atmospheric CO_2 estimated at 3.3 Pg C/year. The cumulative potential of soil C sequestration over 25–50 years is 30–60 Pg. The soil C sequestration is a truly win–win strategy. It restores degraded soils, enhances biomass production, purifies surface and ground waters, and reduces the rate of enrichment of atmospheric CO_2 by offsetting emissions due to fossil fuel.

7.1.3. Nowak, David J., and Daniel E. Crane. 2002. "Carbon Storage and Sequestration by Urban Trees in the USA." *Environmental Pollution* 116 (3) (March): 381–389. doi:10.1016/S0269-7491(01)00214-7.

7.1.3.1. **Abstract:** Based on field data from 10 USA cities and national urban tree cover data, it is estimated that urban trees in the coterminous USA currently store 700 million tonnes of carbon ($14,300 million value) with a gross carbon sequestration rate of 22.8 million tC/yr ($460 million/year). Carbon storage within cities ranges from 1.2 million tC in New York, NY, to 19,300 tC in Jersey City, NJ. Regions with the greatest proportion of urban land are the Northeast (8.5%) and the southeast (7.1%). Urban forests in the north central, northeast, south central and southeast regions of the USA store and sequester the most carbon, with average carbon storage per hectare greatest in southeast, north central, northeast and Pacific northwest regions, respectively. The national average urban forest carbon storage density is 25.1 tC/ha, compared with 53.5 tC/ha in forest stands. These data can be used to help assess the actual and potential role of urban forests in reducing atmospheric carbon dioxide, a dominant greenhouse gas.

7.1.4. Sohngen, Brent, and Robert Mendelsohn. 2003. "An Optimal Control Model of Forest Carbon Sequestration." *American Journal of Agricultural Economics* 85 (2) (May 1): 448–457. doi:10.1111/1467-8276.00133.

7.1.4.1. **Abstract:** This study develops an optimal control model of carbon sequestration and energy abatement to explore the potential role of forests in greenhouse gas mitigation. The article shows that if carbon accumulates in the atmosphere, the rental price for carbon sequestration should rise over time. From an empirical model, we find that carbon sequestration is costly, but that landowners can sequester substantial amounts of carbon in forests mainly by increasing forestland and lengthening rotations. Forest sequestration is predicted to account for about one-third of total carbon abatement. Tropical forests store over two-thirds of this added carbon.

7.2. Heat Island Effect

7.2.1. Hien, Wong Nyuk, and Steve Kardinal Jusuf. 2008. "GIS-based Greenery Evaluation on Campus Master Plan." *Landscape and Urban Planning* 84 (2) (February 6): 166–182. doi:10.1016/j.landurbplan.2007.07.005.

7.2.1.1. **Abstract:** "In the previous study, it was found that urban heat island intensity in National University of Singapore (NUS) campus as high as 4 °C at around 13:00. It is also concluded that the presence of dense greenery in NUS environment is very important in keeping low ambient temperature.

National University of Singapore has announced its new master plan in 2005, entitled NUS Master Plan 2005. Many new buildings will be built and in some areas existing greenery will be removed. Geographical Information System (GIS) was use to evaluate the greenery condition. It was found that the greenery rate of NUS Master Plan 2005 will drop by about 3% from 55.10% of NUS current condition to 52.31%. In order to have a sustainable environment, the greenery condition should be at least maintained at the same rate or even make it better.

For this purpose, potential of increasing greenery area by rooftop greenery application was also done. The target is to maintain the green rate of different zones at the same rate with current condition. In total, there will be more than 56% new buildings in NUS Master Plan 2005. Therefore, there is a good opportunity to plan and introduce the rooftop greenery or vertical greenery since in the early design stage.

The ENVI-met simulation predicts that the ambient temperature in NUS environment will increase about 1 °C when NUS Master Plan 2005 is completed. It is due to the reduction of greenery rate."

7.2.2. Rosenzweig, Cynthia et al. 2006. “Mitigating New York City’s Heat Island with Urban Forestry, Living Roofs, and Light Surfaces.”

7.2.2.1. **Abstract:** "New York City, like other large cities, is warmer than surrounding areas due to the urban heat island effect, which is defined as an increase in urban air temperature as compared to surrounding suburban and rural temperature. The development of a heat island has regional-scale impacts on energy demand, air quality, and public health. Heat island mitigation strategies, such as urban forestry, living/green roofs, and light surfaces, could be implemented at the community level within New York City, but their effects need to be tested with comparable methodologies. This study uses a regional climate model (MM5) in combination with observed meteorological, satellite, and GIS data to determine the impact of each of the mitigation strategies on surface and near-surface air temperature in the New York Metropolitan Region over space and time. The effects of localized changes in land surface cover in six case study areas are evaluated in the context of regional atmospheric mixing."

7.2.3. Taha, H., H. Akbari, and A. Rosenfeld. 1991. “Heat Island and Oasis Effects of Vegetative Canopies: Micro-meteorological Field-measurements.” *Theoretical and Applied Climatology* 44 (2): 123–138. doi:10.1007/BF00867999.

7.2.3.1. **Abstract:** "Dry-bulb temperature, dew-point, wind speed, and wind direction were measured in and around an isolated vegetative canopy in Davis CA from 12 to 25 October 1986. These meteorological variables were measured 1.5 m above ground along a transect of 7 weather stations set up across the canopy and the upwind/downwind open fields. These variables were averaged every 15 minutes for a period of two weeks so we could analyze their diurnal cycles as well as their spatial variability. The results indicate significant nocturnal heat islands and daytime oases within the vegetation stand, especially in clear weather. Inside the canopy within 5 m of its upwind edge, daytime temperature fell by as much as 4.5 °C, whereas the nighttime temperature rose by 1 °C. Deeper into the canopy and downwind, the daytime drop in temperature reached 6 °C, and the nighttime increase reached 2 °C. Wind speed was reduced by ∼ 2 ms^{-1} in mild conditions and by as much as 6.7 ms^{-1} during cyclonic weather when open-field wind speed was in the neighborhood of 8 ms^{-1}. Data from this project were used to construct correlations between temperature and wind speed within the canopy and their corresponding ambient, open-field values."

7.2.4. Weng, Qihao, Dengsheng Lu, and Jacquelyn Schubring. 2004. "Estimation of Land Surface Temperature–vegetation Abundance Relationship for Urban Heat Island Studies." *Remote Sensing of Environment* 89 (4) (February 29): 467–483. doi:10.1016/j.rse.2003.11.005.

7.2.4.1. **Abstract:** "Remote sensing of urban heatislands (UHIs) has traditionally used the Normalized Difference Vegetation Index (NDVI) as the indicator of vegetation abundance to estimate the land surface temperature (LST)–vegetation relationship. This study investigates the applicability of vegetation fraction derived from a spectral mixture model as an alternative indicator of vegetation abundance. This is based on examination of a Landsat Enhanced Thematic Mapper Plus (ETM+) image of Indianapolis City, IN, USA, acquired on June 22, 2002. The transformed ETM+ image was unmixed into three fraction images (green vegetation, dry soil, and shade) with a constrained least-square solution. These fraction images were then used for land cover classification based on a hybrid classification procedure that combined maximum likelihood and decision tree algorithms. Results demonstrate that LST possessed a slightly stronger negative correlation with the unmixed vegetation fraction than with NDVI for all land cover types across the spatial resolution (30 to 960 m). Correlations reached their strongest at the 120-m resolution, which is believed to be the operational scale of LST, NDVI, and vegetation fraction images. Fractal analysis of image texture shows that the complexity of these images increased initially with pixel aggregation and peaked around 120 m, but decreased with further aggregation. The spatial variability of texture in LST was positively correlated with those in NDVI and in vegetation fraction. The interplay between thermal and vegetation dynamics in the context of different land cover types leads to the variations in spectral radiance and texture in LST. These variations are also present in the other imagery, and are responsible for the spatial patterns of urban heatislands. It is suggested that the areal measure of vegetation abundance by unmixed vegetation fraction has a more direct correspondence with the radiative, thermal, and moisture properties of the Earth's surface that determine LST."

7.3. Habitat Restoration

7.3.1. Ewel, John J., and Francis E. Putz. 2004. “A Place for Alien Species in Ecosystem Management” 2 (7): 354–360. http://noss.cos.ucf.edu/papers/Ewel%20and%20Putz%202004.pdf

7.3.1.1. **Abstract:** Blanket condemnation of alien species in restoration efforts is counterproductive. Where their presence does not unduly threaten surrounding ecosystems, alien species can be tolerated or even used to good advantage, if they provide essential ecological or socioeconomic services. By speeding restoration or making it more effective, non-native species can provide economic and ecological payoffs. Risk is always an issue when alien species are involved, but greater risk taking is warranted where environmental conditions have been severely modified through human activity than where reassembly of a biological community is the sole goal of restoration.

7.3.2. USDA, and NRCS. 2008. “Rapid Watershed Assessment: Root River.” United States Department of Agriculture and Natural Resources Conservation Service. Assessed January 16, 2013. http://www.ia.nrcs.usda.gov/technical/RWA/root.pdf.

7.3.2.1. **Abstract:** See *2.1.7.1*

8. Soil

8.1. Brownfield

8.1.1. Carman, Eric. 2001. “From Laboratory to Landscape: A Case History and Possible Future Direction for Phyto-enhanced Soil Bioremediation.” In *Manufactured Sites*, 43-50. London: SponPress.

8.1.1.1. **Summary:** In Manufactured Sites, Eric Carman stated that phytoremediation strategies were less expensive and could be combined with conventional remediation efforts. New technologies and plant adaptations are being researched to develop a unique planting palette. Extraction of contaminants from soil, sediment, and water is stored in the rhizosphere through root absorption and is transpired out of the leaves. Phreatophytes change the impact of contaminants on the ground by creating plumes. Carman articulated the process of phytoremediation as a low cost, a less intrusive, slower process remediation process; the inconsistent results, maintenance requirements, and incineration needs after remediation. Eric Carman talked about the habitat benefits of phytoremediation versus conventional remediation. The creation of habitat and limited vegetation systems provides a new research topic to evolve the planting palette past poplar and willow trees.

8.1.1.2. **Tertiary Key Words:** Cost, Phytoremediation, Poplar Trees, Willow Trees

8.1.2. Hollander, Justin; Niall Kirkwood; and Julia Gold. 2010. *Principles of Brownfield Regeneration.* Washington DC: Island Press.

8.1.2.1. **Summary:** Justin Hollander, Niall Kirkwood, and Julia Gold's book Principles of Brownfield Regeneration evaluated the methods of remediation and their affect on the soil. The term brownfield was from the 1990s. The EPA developed the concept of regeneration for these properties. Brownfields were important lands to remediate and can be used as green space. The book addressed the benefits of brownfield regeneration as economic boosts, cultural understanding and stewardship, educational gains, and habitat restoration. Gold et al suggested having a multidisciplinary team structure to avoid error. Once a common group goal was established, the authors stressed the importance of a community outreach plan that allowed feedback from the community.

8.1.2.1.1. **Tertiary Key Words:** Cost, Environmental Education

8.2. Remediation

8.2.1. Carman, Eric. 2001. "From Laboratory to Landscape: A Case History and Possible Future Direction for Phyto-enhanced Soil Bioremediation." In *Manufactured Sites*, 43-50. London: SponPress.

8.2.1.1. **Summary:** See 8.1.1.1

8.2.2. Hollander, Justin; Niall Kirkwood; and Julia Gold. 2010. *Principles of Brownfield Regeneration.* Washington DC: Island Press.

8.2.2.1. **Summary:** See 8.1.2.1

8.3. Soil Contaminants

8.3.1. Abu-Zreig, M, R P Whiteley, H R Lalonde, and N K Kaushik. "Phosphorus removal in vegetated filter strips." *Journal of Environmental Quality 32*, 2003: 613-619.

8.3.1.1. **Abstract:** "Vegetated filter strips (VFS) are used recently for removal, at or near the source, of sediment and sediment-bound chemicals from cropland runoff. Vegetation within the flowpath increases water infiltration and decreases water turbulence, thus enhancing pollutant removal by sedimentation within filter media and infiltration through the filter surface. Field experiments have been conducted to examine the efficiency of vegetated filter strips for phosphorus removal from cropland runoff with 20 filters with varying length (2 to 15 m), slope (2.3 and 5%), and vegetated cover, including bare-soil plots as control. Artificial runoff used in this study had an average phosphorus concentration of 2.37 mg L^{-1} and a sediment concentration of 2700 mg L^{-1} The average phosphorus trapping efficiency of all vegetated filters was 61% and ranged from 31% in a 2-m filter to 89% in a 15-m filter. Filter length has been found to be the predominant factor affecting P trapping in VFS. The rate of inflow, type of vegetation, and density of vegetation coverage had secondary influences on P removal. Short filters (2 and 5 m), which are somewhat effective in sediment removal, are much less effective in P removal. Increasing the filter length beyond 15 m is ineffective in enhancing sediment removal but is expected to further enhance P removal. Sediment deposition, infiltration, and plant adsorption are the primary mechanisms for phosphorus trapping in VFS" (Abu-Zreig, et al. 2003).

8.3.1.2. **Tertiary key words:** Vegetated filter strips, Phosphorous removal.

8.3.2. Carman, Eric. 2001. "From Laboratory to Landscape: A Case History and Possible Future Direction for Phyto-enhanced Soil Bioremediation." In *Manufactured Sites*, 43-50. London: SponPress.

8.3.2.1. **Summary:** See 8.1.1.1

8.3.3. Franklin, John. "Kansas City, Missouri Overflow Control Plan Overview". The City of Kansas City, January 30, 2009.

8.3.3.1. **Summary:** See 3.2.14.1

8.3.4. Hollander, Justin; Niall Kirkwood; and Julia Gold. 2010. *Principles of Brownfield Regeneration.* Washington DC: Island Press.

8.3.4.1. **Summary:** See 8.1.2.1

8.3.5. Jackson, Luncinda. 2001. "Beyond Clean-Up of Manufactured Sites: Remediation, Restoration and Renewal of Habitat." In *Manufactured Sites*, 35-42. London: SponPress.

8.3.5.1. **Summary:** Lucinda Jackson's chapter in Manufactured Sites talked about the multi-discipline process of cleaning post-industrial landscapes and its benefit to the local habitat. The importance of phytoremediation to detoxify brownfields can only be realized through public interest. Educating people on human health and ecological risks by testing soils and groundwater promotes public awareness to reshape policy.

8.3.5.2. **Tertiary Key Words:** Environmental Education, Groundwater, Post-Industrial Landscapes, Public Interest

8.3.6. Rock, Steven. 2001. "Phytoremediation: Integrating Art and Engineering Through Planting." In *Manufactured Sites* 52-59. London: SponPress.

8.3.6.1. **Summary:** Steven Rock's chapter in Manufactured Sites elaborated on the interdisciplinary approach to phytoremediation. The cost effective solution often had an aesthetic and an ecological gain. The art of planting was considered as a proper layered landscape of re-growth. Early on in the remediation process, a plant comes in contact with contamination, either dying, ignores it, or breaks down the compound and confuses it for a nutrient. Metals are stored in the roots and stay in the leaves or fruit. Metals are incredibly harmful to humans and to plants. The benefits of phytoremediation include erosion control, aesthetics, creation of plumes in the groundwater, and a natural cap solution. Rock explained the process of degradation to allow plants to establish microbial populations. The plant process absorbs the contaminants and drops the leaves to eventually be detritus for the soil. The soil then uses the organic matter to take in more water, breaking up compounds and making enzymes to break down compounds further.

8.3.6.2. **Tertiary Key Words:** Cost, Detritus, Erosion Control, Groundwater, Phytoremediation, Root Storage

9. Aesthetics

9.1. Nature

9.1.1. Corrigan, Jay R., Kevin J. Egan, and John A. Downing. 2007. "Aesthetic Values of Lakes and Rivers." http://economics.kenyon.edu/corrigan/publications/Aesthetic%20Values%20of%20Lakes%20and%20Rivers.pdf.

9.1.1.1. **Abstract:** The aesthetic quality of water resources is often assumed to be valuable to society, yet few robust estimates of this value have been reported in the limnological literature. Because entire lakes and rivers are not bought and sold regularly, their aesthetic value cannot be determined by differences in market prices. Therefore, economically valid estimates must be determined by methods that estimate willingness to pay (WTP) for aesthetic value. Methods for and example results of an environmental valuation study to estimate local residents' and visitors' WTP for improved aesthetic quality in Clear Lake (Iowa, USA), a eutrophic, natural lake are presented.

Both revealed preference and stated preference techniques for estimating value are considered. In the revealed preference application, WTP is inferred by comparing the number of times survey respondents planned to visit the lake given its current conditions with the number of times they would plan to visit if the lake's water quality were improved. In the stated preference application, WTP is inferred by presenting survey respondents with a hypothetical ballot initiative offering improved water quality and resulting higher taxes associated, then estimating the highest tax bill at which the ballot initiative would have passed.

9.1.1.2. **Tertiary Key Words**: Water Quality

9.1.2. Silva, Jorge, Graca Saraiva, Isabel Ramos, Filipa Monteiro, Fernando Nunes da Silva, and Cristina Camara. 2004. "Urban River Basin Enhancement Methods: Classification of the Aesthetic Value of the Selected Urban Rivers". URBEM. http://www.urbem.net/WP4/4-2_Aesthetic_evaluation.pdf.

9.1.2.1. **Abstract:** "This document aims at reporting on the approach pursued to establish a methodology to evaluate and classify the aesthetic values of urban watercourses. In the framework of the URBEM the overall aim is the integration of these aesthetic values, that can have both tangible and intangible dimensions, into decision making process for river rehabilitation. Together with these issues, it was intended to analyse the debate on river landscapes quality perception and evaluation, based mainly on expert assessment, but integrating also results deriving from public surveys.

CESUR-IST/UTL methodology for the assessment of river corridors is focused in the aesthetical value in order to guide rehabilitation interventions at city scale to make the most of their potential aesthetical value (Part I). Closely linked to this methodology TUDRESDEN developed a "Site method for aesthetic evaluation" that aims at being specially designed for assessment of project sites before and after improvement (Part II) focused on the project scale."

9.1.3. Yu, Kongjian. 2011. "Stormwater Park for a Water Resilient City." *Topos: European Landscape Design Magazine.* Munchen (77): 72–77.

9.1.3.1. **Abstract:** See *2.2.19.1*

10. Economics

10.1. History

10.1.1. Brown, Rebekah. 2008. "Local institutional development and organizational change for advancing sustainable urban water futures." Environmental Management. February, 41(2): 221-233. Accessed March 15, 2013. http://www.ncbi.nlm.nih.gov/pubmed/18027015

10.1.1.1. **Abstract:** See 2.3.1.1

10.1.1.2. **Tertiary Key Words:** Administrative Systems, Benchmarking

10.1.2. Brown, Rebekah, Nina Keath and Tony Wong. 2009. "Urban water management in cities: historical, current and future regimes." Water Science and Technology 59(5): 847-855. Accessed March 15, 2013. http://www.ncbi.nlm.nih.gov/pubmed/19273883.

10.1.2.1. **Abstract:** See 2.3.1.1

10.1.2.2. **Tertiary Key Words:** Transistions Framework, Water Sensitive Case Studies

10.1.3. Hubbard, Phil and Malcom Miles. 1998. "Representation, Culture and Identities: Introducaiton." In *The Entrepreneurial City*, 199-223. West Sussix: John Wiley and Sons Inc.

10.1.3.1. **Summary:** Phil Hubbard and Malcom Miles' chapter in The Entrepreneurial City articulated the importance of a city's identity through local business investment. Hubbard and Miles conveyed that the focus of the art within cities should be on the public. A city is rich in culture will be diverse residents and investors. Hubbard and Miles discussed art rooted in historical values of the city. They also warn readers to avoid art without a common good to society, as it can cause gentrification. Public art should be a process benefiting the community over the client. The chapter identified two successful forms of urban art: showing an urban contradiction, and art that is interactive.

10.1.3.2. **Tertiary Key Words**: Business Investment, Gentrification, Historic Values, Identity, Local Economy

10.2. Performance Benefits

10.2.1. Costanza, Robert, Ralph d' Arge, Rudolf de Groot, Stephen Farber, Monica Grasso, Bruce Hannon, Karin Limburg, et al. 1997. "The Value of the World's Ecosystem Services and Natural Capital." *, Published Online: 15 May 1997; | Doi:10.1038/387253a0* 387 (6630) (May 15): 253–260. doi:10.1038/387253a0.

10.2.1.1. **Abstract:** The services of ecological system and the natural capital stocks that produce them are critical to the functioning of the Earth's life-support system. They contribute to human welfare, both directly and indirectly, and therefore represent part of the total economic value of the planet. We have estimated the current economic value of 17 ecosystem services for 16 biomes, based on published studies and a few original calculations. For the entire biosphere, the value (most of which is outside the market) is estimated to be in the range of US$16-54 trillion (10 ^ 12) per year, with an average of US$33 trillion per year. Because of the nature of the uncertainties, this must be considered a minimum estimate. Global gross national product total is around US$18 trillion per year.

10.2.1.2. **Tertiary Key Words:** Ecological Benefits

10.3. Policy

10.3.1. Mell, Ian. (2008). "Green infrastructure: concepts and planning." FORUM Ejournal. June 2008: 69-80. Accessed March 15, 2013. http://www.urbanspaces.eu/files/Green-Infrastructure-Newcastle.pdf

10.3.1.1. **Abstract:** See 2.4.3.1