Growth Conflicts: The Great Trinity Forest Dallas, Texas

Public-Private Commitments to Forest Recovery

A Case Study by Callahan Seltzer

Ecological Urbanism, Fall 2014
Professor Anne Whiston Spirn
Massachusetts Institute of Technology

"It is time to employ one of the greatest human talents, the ability to manipulate the environment, to transform an environment that has become hostile to life itself, into a humane habitat which sustains life and nourishes growth, both personal and collective."
(Anne Whiston Spirn, 1984)

This case study examines two types of commitments the City of Dallas has made to repair and preserve an urban forest amidst various social, economic, and environmental pressures. The city has embarked on two separate, but related efforts to regrow and restore the Great Trinity Forest: 1) the development of the Trinity River Audubon Center (TRAC) in the south Dallas area known as Deepwood and 2) the creation of Great Trinity River Forest Management Plan.

Drawn from interviews, extensive document reviews, photography, and a site visit, the case attempts to answer two questions 1) how has the City of Dallas chosen to restore and protect this urban forest? 2) what can we learn from these approaches?

Exploration of these questions has revealed answers that are more sociospatial than scientific: a robust, multidimensional set of narratives of cultures, neighborhood histories, and relationships between humans and nature emerges, all *growing together* in the Trinity Forest.

Why Study The Great Trinity Forest?

The key to understanding the Great Trinity Forest is to focus on it not as just a natural feature or urban asset, but as part and product of natural and human history and processes. This urban forest is at the nexus of social, ecological, and economic pressures.[1] A critical understanding of the impact of these pressures necessitates a cross-disciplinary approach. Many researchers and practitioners have argued that studying environmental history provides useful context for how humans have interacted with nature over time (Spirn 2013, Cronon 1991, Gandy 2002, Klingle 2007). Other researchers have debated the aesthetics-ecology relationship and how aesthetics impact the human experience of landscape, and whether design interventions can improve the relationships between aesthetics and ecology (Gobster, Nassauer, Daniel, Fry 2007). A more complete understanding of the "deep, enduring context" that Spirn refers to—including human and natural history—can help us redefine how we choose to interact with nature in the built environment going forward in our own professional practices (Spirn 2013). In an effort to explicate and apply the lessons of the Great Trinity Forest, this case is presented as part history, part politics, part environmental design. The case traces two projects that exemplify the complicated interactions between these fields over time.

Imbedded Narratives

The narrative style of this case is intended to trace how interactions and processes—politics, history, ecology—are defined by cultural narratives across time. Early narratives describe a forest heavy in functional and spiritual meaning for Apache and Comanche native peoples. Several Native American Marker trees still stand are a poignant symbol of the human connection to this landscape. Later narratives describe cutting the forest to build the city's first houses, followed by large clearings to carve the river into a tidal basin fit for barges from the Gulf of Mexico. More recent narratives describe horrific racial and environmental injustices in Deepwood, the heart of the urban forest.

Over and over, the bottomland hardwood forest was cut and degraded throughout the 18th and 19th century. Its regrowth was inconsistent, unstable, and patchy. The narratives are patchy, too—spanning many decades, human activities, and interactions with the forest. Together, these narratives are a roadmap for understanding how ecology, history, and politics combine in the urban environment. The Trinity Forest is a metaphor for understanding the interplay of these forces, in trinity, and a bridge for connecting these processes to new knowledge about the vital environmental, social, and economic functions that urban forests serve.

1 Many theorists and practitioners have described the significance of viewing nature as processes, including Spirn (1984), Picket, and Cadenasso (2008)

Growing an Urban Forest Case Study:

This case begins with a broad overview of the history of the Great Trinity River Forest and how people have degraded the heart of forest, Deepwood, since the 1970s. The case explicates the two most important, albeit incomplete, efforts that the City has undertaken to create a new future for this forest: 1) the development of the Trinity River Audubon Center (TRAC) in the south Dallas area known as Deepwood and 2) the creation of Trinity Forest Management Plan (TFMP).

Methane gas from the Deepwood landfill is still visible (2014).

Dallas: Where Four Natural Landscapes Meet

The Great Trinity Forest can be understood as both root and product of natural and human history. In a landscape laden with centuries of human intervention, the case begins with how the natural landscape appeared to its earliest settlers.[1]

Dallas is at the crossroads of the Blackland Prairie and Cross Timbers regions of the United States. A traveler moving east from the City soon encounters a heavily wooded landscape. Pinewood forests emerge within 100 miles of the city limits and continue for hundreds of miles along highway 20, all the way to the Atlantic coast. If one leaves the city headed south, she begins to pass through the rolling hills and cedar trees of Texas "hill country" which extends all the way to central Texas. The areas West of Dallas become flat, rocky, but also dry and laden with oil fields that exemplify the western Texas landscape. In sharp contrast to the more wooded areas east and south, a person driving north towards Oklahoma experiences one of the flattest, straightest roads in the country, lined by prairie grasses. Extending northwards 100 miles from the city, big box development and typical patterns of suburbia slowly gives way to agricultural land.

From these four different natural landscapes arose four valuable commodities: timber to the east, oil to the south, cattle and livestock to the west, and cotton and corn to the north. The City of Dallas was born as a trading post to connect these four products to their respective growing markets. The Trinity River area was settled for trade purposes and because it was ideal for herds of buffalo; its hardwood forest perfect for building a town.

1 Humans have settled along the Trinity River for over 12,000 years. This case will not attempt to cover the history of native peoples in relation to the Trinity Forest but many historians have described the significance of this forest and river to the earliest inhabitants of the area known as north Texas, including Pratt.

2 Photo Source: Library of Congress, http://www.loc.gov/item/2007660628/ Accessed: November 21, 2014.

Growth Patterns

Various growth patterns have impacted the Great Trinity Forest, including a series of forest cuts for agricultural purposes, attempted canalization of the River, and urban and suburban developments. For hundreds of years before there was a city, the Trinity Forest was sacred to Comanche and Apache native peoples, and roamed by black bear, buffalo, and deer. John Neely Bryan, a ferry operator along the Trinity River, imposed the first street grid on this natural landscape in 1841.[1] Soon thereafter, the city's growth was at odds with the ecological processes of the bottomland hardwood forest. Much of the Trinity River watershed was stripped of its watershed forest, a conflict still visible in the barren stretches of the Trinity River across most of central and north Dallas. The forest, too, reflects this history: many of its trees are less than 50 years old.

Canalization: The Great Trinity Forest was repeatedly degraded by centuries of urban development and human use. The 19th century gave rise to a series of land grabs and attempts to manipulate and control the Trinity for navigation purposes. In the early 1900s, the City attempted a massive canalization project to create an inland port from the gulf of Mexico (300 miles away). The canalization cleared thousands of acres of native hardwoods and flooded grasslands. After several decades and an engineering effort likened to building the Panama Canal, the great Port of Dallas project failed, leaving much of the Trinity Forest literally stuck in the mud.

1 James Pratt, *Dallas Visions For Community: Toward a 21st Century Urban Design. The Meadows Foundation, 1994.*

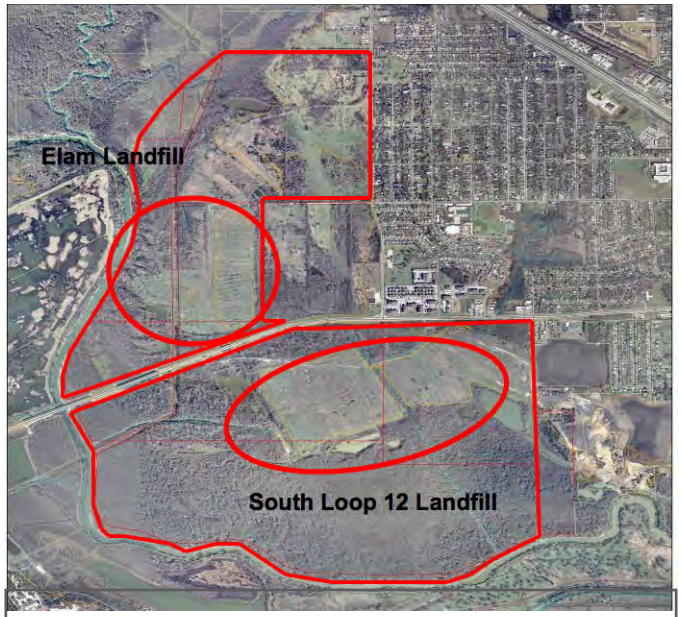
2 Photo: Library of Congress. First barge loaded with supplies leaving Dallas port for the first dock and dam on the Trinity River, Texas. Barge drawn by Burk & Co. boat, May 1906.

Suburbanization: In many ways, Dallas' growth exemplifies the typical patterns of American cities in the 19th and 20th century. The earliest settlers relied upon the Trinity River and its tributaries and creeks as their primary water source. With the advent of modern plumbing and municipal water systems, proximity to the River became less important. Growth spread somewhat equally in each direction from the central city, creating the city's inner-ring. These growth patterns began a long process of suburbanization in northeast Texas. Dallas has consistently expanded northward since the 1930s, to flat, treeless areas prime for construction. Development turned sharply northward with white flight, away from the central core of the City. Northward growth has carved out dozens of small, wealthy, white municipalities strung northwards along highways for miles from the central city. Communities of color have largely remained in the central city and to the south. All of these patterns typify American cities in the 20th century, but there are some unique consequences for the Trinity Forest, as well.

Dallas' suburbs have largely sprouted in flatter, barren areas of the city, particularly to the north of the central city. This is in part because developers viewed the wooded land south of the city as more expensive to clear cut and develop. A growing Dallas has rapidly suburbinized areas to the north, and less ot the south. Though these patterns are also rooted in white flight, another curious consequence is that there has been little interest in developing the areas along the Trinity Forest for decades. As a result, many of the patches that suffered huge cuts in the mid-20th century have since regrown.

Degradation:

In addition to a series of cuts, parts of the Trinity Forest have been degraded by human purposes. Through much of the early 1900s, an area of the Trinity Forest in south Dallas mined for minerals and gravel. The area of the Trinity River floodplain, and immediately adjacent to an African American, middle-class neighborhood, was an illegal dumping sitefor almost 25 years.[1] An estimated two million cubic tons of trash were dumped there illegally.[2] Throughout the 1980s, the City of Dallas turned a blind eye to the illicit operation in the backyard of a middle-class African American neighborhood. In 1988, the landfill burned for six months "with no publicity" despite resident complaints and reported illnesses.3 Following a second fire in 1996, legal action forced the city to repair Deepwood.



The Deepwood Landfills

1 Ironically, much of the solid waste that the City was allowing to be dumped there came from the slum clearance and urban renewal projects in African American neighborhoods across west Dallas. Dilapidated houses were cleared, the trash moved to Deepwood, and the people were moved to subsidized housing projects. "City Tied to Housing Segregation," The Dallas Morning News, Saturday August 5, 1989. Page 1 A and 20 A.

2 According to Cox vs. the City of Dallas, the city claimed it wanted to "fill in" the former mining site with solid waste and rezone it for industrial purposes. The investigation discovered two million cubic tons of solid waste including old car bodies, tires, 55 gallon drums, medical waste, roofing shingles, asbestos, benzene, nitric acid, sulfuric acid, benzo(A)anthracene

3 "Out of Deepwood," BCWorkshop Dallas Neighborhood Stories Film Series Production (Released November 2014).

4 Deepwood Landfill Map Source: http://www.dallascityhall.com/committee_briefings/briefings0112/TRC_UpdateOnEnvironmentalRestoration_010912.pdf

Context: The Trinity River Audubon Center

Deepwood is the area of The Great Trinity Forest that has experienced the most extremes in degradation and restoration. The Trinity River Audubon Center (TRAC) project grew out of the neglected Deepwood landfill site.[1] For locals, it is also the most visible and well-known symbol of this urban forest—many Dallas residents had never heard of the Trinity Forest before the Audubon Center was built.[2] Opened in 2008, the Trinity River Audubon Center is a non-profit, interpretive center in the heart of the Great Trinity Forest in south Dallas, Texas. The location and mission of the Audubon Center relate closely to themes of environmental justice and urban nature.

Architect: Anthony Predock
Size: 120 acres of former illegal landfill and dumping site
Owner: The City of Dallas Parks Department
Manager: Trinity River Audubon Society
Staff: 7 full time staff members; volunteer networks critical to operations.

Overview of Construction and Operations:

- City of Dallas funded the facility from 1998 bond election
- First LEED Gold building constructed by Dallas Parks Dept.
- Located in an underserved area of the city, focus on south Dallas school system
- 100 students a day get urban watershed education ($6.75 per kid for 4 hours); aligned with the Texas standards
- Run longitudinal programs to assess knowledge retention
- ~50,000 visitors a year
- $150,000 in facility rental revenue annually
- Residents of zip code 75217 visit free

1 "Out of Deepwood," BCWorkshop Neighborhood Stories Film Series Production (2014)

2 Identified as one of several potential sites for several projects of the Trinity River Corridor redevelopment, the City was required to clean-up the Deepwood site following state and federal sanctions. The broader, Trinity River Corridor project is focused on flood mitigation and restoration of the urban watershed. Information can be accessed here: http://www.trinityrivercorridor.com/

Analysis of Successes

Born of the City's forced hand, the project has created many positive benefits. Given the City's dismal environmental record and long history of disinvestment in south Dallas, the Audubon Center represents seems to be a bright spot, and possibly a bridge to a new future for the Trinity Forest. Some successes include:

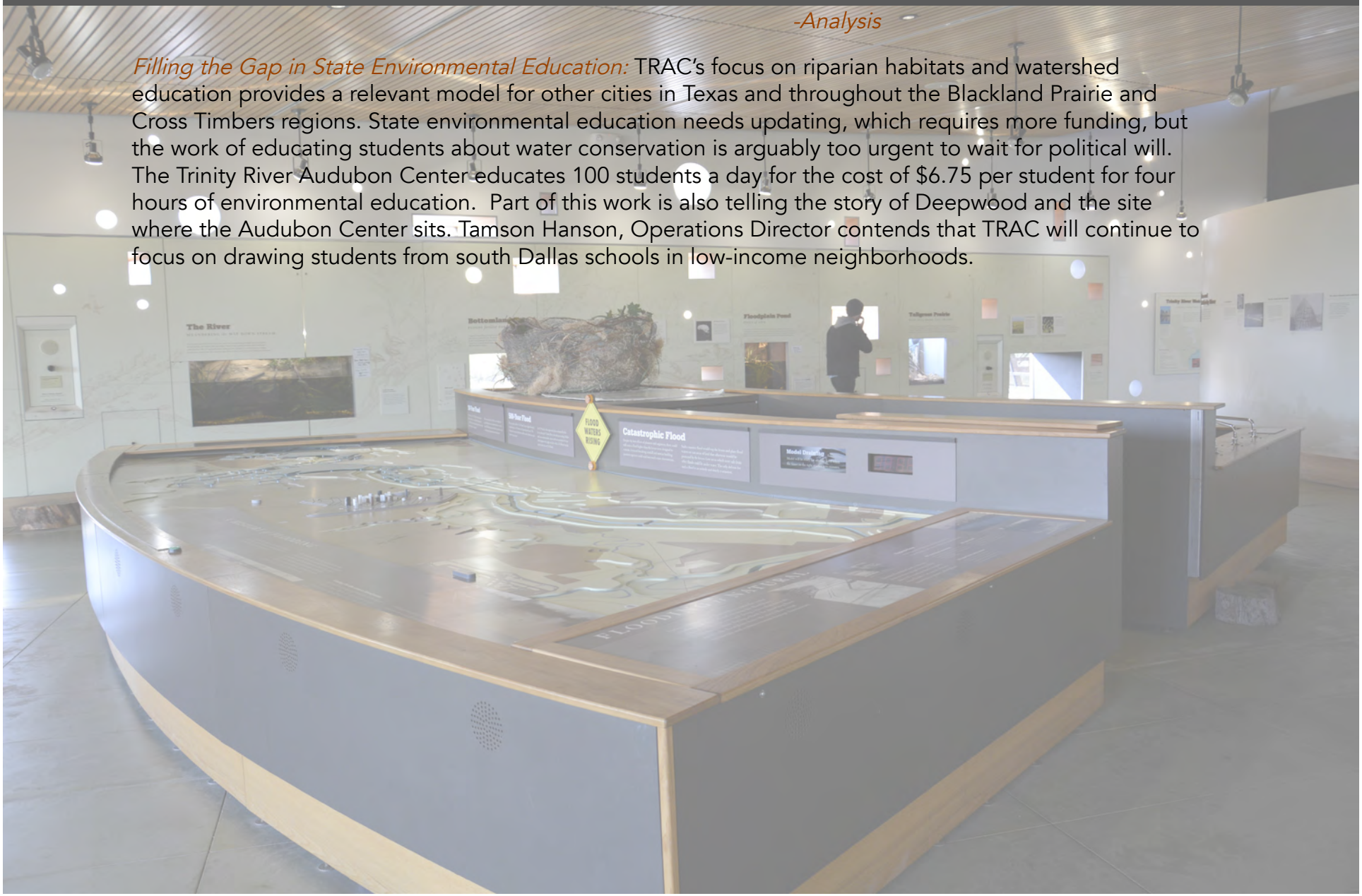
Focus on Ecological Sensitivity in Design: The Audubon Center is an ecologically sensitive adaptation to the natural landscape of the watershed forest, floodplain, and battered landscape. Designed to repair some of the existing environmental problems of this brownfield site, its design features include:

- Incorporation of an extensive study of comparable facilities in six cities;
- Nine constructed man made ponds that filter water towards the Trinity;
- Consolidation of landfill waste into capped rolling hills replanted with tall prairie grass and hardwood trees native to the Texas Blackland Prairie;
- Permeable paving/storm water control created from a series of cascading wetland marshes and ponds to capture and filter runoff from adjacent neighborhoods;
- Harvesting of rainwater and underground storage of 33,000 gallons for irrigation;
- Reduction of the urban heat island effect through light-colored paving, permeable materials, tree canopy, vegetated green roof, and a light reflecting white roof;
- Low water use through waterless urinals, low-flow toilets, sinks, and shower heads and on-site, underground treatment of sewage;
- High efficiency heating, ventilation, and air conditioning (HVAC) systems;
- Low impact construction materials, including: recycled denim insulation, locally sourced gravel and sand, and use of fly ash (coal byproduct) as partial cement substitute, and TREKS decking made of recycled water bottles and sawdust;
- Water-efficient landscaping that incorporates hardy native and adapted North Texas trees, plants, and prairie grasses that require little supplemental watering.

Progress Toward Environmental Justice: In the past, the City has dealt with environmental issues defensively, rather than proactively. Ironically, the Audubon Center would not exist but for the City condoning 15 years of illegal dumping and judicial action that halted this environmental injustice and demanded a cleanup. The creation and success of the Audubon center has created goodwill among environmentalists and city officials. The City generally has a dismal environmental record, but this project is a flagship project for the "new image" that the City is trying to create for Dallas through the greater Trinity River Corridor project.

-Analysis

Filling the Gap in State Environmental Education: TRAC's focus on riparian habitats and watershed education provides a relevant model for other cities in Texas and throughout the Blackland Prairie and Cross Timbers regions. State environmental education needs updating, which requires more funding, but the work of educating students about water conservation is arguably too urgent to wait for political will. The Trinity River Audubon Center educates 100 students a day for the cost of $6.75 per student for four hours of environmental education. Part of this work is also telling the story of Deepwood and the site where the Audubon Center sits. Tamson Hanson, Operations Director contends that TRAC will continue to focus on drawing students from south Dallas schools in low-income neighborhoods.



Power of Narrative

The power of narrative in making invisible resources like the Trinity Forest visible cannot be underestimated. TRAC has successfully translated a complex mix of history, ecological processes, and politics into formats that are interesting and digestible for students and adults of all ages. Building this urban interpretive center on an abused landscape offers some advantages for this important messaging. The overarching water conservation message is tied to a variety of education topics, including urban forestry and birds. The message of the urban watershed is told through story, and a variety of narrative forms are used. Examples include:

- *Out of Deepwood: 2 Million Cubic Yards of Illegal Waste Finally Made Visible*[1]
- *Living with the Trinity: A River's Story,* a documentary and interactive website[2]
- Educational materials and interactive media covering history and ecology of Trinity River and Trinity Forest

Scale of Impact: Dallas-Ft. Worth is the fourth largest metropolitan area in the United States. 11.5 million people in Texas get their drinking water from the Trinity River and its reservoirs. Its watershed composes 7% of Texas natural environment. The City estimaes that it will not be able to meet water demand by 2025. There is arguably an urgent need for watershed education and the Audubon Center is providing that to students, where the public school curriculum does not. This is the only facility of its type in the City. Arguably, the potential impact is great: 26,000 students a year receive urban watershed education. Moreover, TRAC's educational programs tie watershed education to urban forestry--helping students understand the critical connection between the Trinity Forest and the *quality* and *quantity* of water the City has.

1 BuildingCommunity (BC)Workshop Dallas Neighborhood Stories Film Series; released November 2014. Accessed: http://vimeo.com/102130995 .

2 Collaboration between The Meadows Foundation, KERA Public Media for North Texas, and the Dixon Water Foundation. Accessed: http://www.trinitytrivertexas.org/video_full.php .

The Intersection of Aesthetics and Ecology:

TRAC's design and purpose is unique in Dallas. The human experience of the forest, its many landscapes, and TRAC give rise to aesthetic experiences.[1] In turn, these aesthetic experiences impact human landscape perception of the prairie grasslands, wetlands, and wooded areas. TRAC places the Trinity Forest at the crossroads of ecology and aesthetics; translating aesthetic experience into new perceptions and interpretations of landscape change, and the human role in those changes over time. In this way, its aesthetic appeal is complimentary to ecological goals.

1 Gobster et al, 2007

Challenges of TRAC's Approach

Accessibility: TRAC is within the city limits of Dallas but is located outside of the dense urban core in a relatively isolated location. The site was intended to provide a tangible connection to the Trinity River and forest but also serve as a "secluded counter-point to urban Dallas."[1] It is connected to the existing road systems but public transit is not available. Neighbors who live within paces of TRAC have to drive several blocks to access it from a single entrance. This has proven more of a challenge for TRAC to attract visitors to its trails and other healthy recreational activities than expected. At the same time, TRAC must maintain a careful balance of recreational use in the sensitive ecological systems there, which means limiting access and control.

Patronage vs. Community Involvement: RAC was deliberately sited in a low-income, predominantly African American neighborhood, the former Deepwood landfill. Its educational programs serve the Dallas Independent School District (DISD) and other neighboring districts. There are efforts underway to better integrate the surrounding community, including residents on the TRAC Board and offering free admission to those in zip code 75217. Since its opening, TRAC has struggled to attract a diverse crowd of people. Most of its programs are geared towards youth, not adults but continues to market its programs broadly, with particular emphasis on educational programs geared towards youth, not adults.

Environmental Gentrification: As of November 2014, two major new developments—a private golf course and equestrian center—were underway in the Trinity Forest immediately adjacent to TRAC. Arguably, these are better uses than the former illegal landfill but these elite urban amenities also raise questions of environmental gentrification of the nearby lower-income neighborhoods. A cynical person might suggest that TRAC is as much part of the City's economic development strategy for south Dallas as it is an environmental remediation project. The equestrian center and golf course are likely to continue the pattern that TRAC has struggled to break: attracting a largely white, affluent crowd to the natural urban asset in the middle of a community of color.

1 Anthony Predock website, http://www.predock.com/Trinity/Trinity.html

Challenges of TRAC's Approach

Nature Does Not Always Cooperate: North Texas has experienced extreme droughts in recent years, drying up six of the nine ponds at TRAC. Staffers there believe that West Nile virus has scared visitors away from the center in recent summers. In an interview, Tamson Hanson reported that the riparian habitats continue to be impacted by increasingly volatile cycles of drought and flood in the City. Several of the riparian species, including alligator gar, consistently have to be rescued and relocated, posing an operations challenge for TRAC and the master naturalists that volunteer there.

Financial Sustainability: TRAC's beautiful design certainly contributes to its success. Its nonprofit status has allowed TRAC to minimize ongoing public investment, but also to rely upon private donations and revenues for ongoing maintenance of the facility and innovations in programming. There is no endowment fund. TRAC relies heavily on revenues from private facility rentals, such as weddings, to subsidize its education programming. It is possible that these events are good marketing for TRAC and elevate its profile locally and regionally. On the other hand, TRAC has become beholden to this revenue stream to fund its programming, offering it little opportunity to expand. In addition to master naturalists and educators, it seems TRAC will increasingly rely on a savvy marketing team.

Context: The Great Trinity River Forest Management Plan

The Trinity Forest Management Plan is the product of decades of work driven by a small but active cohort of arborists in the City of Dallas. These arborists and naturalists have focused on elevating the profile of the Trinity Forest as an urban asset, and educating public officials and citizens about its ecological significance.

As previously described, the human interactions with and degradation of the Trinity Forest proven a difficult struggle to overcome. Locals have long associated the Trinity Forest with areas of illegal activities and pose threat to safety—landfills, burnt out car bodies, and drug trafficking. Though implementation of the full Management Plan is yet incomplete, the arborists this case finds that the arborists have been successful in changing perceptions of the forest. The Management Plan is the capstone of these efforts to win hearts and minds.

Goals of the Trinity Forest Management Plan

Review of the Plan's recommendations, and an interview with one of its key authors reveal that the plan is comprehensive in its approach, and tries to solve for what's missing from a healthy Great Trinity Forest, including: 1) solid mass producing trees large enough to support diverse habitats; 2) healthy under-story and middle story that provide habitat for migratory birds; 3) citizen participation in planning and education; 4) creation of a City Dept. of Urban Forestry to consolidate several City departments considered ill-equipped to handle the management of the plan; 5) careful consideration of recreation and recommendations for balancing the many uses of the forest that the City is trying to grow.

Authors: Team led by Dr. Gary D. Conrad, Distinguished Professor of Resource Economics and Forest Management at the Arthur Temple College of Forestry at Stephen F. Austin State University. 11 member team with PhDs in wildlife biology, ecosystem management, recreation planning, forest protection, landscape ecology, vegetation management, GIS, soil science, hydrology, and wildlife management.

Details of the Plan

The Management Plan is a 30-year schedule of planting instructions designed to guide public management of the complex ecosystems and habitats of the entire Trinity Forest. It offers a balanced approach for the City to integrate recreation and other desired uses in the forest. The plan is 700 pages long, the general recommendations of which are as follows:

- Year by year instructions for growing a healthy, future climax forest ecosystem with a diverse number of shade and ornamental trees, shrubs, and understory plans;
- Integration of trees of various ages that allow for some resistance to pests and pathogens over time;
- Conservation of pockets of species diversity;
- Integration with management plans for soil, water and wildlife wile maintaining floodplain storage capacity and topsoil;
- Careful consideration of tree species ability to adapt to cycles of drought and flood inherent to this watershed;
- Proper establishment and care of wetlands to be maintained in perpetuity;
- Planned integration of native and non-native species and recognition that non-native species have become an important food source for riparian species;
- Emphasis on habitats—woodland, prairie and edge condition habitats.[1]

Strategies for Realizing these Recommendations:

- Public input and coordination with affected neighborhood groups;
- Integration of LIDAR and Hyperspectoral technologies to provide a complete inventory of every tree species, size, health and location;
- 500 location maps and planting schedules covering a 30-year period and projection of goals for the next 100 years of the forest's life cycle;
- Calculation of carbon sequestration tonnage that the forest provides;
- Carefully planned access points that anticipate economic development pressures;
- Financial analyses of recreational activities in the Trinity Forest and their impact on its regrowth;
- Financial analyses of personnel needed at City level to implement the plan.[2]

1 Dallas Urban Advisory Committee, Great Trinity River Forest Management Plan Recommendations, Accessed: http://dallastrees.org/pdf/Final%20Recom%20on%20GTF%20Management%20Plan.pdf.

2 City of Dallas, http://dallascityhall.com/committee_briefings/briefings0308/TR_TrinityForest_030408.pdf

Emphasis on Habitats: The plan emphasizes the impact of the urban forest on habitats, creating the link between the hardwood forest and the most diverse and endangered habitat in the state. Low-cost solutions for public awareness include signage marking "edge effect"—describing how wildlife diversity is greatest where various habitats meet. Trinity River Forest, due to human interaction with this space over time, is full of these types of edges where species that can use, for example, either the grassland or forest for their habitat.[1] These are frequently access points for people and critical points of intervention for how humans perceive these landscapes.

Role of the Forest Champion: The Management Plan bears the names of many collaborators, but investigation into this case has revealed that two people—Steve Houser and Ned Fritz—are largely to credit for moving the city of Dallas towards recognizing, appreciating, and caring for this urban asset. Reversing perceptions about the Trinity Forest has been Steve Houser's lifelong work. A critical character in the many narratives of the Trinity Forest, Steve's contributions include:

- Founder of Urban Forest Advisory Council (UFAC) and Texas Historical Tree Coalition;
- Used Greenprinting to establish the critical link between the forest and city air, water, and soil;
- Lobbying for the passing of the first tree ordinance;
- Authors curriculum for Master Naturalists program which educates hundreds of arborists and naturalists each year;
- Integrating LIDAR and Hyperspectoral technology for complete inventory of forest;[2]
- Winning over multiple mayors, developers, and public officials to consider the fate of the Trinity Forest in the City's development plans;
- Cultural preservation efforts for Comanche peoples around Marker Trees in the Trinity Forest;
- Procurement of grants to hire the City's first urban forester and other critical staffing changes;

This case concludes that Steve Houser cleverly used the platform of the Historic Tree Coalition to heighten an understanding of importance of native tree species. He was able to translate a growing awareness of individual clusters of important trees among citizens and public officials into a call to protect the Trinity Forest, at large. Steve's story is one of successfully translating activism into political will, and in turn, public policies.

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1 Dallas Urban Advisory Committee, Great Trinity River Forest Management Plan Recommendations, Accessed: http://dallastrees.org/pdf/Final%20Recom%20on%20GTF%20Management%20Plan.pdf.

2 LIDAR technology was used to indicate height and spread of trees. Steve Houser suggested joining LIDAR with Hyperspectoral technology. The result was digital aerial imagery that produced 500 bands of foliage color indicating health and species of all of the trees. Houser raised $130,000 for the first study. The study produced 3-D images of each tree and arborists ground-truthed the data. (Information from phone interview with Steve Houser).

-Analysis

Growing Local and Regional Knowledge: Led by Steve Houser, the work of the Dallas Urban Forest Committee (UFAC) focused on brining developers, city officials, and arborists to the same table to talk about growth. Together, the developers and arborists wrote a set recommendations for a tree ordinance to regulate how developers clear and plant trees. Their recommendations provided a set of incentives for more sustainable development, including tree cut mitigation credits. In addition to years of working with developers—and proving that arborists could be reasonable and reliable partners—these collaborations emphasized local education and knowledge retention, hiring arborists and experts hired from within the state of Texas. This has proven critical to continuing education for professionals that deal with these trees of the Trinity River watershed forest on a regular basis. These professionals understand the range of deep value differences related to growth in the state of Texas and how to work within these contexts to produce reasonable results.

Challenges

Further investigation into the Forest Management Plan reveals three major challenges: First, the Management Plan is not accessible to the public and is somewhat shrouded with political sensitivity. Several requests were made and nobody was willing or able to share it. Second, full implementation of the plan seems unlikely due to staffing, funding issues and political will. There is a lot of education still needed at the city level. Third, the plan is very lengthy and complicated, and although it calls for the creation of the City Dept. of Forestry, without this entity, successful implementation of the plan seems difficult. At this time, there are at least five city departments dealing with urban forest issues. According to the authors of the Management Plan, none of these departments have the proper training, skills and education to manage the forest or implement the plan. As Steve Houser described, "the Plan has produced a lot of data and information that the City does not know what to do with." [1]

Much like the forest itself, political will to protect this urban asset has been inconsistent, unstable, and patchy; the forest continues to fall victim to short-sighted development goals, pitfalls of private ownership and conflicting economic priorities. The Management Plan has been caught up in the same struggles.

On the other hand, Steve's urban forestry legacy and the story of the struggle to implement the Management Plan are evidence that urban ecologists, planners, and landscape architects must not only know how to respond to natural processes, but also understand how nature is at the crossroads of political and economic processes.

1 Interview with Steve Houser, October 21, 2014

Conclusions

The many narratives of Great Trinity Forest afford an opportunity to study how ecological and political processes are intertwined and continuously evolving. An in-depth case study of the Great Trinity Forest is an opportunity to contextualize the unique challenges that urban forests face within local historical, political, and economic contexts.[1] This case exploration has determined that each of the aforementioned challenges that the Audubon Center and Forest Management Plan face reflect characteristics intrinsic to Dallas' history and context.

From Environmental Invisibility to Landscape Literacy

At the crossroads of prairies and woodlands, the Trinity Forest's 330 square miles of trees are primarily small in diameter: at this time, there are only 70 large trees in the forest. Getting public officials to recognize the significance of the forest has proven particularly hard because the damaged, bottomland hardwood forest does not bear the markings of an "important" natural asset. Yet, its survival is entirely dependent on human attention and efforts to protect it. Urban forests depend on a careful balance of human action and inaction to grow and thrive in the built environment. Reversing the degradation and growing appreciation for the forest must involve educating a wide range of public and private actors and citizens about its significance. In their own ways, The Trinity River Audubon Center and the advocates of the Management Plan are attempting to do just that.

Even when they are visible and known, urban forests are often contested spaces—at the nexus of political, social, economic tensions over how city growth happens. This case investigation reveals that most of these conflicts center around *growth*: what type of growth does a city pursue? On what land? How much? What else is growing there that impacts human connection to nature? (social movements, environmental injustice). The urban bottomland hardwood forest has been profoundly affected by these answers over time—to the extent that many in Dallas still do not know it exists. Whereas TRAC has successfully heightened appreciation for the natural and man-made landscapes of the Trinity Forest and the Forest Management Plan is the obvious vehicle by which to grow this new-found appreciation into a larger movement and better future for the forest and citizens of Dallas.

In that sense, growth and urban forestry can be useful metaphors to connect our understanding of political, historical, and economic processes.[2] In turn, our understanding of these processes serves to bridge the asset (urban trees) to the larger ecological processes and systems and translate new visions for human activity in the forest how a city and people will interact with this forest over time.

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1 Spirn, Anne. *The Granite Garden*, 175.

2 As Picket, Cadenasso, and Grove assert in their article, "Resilient Cities: Meaning, Models, and Metaphor for Integrating the Ecological, Socio-Economic, and Planning Realms," sociologists and social scientists "have called for closer links among their disciplines" and metaphor can be a useful tool for promoting these linkages. In a small way, this case attempts to use the metaphor of growth as a frame for understanding the various challenges that urban forests face.

Sources:
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All photos were taken by Callahan Seltzer, unless otherwise stated. Written consent from the Trinity River Audubon Center was received in order to use additional photos and graphics. Interviews were conducted with Steve Houser, October 21, 2014. Tamson Hanson, October 31, 2014. Site Visit and Additional Interviews: December 15, 2014.