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Water

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ISTHMUS GROUP NEW WATERFRONTS IN NEW ZEALAND • **ATELIER DREISEITL** WATERSCAPES FOR SINGAPORE • **OLIN PARTNERSHIP** THE RAY AND MARIA STATA CENTER, CAMBRIDGE • **HARGREAVES ASSOCIATES** INTERVENTIONS IN HYDROLOGY • **ANNE WHISTON SPIRN** THE CONQUEST OF ARID AMERICA • **FIELD OPERATIONS** RIO PIEDRAS RESTORATION PROJECT, SAN JUAN • **BELLMUNT I ANDREU** PLATJA LLARGA, SALOU



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Interventions in Hydrology

Landscape architects are uniquely qualified to synthesize a desire for public parks that are environmentally rich with the concerns of stormwater management and flood control. Eight projects by Hargreaves Associates exemplify a combination of natural systems and urban life.

The hydrologic cycle, powered by sun and the force of gravity, exists in a balance with a fixed volume of water constantly moving from our oceans to the atmosphere through evaporation, and back to earth through precipitation. Human settlement, specifically our rapid urban growth, has impacted the balance of the hydrologic cycle by decreasing the amount of water that is absorbed into the earth after a rain event. As vegetated areas are cleared to make way for development, water cannot infiltrate into the groundwater table as it once did because of the dramatic increase in non-permeable surfaces. This has contributed to flooding in many of our communities, as well as environmental problems as the water, moving across developed areas, picks up toxins and deposits them into vulnerable streams and rivers.

The practice of landscape architecture can be seen, largely, as interventions in the hydrologic cycle, whether from the installation of the smallest garden to the most comprehensive integration into water infrastructure. Whenever the area of absorptive, vegetated material increases relative to paved surfaces, our stormwater flow situation improves. Increasingly, landscape architects are using public parks as water infrastructure, ameliorating flooding issues and cutting down on pollution in waterways. This double duty – providing traditional park services like recreation while performing essential engineering tasks – increases the significance of the park by operating on many programmatic levels simultaneously.

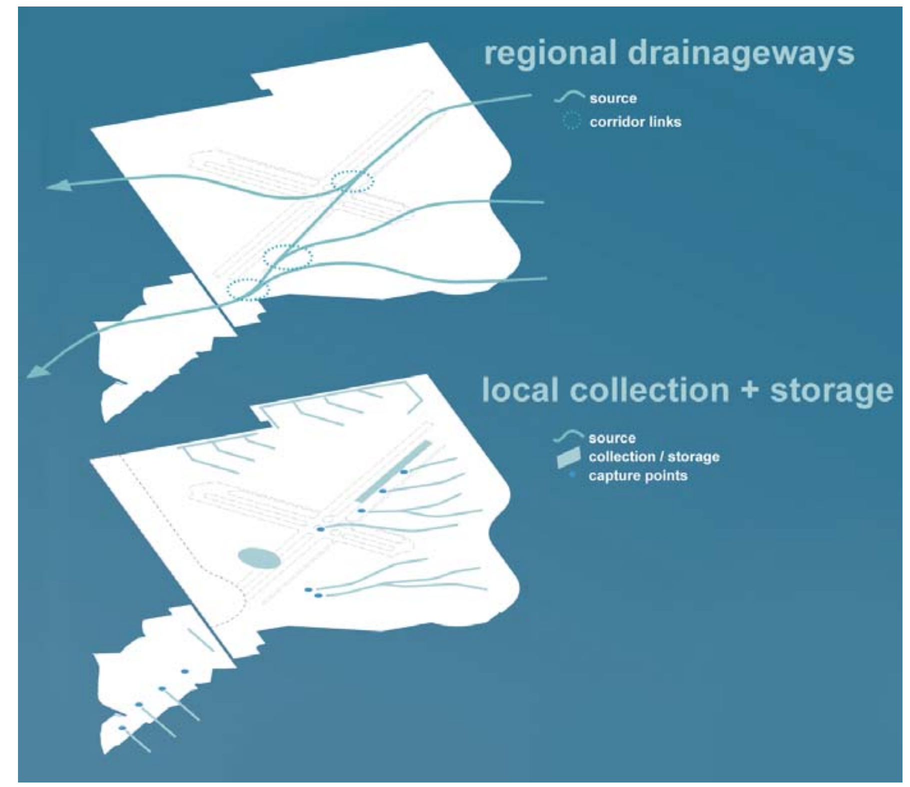
Over the last 24 years, Hargreaves Associates has built a series of projects that integrate water infrastructure and public open space, all impacting particular moments in the hydrologic cycle. The projects solve critical water management issues for the municipalities they serve and also provide creatively programmed public space for those communities. Through their design they integrate water infrastructure management with cultural artifact, creating a meaningful, contemporary experience of natural systems and urban life.

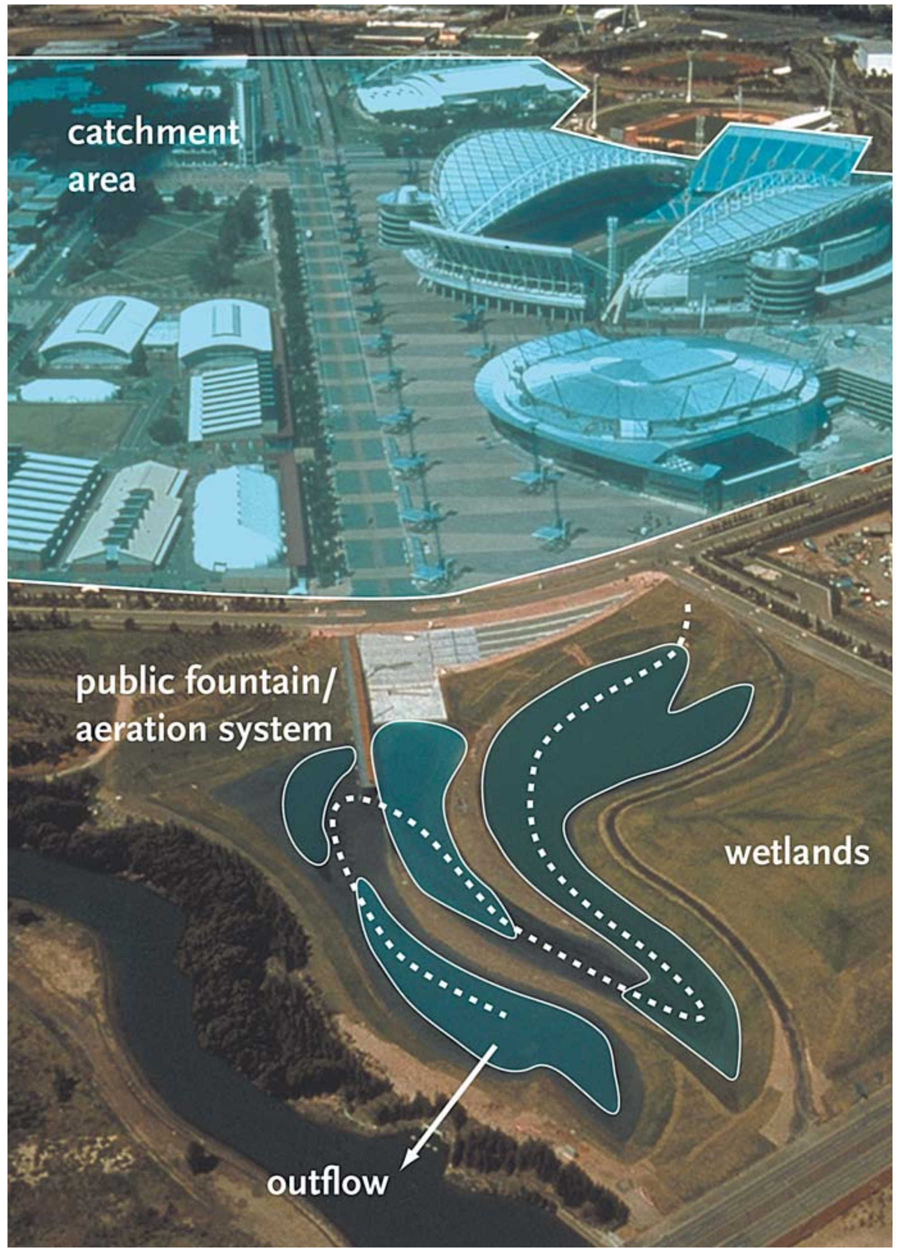
Orange County Great Park: water retention basins and drainage corridors organize the site. Promenades along the basins serve as functional backbone. The drainage, cuts in the landscape, form riparian habitats.

Stormwater retention

Rain falls and water moves in dendritic patterns over the surface of the earth. Parks can provide places where stormwater can be retained, mitigating the enormous and sudden flow of water into streams and rivers during a storm event. The landscape architect can make use of the stormwater by harnessing it to irrigate parks, support plant communities and supply water features.

Our proposal for Orange County Great Park retains stormwater and greywater in grandly scaled basins cut out of the runways on this former airport site. The basins are fed by two co-existing systems. The 1,620-hectare park drains into a system of topographic tendrils – 4.6-meter cuts into the landscape that, while directing water to storage basins, form riparian habitat and recreational microclimates in a largely arid climate. The other source of water is greywater, fed in from neighboring developments. A solar pump raises the water from resurrected drainage swales to the basins.





Area of the 2000 Olympic Games, Sydney: stormwater drains underground and outfalls into the meander-shaped wetland. The cleaned water feeds the fountains and irrigation systems.

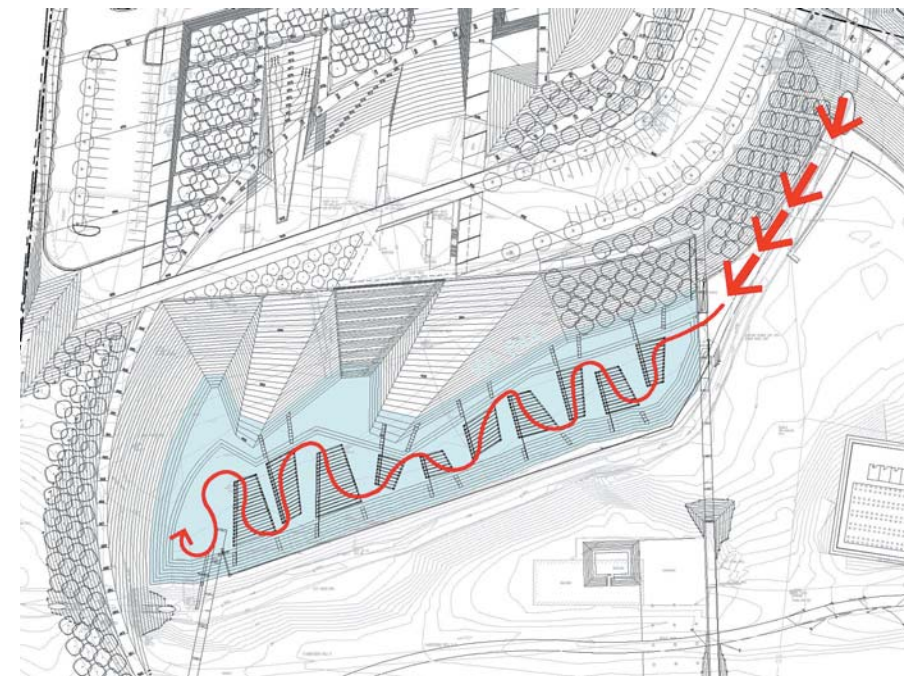
Together, the basins and drainage corridors organize the space formally, giving form to the 1,620-hectare site. The drainage corridors act as guiding borders between zones of the park. The basins cut from the airstrips are industrial scale promenades that serve as the functional backbone for the entire park.

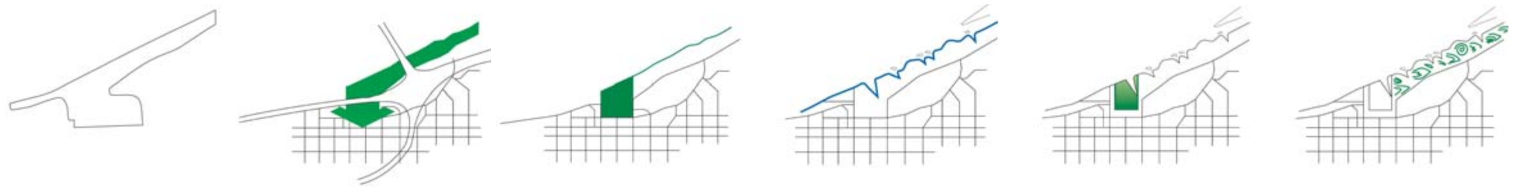
Cleaning stormwater by wetlands

Stormwater, once captured, can be cleaned by directing it through a wetland. Mimicking processes that occur in naturally evolved ecosystems, the scientific planning of these wetlands can filter out suspended solids and harmful chemicals, allowing for cleansed water to re-enter the network of natural systems of rivers and streams.

We designed stormwater treatment wetlands as part of the public open space for the 2000 Olympic Games in Sydney, Australia. The Northern Water Feature treats the 105-hectare catchment of Homebush Bay, including all Olympic arenas, plazas, and buildings. The collected stormwater from Homebush drains conventionally underground and then outfalls into the wetland, which takes a meandering (though clearly constructed) shape, dropping gradually in elevation, retaining the water of a twenty year storm event for two days. The banks of the wetland are tiered at increments in order to support specific wetland species. Once the clean water reaches the end of the wetland sequence it is pumped into storage locations that feed the on-site water fountains and irrigation systems, or if the storage facilities are full, the water returns to a pre-existing on-site creek. Constructed wetlands can also be used to treat runoff from off-site, as in Renaissance Park in Chattanooga, Tennessee. Here we designed a wetland that treats the first flush of urban runoff from a 190-hectare catchment zone from downtown Chattanooga. The park is on the site of the former General Electric Plant whose previous use left the soil polluted with frit, a byproduct from producing enamel. The polluted soils were contained on site in sculpted landforms. Reversing the processes of its previous life, the on-site wetland has a positive effect on river health by cleaning stormwater before it enters the river. Planted gabion fingers extend into the Renaissance Park wetland, the plants cleaning the water as it circulates through the gabions. The water, once cleaned, can either be returned to the river, or recirculated through the site for use in irrigation.

Renaissance Park, Chattanooga: the wetland treats the first flush of urban runoff. Planted gabion fingers extend into the pond, the plants cleaning the water as it circulates through the gabions. The water, once cleaned, can either be returned to the river, or used for irrigation.





Waterfront parks

In our post-industrial age, waterfront sites have emerged as a new territory for public parks. After an era of industrial use and abuse, these sites are troubled and need rehabilitation, but they also offer outstanding opportunities to re-imagine public space and urban life beyond the boundaries of the site. These parks play an active role in the surrounding water systems, whether by remediating pollution on site, or filtering water about to return to the river, or contributing to flood control. The Guadalupe River Park in San Jose, California, is designed as a flood control project doubling as a public park. As a consequence of Silicon Valley development, San Jose faced a huge increase in storm events that flooded the streets of downtown. To manage water flow, we strategically designed combinations of smooth areas (allowing water to pass through more quickly) around the city bridges, and rougher planted areas (holding water for longer periods). Our firm worked closely with the Army Corps to model the hydraulic flow of the river both in computer modeling and also in an 80-feet scale model.

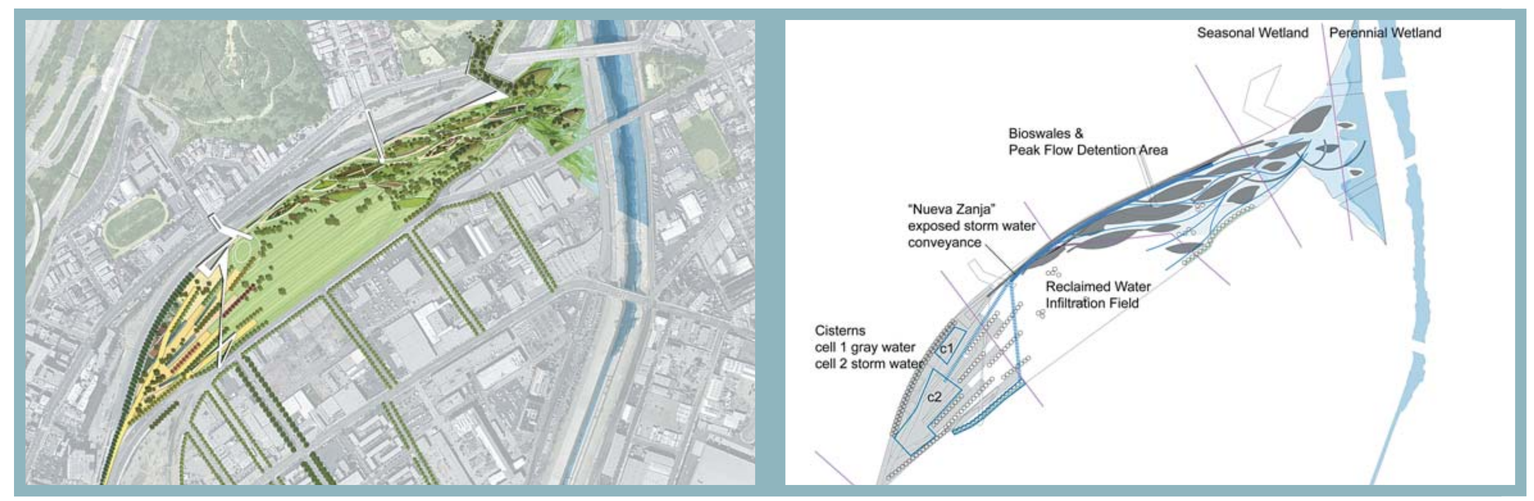
A key design challenge was to integrate the large scale infrastructural moves with traditional park programming. The flood control measures form an underlay on which the park program is placed, forming a synchronized park system. The circulation system creates a coherent spatial experience in the park, negotiating river banks that rise from 0.2 to 5.4 meters, allowing the park to be navigated when the water is high or low with connective pathways joining upper bank and lower bank walks. The banks are held in by gabions, which are planted with native riverine species that withstand periodic inundation. In addition, park elements are flood resistant – all site furnishings – lighting, benches, trash receptacles are durable and located only along the upper bank pathways.

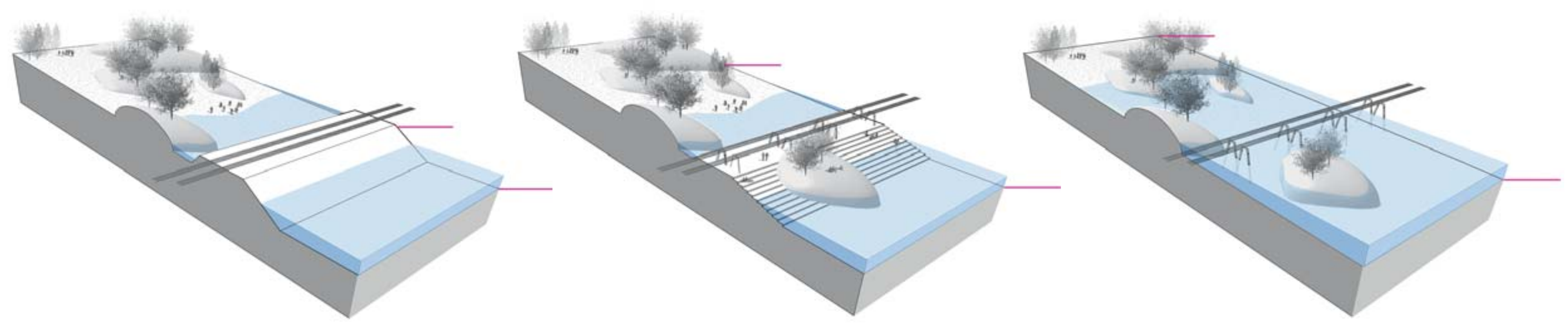
Waterfront industries cut civic life off from the water. Converting these sites into parks makes outstanding improvements in the health of cities by returning these vital locations to the public domain. In Louisville, Kentucky, the waterfront site was cut off from downtown by an elevated highway. To remove this psychological barrier to the Ohio River, we sloped the top elevation of the park from the 100 year flood line, under an elevated freeway and down to the river. This primary spatial move visually re-connects the viewshed from downtown to the river.

Fundamentally about water, Louisville Waterfront Park is designed in conjunction with the flows of the river. The majority of the park lies in the nuisance flooding zone, as a result the park is designed to withstand temporary flooding. Measures taken involve slope stabilization through construction methods and native plantings, fast draining soils, and durable, bolted site furnishings. The lower banks are stabilized with geo-textiles and gabions planted with riparian species, and the landforms are sited in tandem with river flows, minimizing damage as the water levels rise and fall. The lawns are constructed with a shredded material in the topsoil layer which binds with the grass roots to create a tougher lawn. Debris that washes up into the park during a flood event recedes with the water levels due to the constant slope to the park to the river. Program is placed according to elevation of what can be temporarily flooded and what cannot. For example, a sculpture park is pushed up from the river, protecting it from high water elevations, and a great lawn

Louisville Waterfront Park, Kentucky: most of the site lies in the nuisance flooding zone of the Ohio River. The grading provides flood protection. A promenade runs along the river edge.

Los Angeles State Historic Park: a non-permeable channel conveys stormwater from cistern collection points into a series of eco-type bioswales. New edge scenarios are proposed for the Los Angeles River.





meets the river, flooding during rain events. The park ebbs and flows with the river and with the natural processes around it. Migrating species have found their way into the gabions, further stabilizing the park and contributing to ecological evolution, diversity, and habitat on site.

At Crissy Field, we converted a polluted US Army airfield into a national park and extended the Golden Gate National Parks. In addition to leaving the site with polluted soils, the Army had filled in an existing saltwater marsh wetland over the years of occupation. Hargreaves Associates worked closely with environmental consultants to first remediate the site, and then recreate the marsh, balancing the needs of a public park with ecological communities, while respecting the historic significance of the airfield. Crissy Field created a new model for national parks – a balance between cultural and natural resources, sustainability through construction and design, and an open public process culminating in extensive philanthropic support.

Integration of water and park

While smaller moves can mitigate the effects of stormwater on site, large parks can be designed as an integrated part of water infrastructure on a regional scale. These parks fully integrate water systems and recreation by forming the structure for design. There are opportunities for water to be integrated into many scales of the park goer's experience of place – from industrial scale water features, to constructed emergent wetlands, to exuberant fountains.

In Los Angeles, the plan for the Los Angeles State Historic Park integrates water into the park and creates a sustainable infrastructure to support the life of the park. In the park system, stormwater is performatively displayed along the circulation spine, collected into cisterns, used to irrigate a main playing field, and is ultimately returned to the Los Angeles River.

The plan calls for a "Nueva Zanja", or new trench, exposed stormwater conveyance. This non-permeable channel borders the Historic Walk, the circulation spine of the park, and conveys stormwater from cistern collection points into a series of ecotype bioswales. The design integrates the park with the Los Angeles River and proposed new edge scenarios for de-channelizing the river. The park also provides space for a de-channelized river to overflow and recharge.

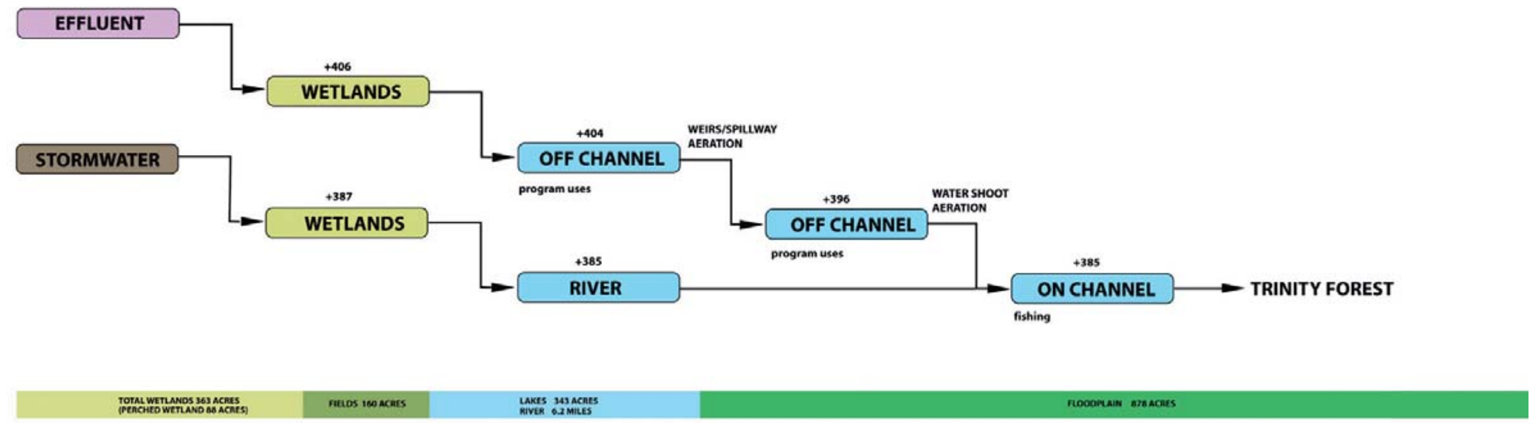
Another Hargreaves Associates project with Chan Krieger, the recent Balanced Vision Plan for the Trinity River Corridor in Dallas, Texas, envisions a complete integration of water infrastructure and recreation for the city of Dallas, allowing people to discover the river's great beauty and take an active part in the natural systems of their surroundings.

The park cleans stormwater through a series of constructed wetlands, and provides flood control by the creation of two lakes and recreation of the river's natural meandering form. In addition to flood control, the new lakes create active recreational programs, such as canoeing and kayaking, along the city's river corridor. Lying in the flood zone, the park will be designed to co-exist with the dynamics of the river, considering elevations for various park programs, surfaces constructed and sloped for drainage, as well as compatible plant and hardscape material selection.

21st century parks

Contemporary parks connect urban centers to rivers, connect people with open space, water, and natural systems, all while solving critical issues in the hydrologic cycle, from stormwater management to flood control. The very idea of public parks emerged as a retreat from 19th century industrial life. Now that the industrial age has run its course, those same sites are providing inspiration to define a new kind of park. Moving beyond pastoral ideals, these projects show how the transformation of public open space – of rivers in particular – have created new vision for what a park can do and the services that they can provide to our communities. Looking forward, landscape architects will have even more impact in the holistic functioning of our cities as they are uniquely qualified to synthesize a desire for public parks that are environmentally rich with our concerns of stormwater management and flood control, essentially integrating science and technology with quality of life in our cities.

These new parks, integrating infrastructure and recreation, extend the boundaries of site. They have significance for the entire city – allowing citizens to have renewed relationship with natural systems and outstanding scenery. Large parks have regional impacts, improving conditions beyond their geographical site boundaries. Parks are performing in more ways than ever.



Trinity River Corridor, Dallas: the vision calls for an integration of water infrastructure and recreation for the city, allowing people to discover the river's beauty and natural systems.