

Room for the River; Los Angeles



May 16-17, 2013

A conference exploring climate change
adaptation strategies, sustainable
development, and the Dutch experience.

Foreward

Before you lies a product of a few inspiring days of sharing knowledge, experience, creativity and vision between delta people. The Los Angeles River delta is clearly different than the Dutch delta, but the deltas share similar risks, challenges and opportunities.

We began with a new, or perhaps, renewed, mindset: to view the LA River not as an enemy that has brings pollution and flood risk, but instead as a friend and ally that can yield resiliency, urban amenity and become a key tool in LA's climate change adaptation strategies.

During our workshop, we shared the Dutch experience with projects like "Room for the River" and concepts like "Building with Nature." We explored innovative projects in both regions related to urban water storage as well as water and soil quality. Most importantly, we gathered to imagine the redesign of a river and watershed that can be, once again, the heart of the City for Los Angeles residents.

I hope this conference is the beginning of an ongoing dialogue between the Dutch and the people of Los Angeles, both Delta Peoples, and both peoples with open minds who strive for a better future.

Both Rotterdam (the largest port in Europe) and Los Angeles (part of the largest port in the US) share the same "can do" mentality: As we say in Dutch "*Geen woorden maar daden!*"; in English: "Not words, but deeds." Let's begin here in Los Angeles and share our "delta thinking" with the other river and port cities throughout the world that face the same challenges.

Bart van Bolhuis
Consul General of the Netherlands, San Francisco

Introduction

The City and County of Los Angeles and partners hosted a two-day workshop and symposium, organized in cooperation with the Consulate General of the Netherlands in San Francisco, to explore the role of the Los Angeles River in the coming decades.

The event built on existing initiatives and examined opportunities for collaboration to achieve multiple benefits: managing flood risk, increasing local water supplies, developing green infrastructure, and guiding sustainable urban development.

The proceedings served as a starting point for future dialogue and exploration of solutions associated with the Los Angeles River, adding insights into the role of urban rivers in times of climate change.

At first glance, the Netherlands and the Los Angeles regions do not have much in common. The Netherlands is relatively flat, and sits largely at and below sea-level, and its 17 million inhabitants are used to seeking innovative solutions for keeping excess water at bay. Greater Los Angeles, by contrast, is a water-challenged, bowl-shaped region surrounded by some of the steepest mountain ranges in the United States.

Both regions, however, are similar in many ways; in size and population; and in contending with rivers that drain large watersheds through key urban landscapes and via two of the largest ports in the world. Both will be greatly impacted by climate change. And both will share similar challenges: flood protection and flood prevention, heat stress and droughts, degraded water quality and at-risk water supplies, and how to enhance the quality of life for a growing population.

To address these challenges, which touch upon key stakeholders and their concerns, an integrated approach is essential. Our workshop program was thus designed to draw upon and learn from a wide range of views to create a new vision for the Los Angeles River.

The Netherlands Delegation included experts on water quality and quantity; the complex relationships between surface water, ground water and soil; and the relationship between water, land use and water users. The Dutch delegation also included landscape architects and environmental and spatial planners to ensure that an integrated approach was pursued. The American Delegation, comprised primarily of well-known experts from Greater Los Angeles, mirrored the Dutch in their skills and approaches. We thus created a welcome environment that was ripe for knowledge exchange, exploration and collaborative endeavor.

We hope that our joint work, some of which has been captured in this booklet, will anchor a continuing dialogue on the LA River watershed adaptation between the Netherlands and the Los Angeles region.

The Dutch Experience

In the wake of Hurricanes Katrina, Ike and Sandy, experts turned to the Netherlands to learn from its 800-year experience in managing water in an urban coastal zone. After two near-floods along Dutch rivers in 1993 and 1995, and given climate change and the likelihood of more extreme weather, the Dutch designed and are currently implementing a new approach to managing its rivers and riverine floodplains, known as Room for the River.

This \$3.1 billion highly-collaborative program aims to restore natural floodplains and integrate planning and river management processes to lower flood risk while improving an area's spatial function and quality. This new, more holistic approach is also being combined with a Building with Nature strategy that recognizes the dynamic power of natural ecosystem functions.

Experience from the Room for the River program was shared in Los Angeles by Dutch experts, who demonstrated how innovative models merging science, technology, and collaborative processes may help solve similar floodplain, water resources, development, infrastructure and planning challenges along the Los Angeles River.

Like much of the Netherlands, the Los Angeles region is essentially a delta region comprising a 3,000 square mile watershed. This watershed, which begins in the mountains surrounding the LA basin, courses through a densely-populated urban area via hundreds of miles of concrete channels -- and over 2,000 miles of storm drains -- before it meets the Pacific Ocean. The LA River watershed, as well as some of its features, were the focus of the workshop.

Los Angeles must develop a multi-decade strategy in which watershed priorities face competing challenges, including water supply, flood control, open space development and stormwater runoff from industrial and construction facilities. Fortunately, a wealth of expertise on these issues, as well as the proper balance between these competing needs, already exists. In fact, the workshop was grounded upon -- and could succeed only with -- the robust expertise already present in the LA region.

Goals

- To create collaboration, knowledge exchange, and networking across disciplines and countries.
- To share technical and strategic expertise, and explore integrated watershed management ideas concerning the design, planning and implementation of river-based projects related to flood-risk mitigation, integrated water resources management and open space development.
- To lay the framework for collaboration between Los Angeles and The Netherlands on (a) climate change adaptation strategies, (b) the mitigating of adverse environmental impacts of riverine management regimes, and (c) innovative and sustainable urban development.

Program

The first day and a half of the program brought together experts from the two countries to consider what physical, political and policy adaptations may be necessary to support a resilient Los Angeles in the 21st-century.

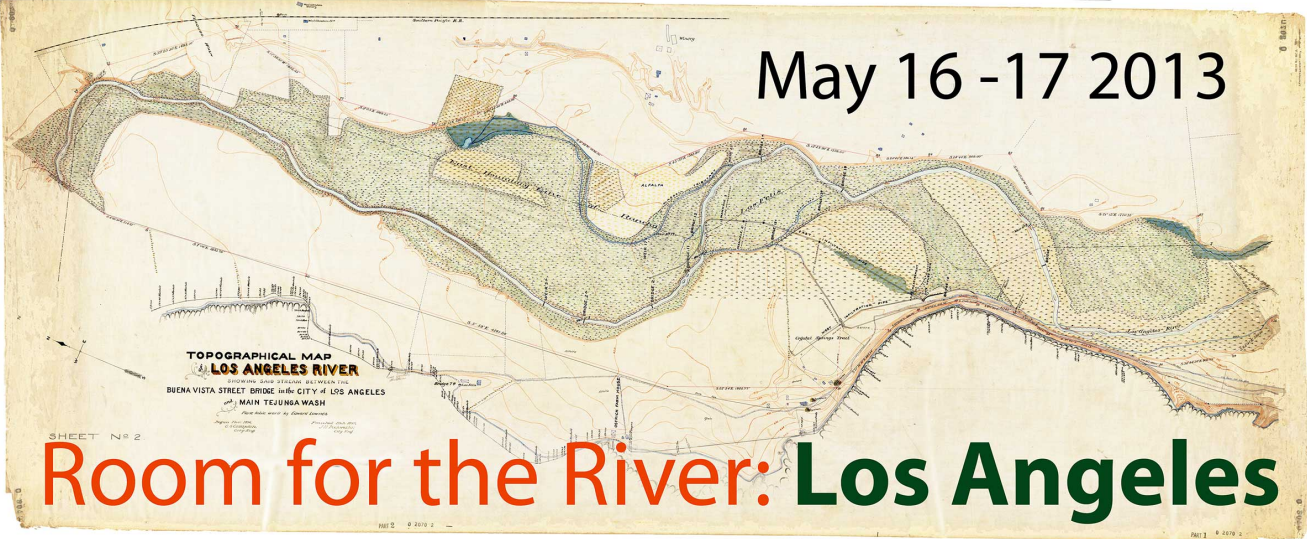
The Day One objectives were to collaboratively define priorities and establish prerequisites that follow those priorities. Small working groups consisted of experts from the two countries in flood avoidance, water supply, water quality and urban development.

The Day Two objective was to graphically explore key regional solutions that synthesize and build on the outcomes of the first day. Each region's team was comprised of experts from all four workgroups.

The results of the two days' work were presented to the public on the afternoon of Day Two. The event concluded with visual presentations to encourage continued discussion between the working group and the public.

DAY ONE:

Define Priorities and establish Prerequisites that follow those Priorities



The Flood Avoidance Workgroup Report

The Flood Avoidance group began by acknowledging the tremendous opportunity inherent in the fact that our existing flood infrastructure is aging. Near-term, significant investments will have to be made in the river one way or another.

We agreed that a decision point has been reached about whether to double down on the 20th century approach to flood risk (trying to make hazardous areas safe for development, then accessorizing with something 'green'), or to adopt an integrated, eco-system based approach that incorporates and leverages valuable functions and services from nature. There was significant concern that any work being done to support this decision should engage all stakeholders in an inclusive, transparent process.

Discussion ensued about the challenges the river system faces or contributes to today: existing flood risks; disaster costs; maintenance costs; flashier storms; increasing droughts and an extended fire season; sediment management concerns; continued loss of excess water to the ocean; decreasing reliability of imported water; degraded water quality; increased heat effects; loss of habitat value; loss of ecosystem services; poor quality of open space; and multiple jurisdictions.

Our **priorities** for managing flood risk in our changing climate would be to restore hydrologic function; maintain public safety; enhance ecosystem services; maximize local water supply and quality; and increase understanding of our watershed among the public and policy makers.

The following **prerequisites** support our priorities and reflect key values. These should be used alongside scientific inquiry to validate decisions about appropriate strategies: invest for resilience and achieve sustainability; prioritize use of ecosystem services; optimize co-benefits for people and ecosystems; incorporate multiple functions to yield multiple benefits; move quickly, yet cost-effectively; commit to a stakeholder-driven processes.

Key **strategies** to accomplish our priorities include revised planning and land use practices that respect natural hydrologic processes; modified building and safety codes; a revised sediment management strategy that works with nature's services; enhanced and expanded spreading grounds and detention areas; acquisition of floodplain lands to make room for the river.

Specific **measures** were identified, including but not limited to: adopt a watershed-based framework for all studies, plans and projects; develop a science-driven restoration prioritization framework to guide land use planning; leverage all transit and development investments to acquire functional open spaces; incorporate resilience into all development project reviews; relocate critical infrastructure away from and limit new development in hillsides and floodplain areas; acquire gravel

pits for detention of high flows; design, fund and implement a 30-year floodplain buy-back program; retrofit dams and revise dam-operational rules to incorporate sediment gates; incorporate underground detention space for peak flows in all road and parking lot retrofits; facilitate and incentivize homeowner-based urban acupuncture; adjust agency missions to support a climate resilient future; consider decommissioning the Corps from their authority on the LA River system; consider phasing in revisions to disaster insurance framework in high-risk areas.

"Floods are an act of God, but flood losses are largely an act of man." – Gilbert F. White

"There are two kinds of levees, those that have failed and those that will fail in the future." – William H. Hall, California's first State Engineer

Workgroup Leader: Melanie Winter, Founder & Director, The River Project

Participants:

Terri Grant, Assistant Division Head, Watershed Management Division, LACDPW

Josephine Axt, USACE

Claire Bowin, LA City Planning

Jessica Hall, Humboldt Baykeeper

Iovanka Todt, Floodplain Management Association

Dennis Bowker;

Nick Garrity, ESA

Piet Dircke, Expert Global Water Management, Climate Adaptation and Delta Cities, Arcadis

David van Zelm, Delta Commission

Frans vd Ven, Team leader Urban Water Management, Deltares

Ralph Schielen, Water Management Expert, Rijkswaterstat

Dale Morris, Senior Economist, Kingdom of Netherlands

The Water Supply Workgroup Report

The Water Supply group focused upon how the Los Angeles River and its tributaries could be an asset to make the city and region more resilient. We focused on two aspects of water supply: local groundwater storage and consumer conservation.

We identified an opportunity in the underutilized storage capacity in the San Fernando, Central, and West Coast Basins; drinking supply basins fed from surface flows. Each basin has been paved-over and plumbed with recharge facilities, and are the object of a court-sponsored adjudication. They also suffer from legacy pollutants, large populations, and many overlapping and distinct water management institutions.

The second opportunity is from consumer conservation. The region still has relatively high per capita water use when compared to similar regions of the world, as shown in the table. Clearly, a high standard of living is not correlated with per capita water use and Los Angeles might do better at water conservation.

Third, the group framed the changing climate and economy as an opportunity – both create the impetus for innovation and sustainable solutions. Modifying infrastructure to new physical realities and investing public and private funds in economic ventures creates opportunities for additional groundwater storage and lower consumer water demand while addressing climate adaptation and economic development.

The group concluded that rules (legislative, judicial and regulatory) and institutional practices are barriers that need to be aligned with our best knowledge and our goals. The group was concerned that there exists a lack of urgency with decision-makers and the community. We concluded that people and communities are, in general, uncomfortable with change.

In our second session, the group turned to the watershed map and crafted conceptual interventions most needed to move our goals forward. Improved dam operations and dedicated sediment management were encouraged to allow additional mountain-front capture of water. By retaining additional flows in the mountains for use as recharge, pressure would be taken off the lower reaches to convey extreme volumes.

We also highlighted the need to reduce the amount of urban runoff through in-street infiltration and landscape change. “Self-sufficiency” was the term we used to describe a neighborhood that used its own stormwater.

Lastly, we called for more off-channel, managed recharge facilities. Because our landscape is fully developed, there are virtually no remaining areas to do traditional recharge facilities. Instead, the group suggested that a visioning effort be undertaken to redefine what a “spreading basin” is for Los Angeles.

Our group concluded that the first critical step is for trusted leaders to become advocates for change. How we organize ourselves to make these decisions is a key challenge and leadership must become part of the discussion.

Workgroup Leader: Mike Antos, Research Manager, Council for Watershed Health

Participants:

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Robbert de Koning, Landscape Architect BNT, Robbert de Koning Architects

Arnoud Melenaar, Project Manager, City of Rotterdam/Rptterdam Climate Proof

Steve Hirai, VP Major Market Manager, Arcadis

Keith Lilley, Assistant Division Head, Water Resources Division, LA

Greg Kandankulun, Real New Energy

Ira Mark Artz, Divisional VP, Tetra Tech

Water and Soil Quality Workgroup Report

The issues of soil and water quality in the Los Angeles River and its watershed are inextricably linked to its ecology and engineered history, given the unique climate of the Los Angeles region. Before development, the river meandered throughout the basin, and its tributaries were likely dry in the summer with high volumes in the winter. As the region developed and floods became more commonplace, the river was channelized in the 1930's and the subsequent development of the area occurred away from the river. Instead of a natural river system, the LA River became an industrial zone and a gutter.

The water and soil quality group began with context-setting discussions, with the understanding that a number of efforts are underway to re-integrate natural processes into the river system through LA's existing river revitalization and green infrastructure programs. The session participants shared information on the historical ecology of the region, the current status of soil mapping of the basin, and water quality objectives needed to support habitat restoration and species recovery.

The discussion was held in the context of funding strategies unique to the various governmental funding streams of the Netherlands and Los Angeles.

The group arrived at a prioritized list of strategies that needed funding:

A monitoring database;

A soil information database;

A flood-plain buy-back and brownfield redevelopment program with an integrated, multi-dimensional (surface water, soil and groundwater) management strategy for the polluted sites, possibly including an thermal energy storage element.

Workgroup Leader: Paula Daniels, Sr. Policy Advisor, Mayor's Office

Participants:

Adel Hagekhalil, LA City Bureau of Sanitation

Deb Smith, LARWQCB

Kirstin James, Heal the Bay

Eric Stein, SCWRP

Liz Crosson, LA WaterKeeper

Randy Riddle, NRCS

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Dr. Shelly Luce, SMBRC

Sabrina Drill, UCCE

Dr. John Dorsey, LMU

Dr. Mark Hanna, Geosyntec

Judi Miller, CH2M HILL

Urban Acupuncture Workgroup Report

The focus of the urban acupuncture workgroup was making room for the river by making the urban landscape function as a watershed, thus improving quality of life while seriously enhancing climate resilience and sustainability.

We formed consensus on these fundamental principles and approaches:

- Urban Acupuncture means punching holes through, and un-paving, parts of the City's over-cemented, over-turfed and impermeable surfaces to facilitate reconnecting rainwater to the soil and the river. To restore the life and health of Los Angeles' creeks and rivers, land throughout the city must function like a sponge that captures, cleans, and stores rainwater close to where it falls, and then releases it to meet local water supply, aquifer recharge, and habitat maintenance needs.
- We recognized that whenever people dig in the ground, they have an opportunity to improve the river.
- Opportunities to practice Urban Acupuncture range from small adjustments to residential landscapes, to rainwater harvesting parks, schoolyards and parking lots, to retrofitting roads to be green/complete streets, to adapting industrial sites. Coordinating such efforts throughout the area can result in substantial increases in local water supply and avoidance of water pollution and flood threats.
- Urban Acupuncture tools include mulch, trees, rain-gardens, constructed wetlands, swales, cisterns and groundwater recharge infiltrators.
- A key priority is to increase public awareness and community-wide support for a functioning urban watershed, which in turn will create the foundation for policies, programs, funding to support such a watershed as well as the land-use changes necessary for a healthy river and city. This includes more full-scale demonstrations and educational places, especially schoolyards; and other sites including the Piggyback yard.
- Because the LA River Revitalization Plan may cost up to \$7 billion, its implementation is called into question. However, implementation of an Urban Acupuncture approach is both feasible and practical because it can deliver, in a cost-effective way, multiple mandated, and often already funded, infrastructure services. Billions of dollars in existing and upcoming funding could be tapped for construction and maintenance of urban acupuncture-green infrastructure projects, IF used for multi-objective projects.
- The full integration of multi-purpose planning among diverse infrastructure agencies is the key to full-scale and cost effective implementation.

- The Dutch use of "serious games" to (a) engage decision makers, community leaders and common citizens and (b) clarify challenges and options is a promising way to educate diverse stakeholders and the public.

Workgroup Leader: Andy Lipkis, President, TreePeople

Participants:

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Stephanie Pincetl, UCLA

Russ Henly, Assistant Deputy Director, Resource Protection & Improvement, CAL Fire

Mark Hovatter, LAUSD

Amanda Vaughn Rios, LAUSD

Mike McCoy, California Strategic Growth Council

Diego Cardoso, Executive Officer-Transportation Development, Metro

Steven Slabbers, Bosch Slabbers

Anne Sietske Verburg, Advisor, Bosch Slabbers

Annebeth Loois, Project Lead Water and Climate, Tygron

Pex Langenberg, Transportation Attache, Embassy, Kingdom of Netherlands

Ben Feldmann, Mia Lehrer+Associates

Nate Cherry, RTKL Los Angeles

DAY TWO:

Build on the Outcomes of the first day to explore Key Regional Solutions

Workshop Session	Region 1 Upper LA River	Region 2 Glendale Narrows	Region 3 Downtown/Industrial Corridor	Region 4 Lower LA River
Workshop Leaders	<i>Melanie Winter, Founder & Director, The River Project</i>	<i>Andy Lipkis, President, TreePeople</i>	<i>Paula Daniels, Sr. Policy Advisor, Mayor's Office</i>	<i>Mike Antos, Research Manager, Council for Watershed Health</i>
	<i>Frans van de Ven, Urban Water Management Deltares</i>	<i>Arnoud Molenaar, City of Rotterdam</i>	<i>David Zelm, Delta Commission</i>	<i>Piet Dircke, Arcadis & Ralph Schielen, Rijkswaterstaat</i>



City of Ephemeral Streams

Context

A hundred years ago, the opening of the Los Angeles Aqueduct in the NE San Fernando Valley started the city down a path of importing water from distant regions, stifling our awareness and appreciation of this precious local resource. Ephemeral streams, similar to those still found in Santa Clarita to the north, continued to characterize the valley until the channelization of our rivers and washes 25 years later. The rapid development of our floodplains and paving over of resource lands that followed, deprived us of critical ecosystem services. Most of what we know as the San Fernando Valley was designed and built in the last 65 years. Imagine what we can retrofit for climate resilience in the next 65.

The Valley is a high-priority region to focus on implementing climate adaptive strategies that will benefit the entire downstream city. The mountains that drain to it are the source of most of our rainwater. This rainwater flows toward our largest natural water storage facility – the San Fernando Valley Groundwater Basin. Native soils here are highly permeable and perfectly suited for wide-scale parcel-by-parcel rainwater harvesting, or urban acupuncture.

Conditions

Today, most of the valley's 1.76M residents live in single story, single-family homes. Overall, the region is park-poor and car-dependent, with relatively little public transit or bikeways. City codes and the largely impervious land area prevent natural groundwater recharge, leaving the diminished aquifer with more than .5M acre-feet of available storage capacity. Groundwater has legacy contamination from aerospace activities. Industrial activities and asphalt roadways also contribute pollution. Rainwater is thrown away to the sea, yet many areas remain at risk in heavy storm events. Most of the drinking water is imported from distant sources at high (financial and ecological) cost. The extent of asphalt and concrete also create significant heat stress & degrade water quality in rivers and streams. Mountain areas are at increasing risk in a lengthening fire season. Habitat is fragmented and dominated by lawn and water-thirsty species.

The 'Business As Usual' approach:

- Maintain the existing zoning
- Facilitate new development adjacent to river and tributaries
- Raise the concrete floodwalls and develop bike paths along them
- Allow continued development in fire-prone mountains
- Manage sediment behind dams (reducing their capacity), periodically removing by truck
- Begin cleaning up groundwater
- Utilize reclaimed water for industrial use
- Utilize increasingly expensive imported water for residential landscape and potable supply
- Implement LID for new construction
- Create a dozen new 'Green Streets'
- Maintain dependence on automobiles for transit
- Increase density along all primary and intermediate streets
- Develop a dozen new parks

This is the path we are currently on. But adapting to climate change in the Valley demands bold solutions to mitigate water shortages, flood and fire risks, energy demand, and urban heat stress. While we are often hesitant to make bold investments, recovering from climate disasters can cost significantly more than preparing wisely for them.

The opportunity exists to embrace climate-adaptive solutions that add economic value to the city, preserve public health and safety, expand local water supplies, make it a more interesting place to live, to work, to play, and increase the functioning and resilience of nature's services.

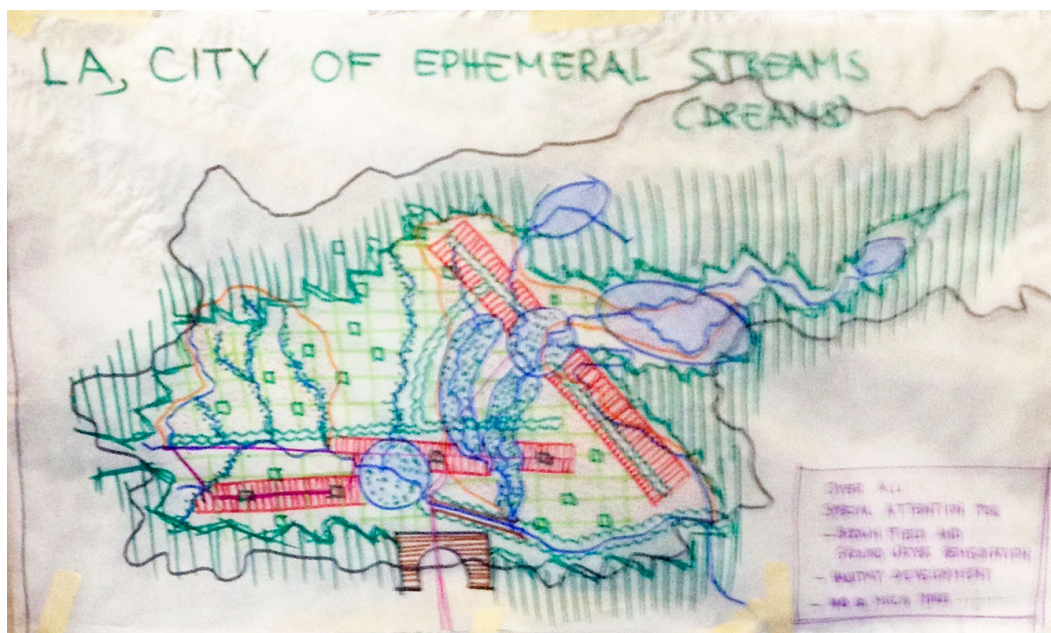
Our team looked to science and history to guide our proposal: the 1915 Flood Engineers Report to the County, the 1929 Olmsted Plan for Parks, the 1970 Concept Los Angeles Plan, and the recent plans for the Sun Valley and Tujunga/Pacoima Watersheds. These recommended protecting our local water resources by setting aside land to infiltrate rainwater at the base of the San Gabriel Mountains, limiting development in floodplains and mountains so that they could provide us with valuable ecosystem services, concentrating densities around a network of public transit, and providing a regional network of parks and greenways.

The 'Climate to the Top' approach:

- Zoning codes and community plans would prioritize protection of water resources and coordinate closely with transit plans. Transit planners would invest more attention to the populous Valley. Building and safety codes would be rewritten to facilitate parcel-based water management rather than requiring the wholesale elimination of rainwater off properties. In this way, the existing grid could be incrementally and strategically re-shaped to support the population and its economies without losing out on nature's inherently resilient and cost-effective services.
- Agencies would review their missions and explore re-organization, re-alignment and/or mergers to support 21st century priorities and more effective collaborations. Recognizing that bold change requires all hands on deck, agencies would partner with and facilitate climate-adaptive actions by local communities and NGOs.
- Since local water is more cost effective and less energy intensive than imported water, widely-distributed rainwater capture and infiltration areas are proposed. Small-scale urban acupuncture projects will be incentivized for existing development, medium-scale projects will be integrated into existing and new greenways and parks, and large-scale projects will be implemented where soils are most suitable. These more functional blue-green areas will also add aesthetic value to the existing urban surroundings. Publicly promote the value of the groundwater cleanup and recycled water programs, and move them forward on a fast track. Incentives to "Capture, Conserve, Reuse" and a campaign promote to the beauty and variety of our native plants ("Hi - I'm an Angeleno!") could facilitate a transition from lawns.
- As mountain/urban interface areas will be increasingly fire-prone, development restrictions will mitigate fire risk. Protecting the forested upper watershed also protects our air and water resources. Because soils in some parts of the San Fernando Valley are highly permeable, we propose to limit density in these specific areas to enhance groundwater recharge while mitigating

flood risk. Key areas are at the base of the San Gabriel Mountains, others exist along historic washes and throughout the Valley floor. Open spaces in these areas can provide water infiltration, recreation, habitat, healthy soil to serve as a carbon sink, and urban agriculture.

- Reestablishing ecosystem services, primarily the seasonal flooding and groundwater recharge function of rivers and alluvial fans is key to mitigating impacts and rethinking the Valley's urban form for a resilient future. Rather than adding more concrete, we propose substantial re-naturalization of the river and its tributaries to facilitate groundwater recharge, improve water quality, re-establish healthy soils to support local agriculture, provide connective corridors for people and habitat, and reduce heat-island impacts. This will require development of a long-term floodplain buy-back program with incentives, financed by multiple partners.
- To compensate for this density reduction, high-density zones will be developed in close concert with the region's long-range transportation plan. This approach will create a greener, more varied and interesting Valley, as well as increase its variety of housing stock and land use. Walkable, transit-supported communities are healthier, and denser areas are more energy efficient to cool, reducing the carbon footprint and creating urban oases.
- To further enhance the region's infiltration capacity, green boulevards, green streets and urban parks will be developed and retrofit to serve as net positive components of local water infrastructure. The main transport axes will be transformed in broad, leafy pedestrian and bicycle-friendly boulevards that capture, detain, and infiltrate rainwater.
- In residential areas, 680 blue-green streets will be developed, together with 68 new blue-green urban parks, and 34 new community gardens, so that every citizen will have access to living open space within a quarter mile of home.



The Narrows

The area known as the Glendale Narrows presents some unique challenges. The Glendale Narrows can be characterized as the area between the San Fernando Valley and the Los Angeles Coastal Plain, where the River takes a turn to the south towards the ocean. The river here flows between the easternmost end of the Santa Monica Mountains and the western San Rafael & Repetto Hills. This 7-mile stretch is one of the three remaining 'soft-bottom' reaches of the river, and due to the high elevation of the water table here, even in drier weather cycles there is generally some interaction between ground water and surface water.

Land use consists of a combination of flat, heavily paved residential and industrial lower and middle class neighborhoods, combined with moderately forested hills consisting of natural reserves and upper class residential areas. These hillsides are susceptible to erosion and brush fires that can cause debris to be discharged into the River, along with its contaminants and chemicals.



The working group identified two major challenges for the Glendale Narrows area. The first is the potential impact of debris flow and contaminants. The second challenge is that the Glendale Narrows area is a major corridor for automobile transit and rail adjacent to the River. The group identified the opportunity of creating an "oasis" in the area by creating opportunities for the water to make its way to the River more slowly. This in turn would provide opportunities for putting the water to beneficial use, as opposed to losing it to the ocean.

This "slow trip" allows for three major opportunities: Green Hills, Blue-Green Corridor, and Residential Retention.

Green Hills

The hills create the challenge of "fast water" and debris flows. This can be mitigated by creating an interface where the hills meet the urban landscape. A series of retention tags would be created at the interface to intercept the fast water and collect the debris flows, thereby allowing the clean water to continue downhill towards the River. The retention tags also allow for the capture of some water for recharge of the hillsides and creating Green Hills.

Blue-Green Corridor

The issue of major transit along the River can be alleviated by creatively incorporating transit infrastructure into river protection. One such opportunity is to connect the River with the Griffith Park by constructing underground transit corridors with highway and rail, thereby eliminating the physical transit barrier that currently divides the River from the Park. This corridor can also be designed to create a dike for water protection while not obstructing the already impacted ecosystem. An opportunity to create another "pearl along the river" also presented itself by creating visible "blue" water opportunities. This consisted of changing currently hidden underground drains into daylighted streams that flow more slowly into the River, resulting in clean, free flowing water courses with restored habitat leading to and connecting with the River for people to enjoy.

Residential Retention

The last step is for the residential communities to create opportunities to benefit the River. This is achieved by urban acupuncture to allow for greater water percolation and storage, which reduces flow to the River. This strategy includes greening streets with trees and greenery, removing concrete and other hard surfaces, and creating green playgrounds for schools. Promoting green schools gives children the opportunity to play in a healthy and natural environment, but also creates the opportunity to educate them about the environment and the ecosystem. This younger generation represents our greatest opportunity for a healthy and sustainable future.

Source to Sea

Site Characterization

The area of inquiry was expanded to include the Arroyo Seco watershed and extended to the Rio Hondo confluence and the watershed area draining into it.

The urban area is dense and diverse. The Arroyo Seco and Los Angeles River through these areas are mostly in concrete channels, and the rights-of-way are constrained by infrastructure (railroads, freeways, electrical transmission lines, utility infrastructure). Light rail is a significant part of the public transportation system, and bike paths exist along the Arroyo Seco (in its bed) but not along this reach of the LA River. Union Station is an important transportation hub and landmark. Downtown LA and industrial facilities dominate the landscape in the southern part of the reach.

Challenges

Flood frequency and intensity is going to change (get worse). The channels are already undersized. Development has caused the loss of the floodplains. Infrastructure constrains the right-of-way, making it difficult to reclaim floodplains. There is a need to improve public access. High Speed Rail is in planning stages and can also become a constraint along the river.

Assets/Opportunities

Existing planning is starting to deviate from traditional land use approaches and create opportunities for more holistic planning that includes watershed functions. (Cornfields/Arroyo Seco Specific Plan – CASSP – was an example the group was excited about. It creates a river-oriented zone.)

The Piggyback Yard is a site with potential.

The open space along the Arroyo Seco could make floodplain restoration fairly easy.

Integrate infrastructure, especially around high-speed rail.

Strategies

A: Business As Usual Approach – design for 50-year storm event (1 in 50 chance of occurring)

- Stay mostly within the existing flood control right-of-way.

- Keep infrastructure where it currently is.

- Add floodwalls

- Add bypass culverts

Off channel storage – dams. This results in sediment collecting behind dams and perpetual maintenance issues.

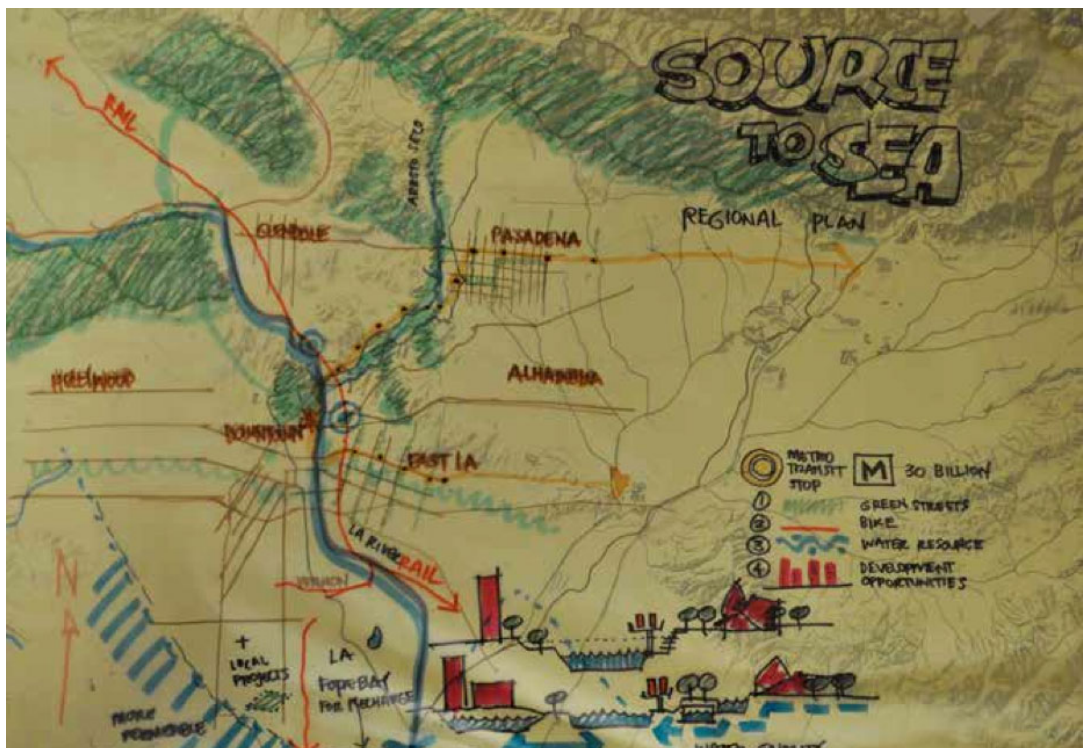
Building and maintaining this is very expensive. It has a single benefit – flood prevention. Consider the life cycle cost/performance cost-benefit analysis. An analogy with the use of emergency rooms in the health care system came up – prevention is more efficient and less expensive than responding to or after an emergency.

B: Alternative Vision: Source to Sea – design for 200-year storm event (1 in 200 chance of occurring)

5 key elements/typologies:

- Connecting parks: Parks and rivers can be connected via a water system. The permeable surfaces decrease water velocities and increase infiltration/recharge before water enters the river system. Greenways can be used to connect parks and river for recreation and ecological health. Always consider how the parks are connected to their communities.
- Multiple use of transit system: Leverage the investments in the transit system for the creation of “urban acupuncture” sites, greenbelts, and nested utility infrastructure. All cities and agencies must cooperate.
- Transform existing infrastructure: The maintenance of the dry and wet infrastructure can be a driving force for revitalizing the river system and spatial quality. The network of storm drains can be transformed, over time, into green and visible urban “day-lighted creeks.” Roads can be transformed into greenways with green and permeable road medians and shoulders.
- Floodplain expansion: Use adjacent vacant or public land to create extra multifunctional water storage space --Room for the River!--in case of flooding. Create ‘buy back’ programs. The existing plans for Piggyback Yard are an inspiring example of these new interventions.
- Transform city blocks: Redevelop impervious industrial zones such as the LA Forebay and use the momentum when urban areas need restructuring. Implement Low Impact Development (LID) concepts, increase permeability. Upstream areas of the project site that recharge will support the water supply; downstream areas will support habitat and ecosystem.

The proposal shows linkages along green streets and naturalized stormwater infrastructure, restored floodways along the Arroyo Seco, and a phased approach to establishing floodable, restorable open space along the Los Angeles River. Alameda Street once signified the presence of cottonwoods (álamos, in Spanish) that would once again resonate, from both urban and ecological perspectives, as a revitalized boulevard with cottonwoods signaling entry to this restored riverfront zone.



The Delta River City

Group 4 developed a first draft strategy for the lower end part of the LA River basin. The principles for this strategy were developed the day before. A brief impression of the process:

The first day the group started as the Water Supply Group. In the beginning discussions were angled from a sectoral perspective. Further in the process participants started to see each other as colleagues and the discussion gradually focused on the challenges and the common future perspectives of the whole river basin. And at the end a first draft integral approach was described. This was the first paradigm shift: studying the LA River in fact is studying the river basin, the river basin in fact corresponds with LA City and neighboring cities, so LA River = LA City. Somebody said: the "river starts at your front door!" An important central question was put forward: How to use the LA River adapt the City, and to create a Better City.

The following statements were made the first day and set the framework for the second day:

1. optimize upstream storage
2. create more large detention basins, as a pearl chain or necklace
3. Create a partially permeable river
4. invest in and use tributaries
5. create self supporting urban areas (zero-runoff)
6. change attitude of the public
7. link adaptation to investment plans (such as enterprise zones)
8. create jobs with smart adaptation
9. develop an urban grid of green- blue- structures
10. create "river streets" (use streets to collect and infiltrate)

Lower End LA River Characteristics

Relatively flat;

Port area;

Several cities: LA and probably 20 neighbor cities;

Low income communities

Challenges

Restoration LA River - Peakflow LA River - Sediment flow LA River

Water and soil pollution

Port expansion

Upgrading residential areas: social challenges

Stronger economy

Top 10 Outcomes

1. An integrated adaptation strategy is needed, set up together with all stakeholders: funding comes with a vision. "We need a Climate Proof manager";
2. We rediscovered the LA River Delta City;
3. Combine Port expansion with adaptation measures, adaptive waterfronts and
4. Use the sediments to create more natural barriers (eco engineering)
5. Create more water storage in the residential areas by introducing storage facilities that introduce urban quality at the same time, on different scales: 1. private properties, 2. street/ neighborhoods, 3. districts/tributary catchments. Use Rotterdam Approach as inspiring examples (water plazas, rowing track, green roofs, etc).
6. When reconstructed, develop urban areas more dense in order to create more space (room for water/ blue/green); Room for restoration of some historic wetlands: urban wetlands as part of the delta city: bring back the sponge function, create resiliency.
7. Find connection with urban development, projects and maintenance programs!
8. Example: replace Piggy back Yard to the East, transfer the area to a retention basin (Pearl of Necklace); Port expansion is linked to PiggyBack area, including new railway; existing railway can be used to restore LA river.
9. Soil remediation: Rotterdam has experiences with in situ soil/groundwater remediation in Port area.
10. Comprehensive Approach: create knowledge, find smart win-win measures, piggyback with projects: innovative adaptation creates jobs!

