重塑洛杉矶河：
连接公共开放空间的51英里
The Los Angeles River Reimagined:
51 Miles of Connected Public Open Space

杰西卡 · M · 汉森
注册景观设计师，美国景观设计师协会会员，欧林事务所合伙人，宾夕法尼亚大学景观设计学硕士

马克 · 汉娜
Geosyntec跨国工程咨询公司高级首席、注册专业工程师，加利福尼亚大学洛杉矶分校土木工程学博士

Jessica M. HENSON*
RLA, ASLA, Partner at OLIN, Master of Landscape Architecture at University of Pennsylvania

Mark HANNA
PE, Senior Principal at Geosyntec; PhD of Civil Engineering at University of California at Los Angeles

*Corresponding Author
Address: 5900 Wilshire Blvd Suite 2375 Los Angeles, CA 90036, USA
Email: jhenson@theolinstudio.com

摘要

因其特殊的混凝土河道，洛杉矶河可能是世界上最具辨识度的河流之一。随着洛杉矶地区的城市化逐渐推进，这条河流为降低洪水发生风险而被渠化，在一些人眼中，这是建筑工程史上的丰功伟绩，而在另一些人眼中则是一场生态灾难。洛杉矶河流经17个城市，其中不乏洛杉矶县境内环境最恶劣、公园最稀缺、服务水平最差的一些社区。在河道的通行权范围内有超过930多公顷的公共用地可以用来重塑洛杉矶河，这将会影响河道周围1.6km范围内100万人的生活。

洛杉矶河总体规划由洛杉矶县主导，计划于2021年秋季完成。该规划提议建设长约51英里（约82km）相互连接的公共开放空间，其中包括一系列多效益项目，共响应了9个总体目标，从防洪韧性到房屋经济实用性，再到生态功能、艺术、教育和文化等。在这一面向未来25年的基于数据的规划中，进行了一项针对全流域的研究，致力于记录和理解与环境和社会问题相关的水质、水源地保护与洪水风险的话题。规划还提出了兼具传统与创新策略的“工具包”，配置了栖息地桥梁、干旱河谷侧渠等在内的65种设计工具，旨在提升生态系统服务、形成一个欣欣向荣的城市居所和相互连接的滨河公园网络。

关键词
流域分析；目标驱动的规划框架；基于数据；生态功能；工具包；生物多样性；洪水风险

ABSTRACT
The concrete channel of the Los Angeles (LA) River is probably one of the most recognizable rivers in the world. Channelized to manage the risk of flooding as the Los Angeles region urbanized, the river today is an architectural and engineering feat in the eyes of some people but an ecological disaster to others. The river flows adjacent to 17 cities and among some of the most environmentally burdened, park poor, and underserved communities of LA County. With over 2,300 acres of largely publicly owned land within the river right-of-way, a reimagined LA River can impact the lives of the one million people that live within a mile of the river.

The LA River Master Plan, led by Los Angeles County and scheduled to be completed in fall 2021, proposes 51 miles of connected public open space with multi-benefit projects supporting nine goals ranging from flood resilience to housing affordability, to ecological function, and to arts, education, and culture. The data-based plan for the next 25 years includes a watershed-wide research effort to document and understand water quality, water conservation, and flood risk in relation to environmental and social issues. The plan includes traditional and innovative strategies within a “kit of parts,” interventions that include over 65 components ranging from habitat bridges to dry arroyo side channels demonstrating opportunities for enhancing ecosystem services to create a thriving urban habitat and connected network of parks along the river.

KEYWORDS
Watershed Analyses; Goal-Driven Planning Framework; Data-Based; Ecological Function; Kit of Parts; Biodiversity; Flood Risk

编辑 | 冉玲于、田乐
翻译 | 冉玲于、嵇扬、张晨希、丁祎
EDITED BY | RAN Lingyu, Tina TIAN
TRANSLATED BY | RAN Lingyu, Victor Ji, ZHANG Chenxi, Eve Yi DING

https://doi.org/10.15302/J-LAF-1-040024
收稿时间 RECEIVED DATE | 2021-05-26
中图分类号 | TU984, TU986, TV212.4, X176
文献标识码 | B

1 引言

逾100万人居住在距离洛杉矶河一英里（约1.6km）以内的地方，美国最大的州——加利福尼亚州甚至有四分之一的人口住在距离洛杉矶河仅一小时车程的范围内[1]（图1）。洛杉矶河闻名全球，在当地也常被视作是洛杉矶地区的“后花园”。它标志性的混凝土河道被一些人认为是工程奇迹，沿途点缀着无数桥梁与建筑瑰宝。自河道建设的20世纪初期和中期以来，与其相关的生态和社会效应开始逐渐得到重视。到了近几十年，人们更加倾向于将洛杉矶河重塑为一种能为社区带来多重效益的资源，其不仅可以创造繁华的城市居住环境、形成活力四射的艺术和文化氛围，提供更纯净的水源，同时在洪水爆发时，还可以保障当地居民的生命财产安全。洛杉矶河流经了17座城市，其中便包括了一些环境最恶劣、公园最稀缺、服务水平最低的社区。在洛杉矶河的通行权范围内有超过930hm^{2}的公共用地，为河流、城市与环境发展提供了巨大机遇。洛杉矶县监事会在认识到这些潜力后，于2016年投票表决将对1996年洛杉矶河总体规划进行修订。修订版规划将于2021年制定完成，并会成为洛杉矶河的首个综合性规划——该规划将复杂的水环境与社会问题联系起来，同时提出多效益的项目发展战略，旨在提升生态系统服务功能、改善水质，并繁荣地方文化。

1. 有100多万人居住在距离洛杉矶河1英里（约1.6km）范围内，且近一半的洛杉矶县的居民住所在河流流域内。

1. Over one million people live within one mile of the LA River, and nearly half of LA County's residents live within the river's watershed.

© LA River Master Plan 2021, LA County Public Works, OLIN, Gehry Partners, Geosyntec, LANDAU Design+Technology
1

2 洛杉矶河流域的设计挑战

洛杉矶河仅约51英里（约82km）长，河道短而陡峭。始于圣佛南多谷西缘，一路奔腾至长滩市，并在此汇入太平洋，总体高程下降了近244m。整条洛杉矶河的流域面积约2 150km^2，其平坦的冲击平原上坐落着美国一些最发达、人口最密集的地区，而在它上游则多为国家森林用地的最陡峭的山脉。如此经年累月，这些地理条件逐渐造就了这片独特的流域：雨水从陡峭的山上冲刷下来，在流域较平坦的地区形成宽阔的洪泛平原和广阔的洪涝湿地。有时，洛杉矶河会与圣盖博河汇合，形成一个数千米宽的三角洲；有时，洛杉矶河河水又会跨越河岸，在圣佩德罗湾与圣莫尼卡湾之间改道进入太平洋，其中，圣佩德罗湾是今天的洛杉矶河入海的地方，圣莫尼卡湾则是它曾与巴罗纳溪汇合的地方（图2）。几个世纪以来，原住民在这个流域的自然系统中繁衍生息，这里特有的野生动植物则在生物多样性极为丰富的生态系统中蓬勃发展。[2]

从19世纪后期到20世纪初期，随着洛杉矶河流域内城市的迅速扩张，这条难以掌控的河流日益成为令城市开发者与居民头痛的难题。在经历连年干旱后，城市开发开始慢慢逼近河流。与此同时，人们修建了灌溉渠道，并进行了适度改变逐渐渠化了河流。然而，之后几年，河水泛滥，重新变宽的洪泛平原，警告着人类洛杉矶河强大的自然力量。

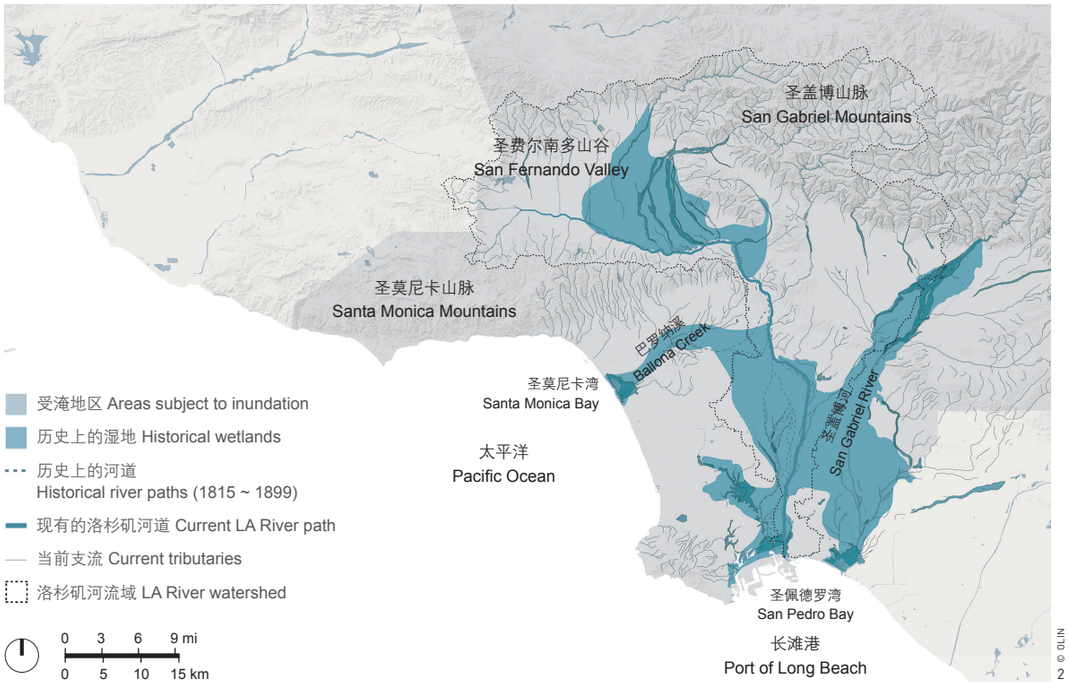
而在经历20世纪初的洪水后，加利福尼亚州于1915年设立了洛杉矶县防洪区。在此之后，防洪区一直与美国陆军工程兵团（USACE）合作进行河道渠化，直到20世纪30年代，接连不断的洪水造成了前所未有的财产损失和人员伤亡，考虑到洛杉矶在美国经济与工业生产中的重要地位，人们不得不重视这条威胁着铁路线、生产建设且连接着不断扩张的港口的河流。于是，美国陆军工程兵团在此后的20年中彻底渠化了洛杉矶河。如今的洛杉矶河被禁锢在一条单向的混凝土水渠中，仅余几处可以隐约看到河流原本的样子：一条自然的、半干旱气候中的河流（图3）。尽管水渠容量在不同位置会有所变化，甚至在某些河段容量极低，但是，当面对百年一遇的暴雨灾害时，洛杉矶市中心的河段仍然可以承载大约2 832m^3/s的水流量，这对于一条几乎完全干涸的混凝土渠道来说，已是惊人水量。[3]

洛杉矶河渠化除了对环境造成毁灭性的冲击外，这些基础设施的建造也对沿河社区特别是对位于洛杉矶东南部的社区产生了一定社会影响。例如，20世纪房地产行业“指定红线区”的行为加剧了沿河社区的种族隔离和歧视，而对环境有害的物质也随河流廊道内的工业设施建设逐渐渗透进周围土壤中[4]。如今，洛杉矶河的设计方案正面临着复杂的管辖权与渠化后遗症的双重挑战。

3 未实现的公共开放空间愿景

在尽可能渠化洛杉矶河以保护市民及建成区免受洪水侵袭的同时，也不乏关于洛杉矶地区的河流、公园与开放空间的光明的未来愿景的设想。1930年，奥姆斯特德兄弟事务所与哈兰德·巴斯洛缪联合公司曾一起为洛杉矶制定规划，设想了以洛杉矶河等河流为绿道“骨干”的大约287km^{2}的公园绿地。规划指出，“洛杉矶县能否维持经济繁荣将取决于是否能够提供足够的公园，因为随着大都市的蔓延，缺少公园将削弱这里的居住条件吸引力，也逐渐不利于身心健康……因此，到目前为止，由于人们未能在这场危机中表现出必要的领悟力、勇气与领导力，该地区的发展无疑会造成对自身的反噬。”[5]与其将这些未能实现的未来愿景归咎于大萧条（美国历史上影响深远的一段时期）或20世纪30年代的洪水灾害，不如反思缺乏清晰明确的政府管理对这个综合规划实施的不利影响。

洛杉矶历史学家威廉·德弗雷尔曾写道，该规划中存在一个致命问题——如果考虑规划中的巨大成本，也就意味着需要形成新的治理结构，而这会损害当地商会的已有权力，显然，这并非他们喜闻乐见之事[6]。因此，在这种尴尬的情形下，该规划没有任何实质性进展。由于规划并未实施，洛杉矶县域范围内开放空间的可达性差异悬殊。虽然洛杉矶县确立了非建制地区内1.6hm^2/千人、全县范围内2.4hm^2/千人的公园服务密度目标[7]，然而实际情况却是，某些社区的公园服务密度不足0.4hm^2/千人[8]。



1986年，环保人士们对洛杉矶河重新燃起了兴趣，不过，他们此次关注的重点是生态健康和残存栖息地[9]。1996年，洛杉矶县完成了第一部针对洛杉矶河的渐进式规划条例的制订。在这部规划中，河流通行权范围内以及周边的土地可以用作智能水务管理和娱乐休憩场所的场地[10]。

在2007年，洛杉矶市继续试图规划约51km的河流上游部分[11]。该规划设想了一个滨河生态系统，通过大型区域蓄水空间将河道流量调节至足够低，以满足植被生长需求，而密集的住房开发区则自河流廊道后撤，为可能的河道拓宽腾退空间。自2007年以来，洛杉矶在自行车道建设方面取得了长足的进展，这些车道在规划中连接着河流与一些河道周边地区的公园，同时在一个之前曾是铁路车站的场地上建设了一个具有标志性的、意义重大的河流项目[12]。然而，该规划的主要原则——河岸修复、保障大型区域蓄水空间及清除私有房地产——给方案的整体实施带来极大挑战。规划中提到，平均而言，一条完全河岸化的河流所需的河道宽度是当前河道宽度的5倍。考虑到在实施过程中所面临的复杂问题，该规划提出借助能满足总蓄水量需求的大型区域蓄水空间来实现这一规划目标[11]。然而，从整个流域当前的开发水平来看，在需要控制流量的某些地理区域，并没有符合条件的蓄水空间。

洛杉矶河的规划历史、治理和该地区从未间断的复杂社会问题，再加上对于洪水风险管理的实际需求，以及河道管辖权利的交叉，共同引发了对洛杉矶河未来的持续讨论。

4 洛杉矶河沿岸的洪水管理

洛杉矶河当前的洪水管理系统旨在当遇到大雨或暴雨时，能尽快将水排入海洋，以防止城市中遭受洪涝灾害；同时在更频繁的小型降雨事件中，可以留住宝贵的雨水资源以补给地下水。河道的混凝土和桥墩的设计能减小摩擦力，使水可以快速流动。大部分的河道可满足百年一遇的降雨事件中的水量通行需求；然而，目前，该河道许多断面的疏水流量却低于这一标准（图4）。若想将此两用系统重新建设为一个具有多重效益的河流系统，就需要精确了解这些河道的工程设计。若只是不加思考地进行哪怕微小改变或移除混凝土，也可能会导致水位的大幅上升，甚至造成河水漫溢。

在洪峰流量最大的时候，通过增加流域上游的渗透以减少河道中的流量，看起来似乎是合理的；然而，水文学研究表明，即使将流域的防渗措施减少50%，也只会在大型暴雨事件中微弱削减河道洪水流量。因此，尽管绿色基础设施的建设与本地化的雨水管理对洛杉矶河流域的水质和水资源保护至关重要，但它们无法满足当遭遇最强暴雨灾害时城市对于雨水疏导排涝的需求。

5 洛杉矶河索引网站与河流－英里系统的创建

2014年与2015年，在非营利组织River LA的领导下，欧林事务所、盖里建筑事务所与Geosyntec跨国工程咨询公司合作开展了一项公益性的深度研究，旨在创建整条河流的数据库，以便更好地了解与洛杉矶河沿岸社区有关的水资源、环境与相关的社会需求（图5）。2016年，这项研究建立了洛杉矶河索引网站，这是一个致力于收集洛杉矶河数据的网站，该网站的部分资金则来自于两个州级保护协会和一个地方政府的拨款（图6）。[13]

洛杉矶河索引网站的一个重要进展是为洛杉矶河创建了一个“河流－英里”系统，使人们首次通过一个统一的参考坐标系来了解洛杉矶河。通常来说，美国其他的主要河流都拥有自己的参考坐标系统，但由于洛杉矶河为非航行河流，因而并没有相应的系统。洛杉矶河索引网站里的一系列研究，尤其是建立起“河流－英里”系统对从区域角度理解洛杉矶河流域具有关键作用，其可用于指导同时适合上下游的倡导社会公平的方案设计。该研究也发现了洛杉矶河的一些问题，包括河流上下游存在的不公平性、生态破碎化、开放空间可达性较低、污染导致的公共健康问题，以及居民的交通需求。

也许最不可思议的是，在其中一项针对位于“河流－英里”参考坐标系统里约190km处的下游河段的研究中发现，即使在河道中央种植一小块草坪也会使该河段的河道疏水流量减少5%（图7）；而如果仅在河堤上栽植树木，则会减少50%~60%的河道疏水流量[14]。混凝土河道的好处在于其本身光滑度高而少有摩擦，这能使河道拥有巨大的疏水流量并可快速流向海洋。这也意味着，完全拆除一个世纪前建设的混凝土河道是不现实的。

虽然，正如前文所述，洛杉矶河的渠化造成了一系列的环境和社会问题，但是洛杉矶河索引网站也表明，如果可以从区域尺度实施大规模的地下水补给项目，洛杉矶河流域的下方含水层是可以容纳更多水分的。另外，通过建设更多的沿河公园与引渗空间，可以达到雨水下渗的目的，这也在保障洪水

管理的同时提升了生态和社会效益。因此，在进行这片区域的规划时，可以在含水层中储存水分，同时确保必要的河道疏水流量，进而逐渐改善社会公平问题。

6 洛杉矶河总体规划

2016年，洛杉矶县监事会投票表决修订1996版的洛杉矶河总体规划方案。这是洛杉矶河治理的重要里程碑，1996版的规划是自1929年奥姆斯特德－巴斯洛缪规划以来首次提出不再仅将洛杉矶河用作简单的洪水管理的规划理念，但其已不再适用于社会、气候和经济都迅速变化的21世纪。另外，更多开源技术的出现使规划人员能够轻松地获得丰富的河流与流域知识。2018年，洛杉矶县公共工程部门开始着手与Geosyntec跨国工程咨询公司、欧林事务所及盖里建筑设计事务所领导的顾问团队，以及River LA领导的社区参与团队共同制定与时俱进的总体规划方案。在此之前，没有任何规划方案会为规划师与决策者提供一个涵盖洛杉矶河82km全部数据的综合数据库。该规划参考了140多份洛杉矶河的规划文件与50多个美国本土及国际项目，包括芝加哥深层隧道和水库工程[15]或波士顿“大开挖”中央隧道改造工程[16]等大型多辖区基础设施项目，以及像南普拉特河绿道建设[17]这样的城市半干旱河流项目。

目前，洛杉矶河总体规划已经进行了超过两年半的社区参与，参与者总数近几千名，同时以电子网络形式联络到了在洛杉矶县的近100万名居民[14]。此规划方案具备两大特征：1）这是一个基于社区与数据的框架，并为最后决策服务，因此那些试图在82km长的河流沿岸精确定位每棵树、每个结构，甚至是每个垃圾桶位置的想法将是徒劳无功的；2）这是一个基于未来发展过程的规划，即我们需要认识到社区需求抑或气候条件可能会发生变化，在25年的规划实施期间应当预留出可以灵活调整的空间。仅在过去的18个月中，新冠肺炎疫情就足以说明制定灵活规划的必要性，以弹性应对气候变化、住房危机和种族平等等复杂多变的问题。

6.1 基于数据的规划框架

洛杉矶河总体规划团队从与洛杉矶河索引网站同步启动的“河流－英里”数据系统着手，开发了一种基于数据的方法，以服务于最后决策，同时重点考虑社区需求。而这种方法实施的前提是要创建洛杉矶河标尺系统。因为通常情况下，大型的系统性规划会因数百张地图共同展示而显得信息极度庞杂，这会使规划人员难以确定需要重点关注的数据。

洛杉矶河标尺系统是对洛杉矶河进行线性解读的一个系统（图8）。规划团队使用地理信息系统图像与线性参考沿标尺投影的数据，以此得到了200多个基于洛杉矶河数据库的标尺集。这一方法综合了工程学、景观设计学与规划学的多学科知识，创建了可以沿河快速识别的视觉模型。例如，借助标尺集，我们可以快速了解何处的公园需求与环境负荷相重叠，或者何处的住房有一定的洪水风险。

根据这些数据，洛杉矶河总体规划指导委员会、洛杉矶县相关部门与设计团队一起从总体规划所涉及的所有目标中筛选出了最为关键的数据。最终，团队制定出9张响应总体规划目标的需求地图，直观地显现了需求最高的社区。

6.2 目标、场地与设计原型

洛杉矶河总体规划的每个规划目标都是互相关联的，而这对规划实施的成功至关重要。人们逐渐认识到在基础设施的规划中综合考虑与之相关的各类话题有助于真正满足社区需求、实现环境正义与公平，于是总体规划的目标从洪水风险缓解与韧性建设之类的水话题到经济适用房一类的社会话题均有所覆盖（图9）。然而，洛杉矶县目前正在经历一场经济适用房的危机，这将进一步导致了无家可归人数的持续上升。但针对洛杉矶河的投资可以改善社区环境并提升社会公平性，进而减轻当前的流离失所问题，因此，社区居民可以享受河流改善措施所提供的


51英里河段：卡诺加公园
River mile 51: Canoga Park


43英里河段：塞普尔维达盆地
River mile 43: Sepulveda Basin


39英里河段：影视城
River mile 39: Studio City


28英里河段：阿特沃特村
River mile 28: Atwater Village


24英里河段：伊利森公园
River mile 24: Elysian Park


22英里河段：洛杉矶市中心
River mile 22: downtown LA


12英里河段：南盖特
River mile 12: South Gate

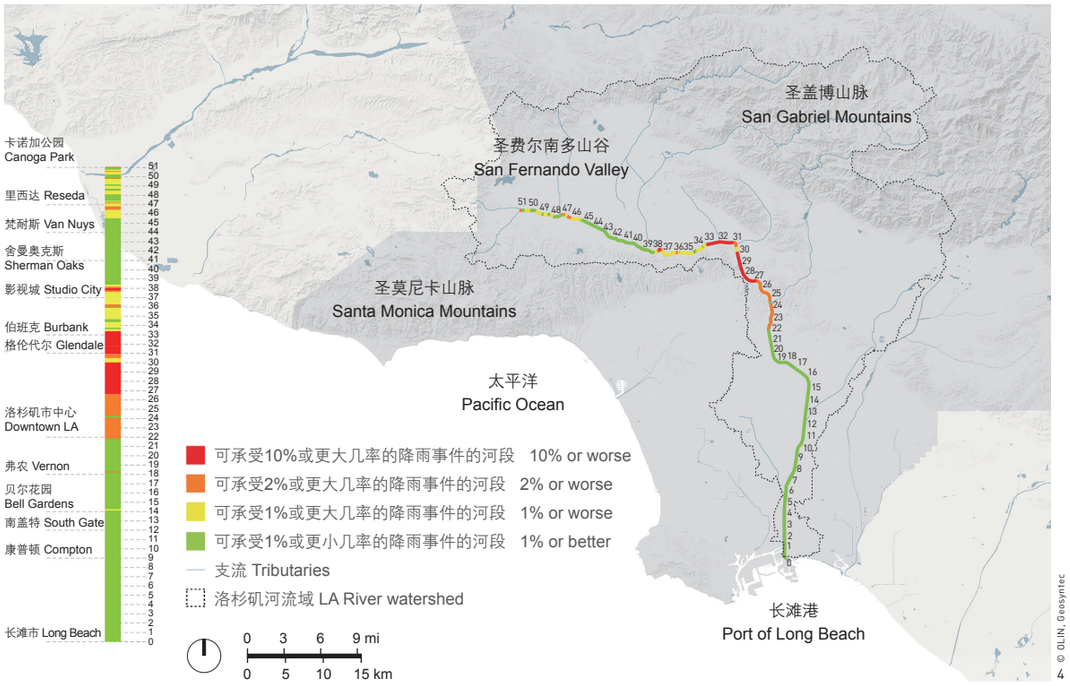

2英里河段：长滩市
River mile 2: Long Beach


起始点：河口
River mile 0: river mouth

© OLIN 3

2. 在过去的几个世纪中，洛杉矶县附近的山脉径流逐渐形成了分布广泛的溪流和水道。
3. 洛杉矶河既有箱形断面，也有梯形断面，从山脉源头到长滩市的平原河口，其宽度发生了巨大变化。

2. In several centuries past, runoff from LA County's nearby mountain ranges created widely spreading streams and channels.
3. The LA River features both box-channel sections and trapezoidal sections and varies significantly in width from its headwaters in the mountains to its mouth at the coastal plain in Long Beach.



4. 洛杉矶河输送雨水的能力会根据河道形状、尺寸，以及局部流域特征而变化。河流的许多地段可以承受100年一遇的降雨灾害。然而，在某些区域，50年一遇甚至10年一遇的降雨事件所产生的雨水就可能已经超出河道疏水流量，进而导致河水漫过河岸而淹没邻近土地。
5. 来自三个事务所的成员就洛杉矶河索引网站、洛杉矶河总体规划和洛杉矶河其他项目的开发展开的一系列工作会议。
6. 洛杉矶河索引网站于2016年建成，收集了有关洛杉矶河的9个类别的数据，包括水体、环境和社会主题等。

4. The capacity of the LA River to convey stormwater varies based on the channel shape and size and localized watershed characteristics. Many stretches of the river can accommodate a 1% (100-year) storm events. However, there are some segments for which the amount of stormwater created by a 2% (50-year) or even 10% (10-year) storm event may exceed channel capacity, overtopping the river banks and flooding adjacent lands.
5. Team members from OLIN, Geosyntec, and Gehry Partners came together for a series of work sessions throughout the development of the LA River Index, LA River Master Plan, and other LA River projects.
6. The LA River Index website completed in 2016 brings together data for LA River across nine categories including water, environment, and social topics.

服务与便利，以保障他们稳定的社区生活。随着开放空间的改善，洛杉矶河沿岸的市政当局将重点建造并保留经济适用房、鼓励更强有力的租户保障措施、进行包容性的分区规划与社区公平性建设。

为了提高沿河开放空间的连通性，以及保障公园、设施与道路的公平合理布局，总体规划将重点放在了重新利用公有土地、河道通行权内未能充分利用的土地，以及河道本身——所幸河道通行权范围内有超过86%的土地是公有的[①]。最终，待开发的场地的选址结果体系中囊括了已规划的项目、待改善的河道空间出入口，以及新建的超小型、小型、中型、大型及超大型场地，而这些场地填补了滨河公园、道路及改善措施之间的空白（图10）。通过这个系统，确保河道的每个部分都会得到关注。创建一个可以融入洛杉矶县居民日常生活的、无缝衔接的82km公共开放空间是此次规划的愿景，而连接沿河道路和步道正是实现愿景过程中的重要一步。

规划团队意识到创造完整的滨河生态系统将占用比现有河道宽3~7倍的用地，这意味着需要将20 000~100 000人的私有房地产与许多关键的基础设施进行大规模搬迁，显然，这对于高度城市化的洛杉矶而言是不现实的。因此，总体规划提出了“工具包”的概念，包含了6种可行的设计原型，以面向不同的地理区位与需求（图11）。这也是由于洛杉矶河沿岸有多种多样的河道条件与社区类型，而单一目标的设计方案是无法在此发挥作用的。于是“工具包”中配置了可以满足不同河段需求、支持生物多样性与不同生态系统功能的65种设计组件。增加原生生境、保护脆弱的生态系统，同时清除入侵植物，这几项措施对于构建洛杉矶河流域健康互联的生态系统至关重要。更进一步地，构建滨河地带与高地栖息地的联系、提升退化生境的质量、引导野生动物进入河道，甚至建设野生动物专用通行桥梁，都将成为可能。除了主体规划内容外，以上这些主题也都在规划附录中进行了详细说明，包括允许洛杉矶县沿着河流廊道与支流开展建设的设计指南。

6.3 项目示例

虽然洛杉矶河总体规划中并不包括具体项目，但却展示了当地社区通过设立目标、利用潜在场地与“工具包”来开发这些可以满足社区需求的项目的方式。规划中包含了一系列中小尺度基于场地的与大尺度系统性的项目示例，用以说明不同社区可以如何使用这一规划，虽然这也取决于在未来地方层面的公众参与和决策过程。

中小尺度基于场地的项目将包括公园与其他位于某一特定位置的多效益项目，包含从河道空间出入口或滨水亭台等小型项目到区域公园、集水湿地和侧渠等大型项目。以大型栖息地公园桥的项目为示例（在“工具包”中被称为平台），它可以修建于人口高密度地区，利用占地几公顷的栖息地来满足这片区域对于公园与生态系统的高度需求。在已有混凝土河道之上，介入公园桥项目，旨在服务生态系统和公园系统，提升水质以及连接两岸居民，而在强降雨时，大量洪水仍可在下方的混凝土河道中通过（图12）。另一个示例是一条干旱的河谷侧渠（在“工具包”中被称为分流改道），它可以在暴雨天气时容纳额外的洪水流量。这个侧渠会确保洪水前后拥有稳定的栖息地和水质效益，并起到连接和缓冲现有开放空间的功能（图13，14）。

大尺度系统性的项目则依靠若干场地或线性特征的共同作用来满足场地需求。例如，区域内相互连接的环路可创造纵向与横向的沿河休闲区域与动态交通网络。另一个大尺度项目的示例是一项区域地下水补给策略，可连接若干场地以提

① “洛杉矶河道通行权”数据集是洛杉矶河流总体规划项目的一部分，是在“洛杉矶县防洪区通行权场地”数据集的基础上创建的，后者可在洛杉矶县GIS数据网站上获取。

高地表水储存能力，有助于收集雨水，并以每年平均约61 675 000m³[②]的额外水量对区域地下水流域进行补给（图15）。最后，作为洛杉矶县排水区主干的洛杉矶河，规划团队推荐制定一些有助于维护并能在特定情况下增加河流洪水输送能力的洪水风险管理策略，同时也能创造多重效益，例如改善栖息地条件及优化到达河道的路径或沿河道路的分布。

6.4 实施

洛杉矶河总体规划框架细致地为每一个负责实施某个特定目标的相关部门制定了相应的措施与方法。此外，还包括本地居民聘用、环保工作培训、任用河流运营与维护人员等主题，从而鼓励社区居民参与河流改善工作，以提升社区公平性。而实施过程中，更是鼓励在具体项目中进行“超本地”的社区公共参与，借此引导多效益公园与基础设施的建设，为沿岸不同社区制定特殊的设计原型。

目前，一些沿河基建项目的经费来源已经就位，比如一项最近通过的旨在改善水质的洛杉矶县的债券措施[18]。总体规划中也列举了现有的及其他可能的资金来源，并指出了相应的执行方法。不过，本次河流重塑的巨大规模意味着需要持续的资本投资、增加运营与维护预算，以及加强若干地方、州与联邦政府之间的合作。同时，实施过程中的稳步推进以及合作与共同治理至关重要，如此，洛杉矶河总体规划才能免于遭受近一个世纪前奥姆斯特德－巴斯洛缪规划类似的命运。

7 “总体”规划与框架规划

洛杉矶河总体规划方案与传统的总体规划最大的不同点在于，规划中的项目都不是事先指定的。此方案是一个灵活的框架式规划，将未来的不确定性也考虑在内。虽然这种不确定的框架规划在景观设计的实践中，尤其是生态都市主义和景观都市主义[19]的理论中越来越常见，但还是难以完全打消那些社区居民与利益相关者的疑虑，他们想要确切地了解什么项目将在什么时间点被开发、它会是什么效果，以及项目所需的资金投入。

洛杉矶河总体规划没有特意规定其中包含的针对每个项目、每棵树的位置或是任何一项干预措施，而是将居民的需求地图与潜在的项目设计工具联系起来，并邀请社区居民参与到河流的重塑中。洛杉矶河总体规划的需求地图就像是将伊恩·麦克哈格的适宜性叠图分析方法用以解答21世纪的文化与社会正义问题。洛杉矶河的总体规划诠释和继承了适宜性分析的方法论精神，因此被《现代设计与自然》一书收录[20]。书中劳里·欧林指出了麦克哈格的景观过程与洛杉矶河总体规划过程之间的关系[21]。

朱迪斯·施蒂根鲍尔在她的《过程景观》一文中讨论了景观设计专业中一直以来备受关注的话题：如何平衡不确定的设计过程与正式的设计语言。她写道，“对不确定性与适应性的强烈关注，可能会使那些试图设计有美感且利用率高的景观的设计师受到冲击。因此，需要关注的关键问题是：如何把握设计过程的程度？作为设计师，我们如何在景观过程与场所营造这两种可能发生冲突的设计目标之间实现平衡？”[22]基于上述思考，施蒂根鲍尔提出一种可以在项目的有为设计与不确定的过程驱动之间达到的微妙平衡。而洛杉矶河总体规划项目就是在力图寻找这种平衡，即通过确定参数与战略方向，邀请众多社区与设计师共同使用这些方法来重塑洛杉矶河。这一战略的成功将会在未来对其的回顾中得到证实；不过，这一规划的灵活性已被事实证明是有价值的，因为新冠肺炎疫情的爆发已然改变了许多地方、州及联邦的政策焦点。

8 结论：相互连接的公共开放空间

从一条引人注目的天然河流到20世纪的完全渠化的状态，洛杉矶河已然蓄势待发，它将在接下来的25年中得到重塑，成为具有支持生态系统服务功能、城市韧性建设与社会公平正义的包含多重效益的社区项目的城市开放空间，它将不再是一条简单的自然河流，也不再是一条单一效益的排洪河道。

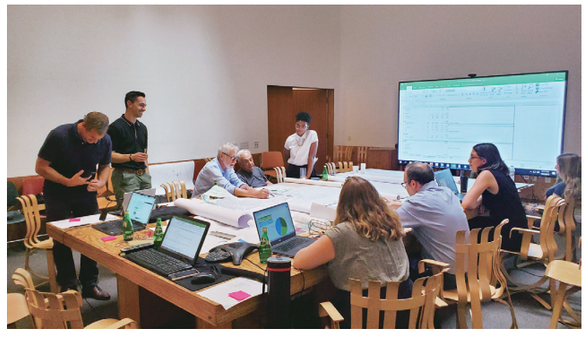
总体规划将未来的洛杉矶河描写为：“标志性的洛杉矶河流经82km长的公共开放空间，与周边社区无缝地交织在一起。它是洛杉矶县居民日常生活中必不可少的一部分——在这里，人们进行户外活动、在城镇中穿梭、感受宁静的生活、聚集所有居民、享受生气勃勃的城市居所、了解基础设施，并知往鉴今、塑造未来。”[14]洛杉矶河总体规划方案是一个目标导向的框架，运用数据与公众参与来确定社区需求。而这些需求则决定了哪些“工具包”与哪些河段对应最为合适。没有一种单一目标的设计方案能够适配于这片河流沿岸或整个流域内部的所有地方。因此，为了创造社会效益良好的多重效益河流系统，懂得活用多种多样的设计手法至关重要。

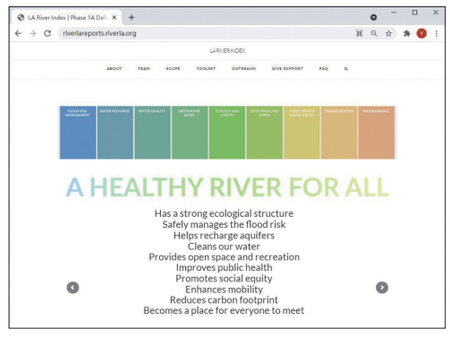
要解决过去的社会不公正、体制下的种族主义、环境污染与退化问题是一项艰巨的任务。洛杉矶河总体规划的许多经验将对其他大型规划项目产生一定借鉴意义，尤其是正确认识到不断变化的外部环境和特有的社区需求需要一个可扩展的、有预见性且灵活的设计框架——这是该项目的关键所在。**LAF**

项目信息

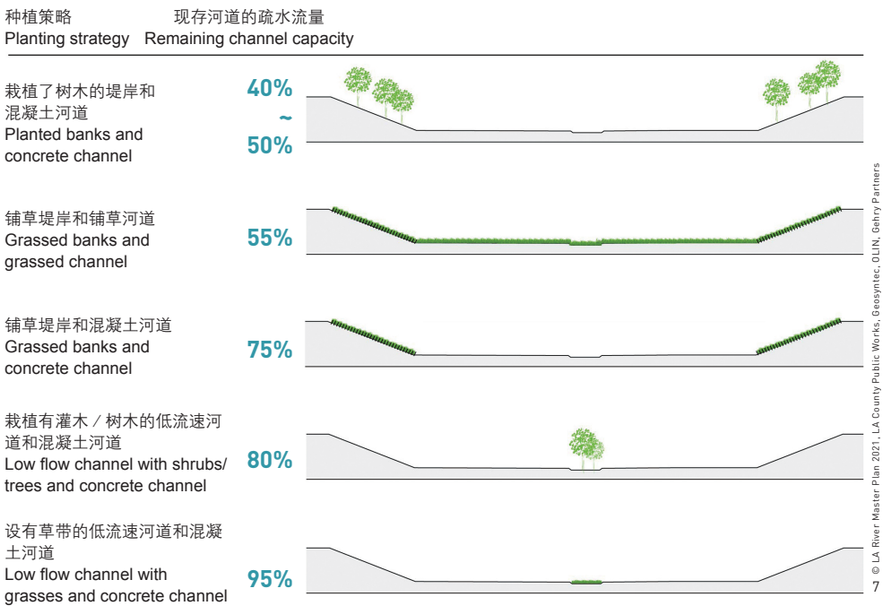
项目地址：美国加利福利亚州洛杉矶县
项目规模：82km
项目委托：洛杉矶县公共工程部
景观设计：欧林事务所
首席设计师：Laurie Olin、Richard Roark、Jessica M. Henson、Mark Hanna、Frank Gehry、Tensho Takemori、Meaghan Lloyd
设计团队：Geosyntec跨国工程咨询公司、River LA非营利组织、盖里建筑事务所、Street Level城市发展咨询有限责任公司
合作团队：Rick Jacobus、Chris Landau
设计时间：2014~2016年（洛杉矶河索引网站）、2018~2021年（洛杉矶河总体规划）
建成时间：2046年

② 1亩英尺（约1 233.5m³）指的是灌溉面积1英亩（约0.4hm²）、地面以下1英尺（约30.5cm）深的土地的水量，相当于3~4户家庭一年的用水量。


© Jessica Henson
5



© River LA, Gehry Partners, LLN, Geosyntec
6



7 对现存河道的研究表明，河道内植被与河道疏水流量成反比：当河道中有植物时，可输送的水量会减小，流速也会减慢。

8 河流标尺是一种图形化工具，它将82km长的河流转化为了一条直线。我们可以快速比较并叠加整个河段的空间数据集，而这一过程将帮助确定总体规划中需要优先关注的场地需求。由数百个数据集所构成的200多个河流标尺贯穿了整个总体规划的制定过程。图上展示了其中两种需求所对应的河流标尺。

7. This study of the existing channel demonstrates there is an inverse relationship between vegetation and channel capacity: when there are plants in the channel, the channel can convey less water less quickly.
8. The river ruler is a graphic tool that represents the 51-mile river as a straight line. It allows for the quick comparison and overlays of spatial datasets along the river's length, a process that helped identify the high-priority needs for Master Plan opportunity sites. Over 200 river rulers were created from hundreds of datasets throughout the development of the Master Plan. Only two rulers are shown in this figure.

1 Introduction

Over one million people live within a mile of the Los Angeles (LA) River, and one-quarter of the population of the largest state in the United States—California—live within a one-hour drive[1] (Fig. 1). The river is globally recognizable while locally it is often considered the backyard of the Los Angeles region. The concrete channel is iconic, considered by some as an engineering marvel with countless bridges and architectural gems lining its course. Since the construction period of the channel during the early- and mid-20th century, ecological and social priorities have shifted, and recent decades have brought a desire to reimagine the river into a multi-benefit resource for communities with thriving urban habitats, vibrant arts, and cultures, and better water quality while still keeping people and properties safe from flooding. The river flows through 17 cities, which hold some of the most environmentally burdened, park poor, and underserved communities of Los Angeles County. With over 2,300 acres of largely publicly owned land within the river right-of-way, the LA River holds significant opportunities for water, people, and the environment. Recognizing this potential, in 2016 County of Los Angeles Board of Supervisors voted to update the 96 LA River Master Plan. The updated plan, scheduled for completion in 2021, will be the first of its kind for the river, linking complex water and social issues while developing strategies for multi-benefit projects that enhance ecosystem functions, improve water quality, and celebrate local culture.

2 Design Challenges of the LA River Watershed

At just 51 miles, the LA River is short and steep. It drops nearly 800 feet in elevation from its headwaters at the west edge of the San Fernando Valley down to Long Beach, where it meets the Pacific Ocean. Covering roughly 830 square miles, the watershed includes some of the most developed and dense areas of the United States in its flat alluvial plain, as well as some of the steepest mountains in the upper watershed, where the land is primarily national forest. This combination of conditions led to a river that historically created wide, outwash floodplains, and extensive flooded wetlands in the flatter areas of the watershed as rains rushed down steep mountain washes. The LA River would sometimes join with the San Gabriel River, creating a miles-wide delta condition. Other times, the LA River would jump its banks, switching its course to the Pacific between San Pedro Bay, where it meets the ocean today, and Santa Monica Bay where it once joined with Ballona Creek (Fig. 2). Indigenous peoples lived with this natural system throughout the watershed for centuries, and endemic wildlife and plant species flourished in a highly biodiverse ecosystem.[2]

As urban development in the LA River Watershed increased quickly in the late 19th and early 20th centuries, the unpredictable river became increasingly problematic to city boosters and property owners. After years of dry weather, urban development inched closer to the river. People built irrigation channels and made modest changes to channelize the river.

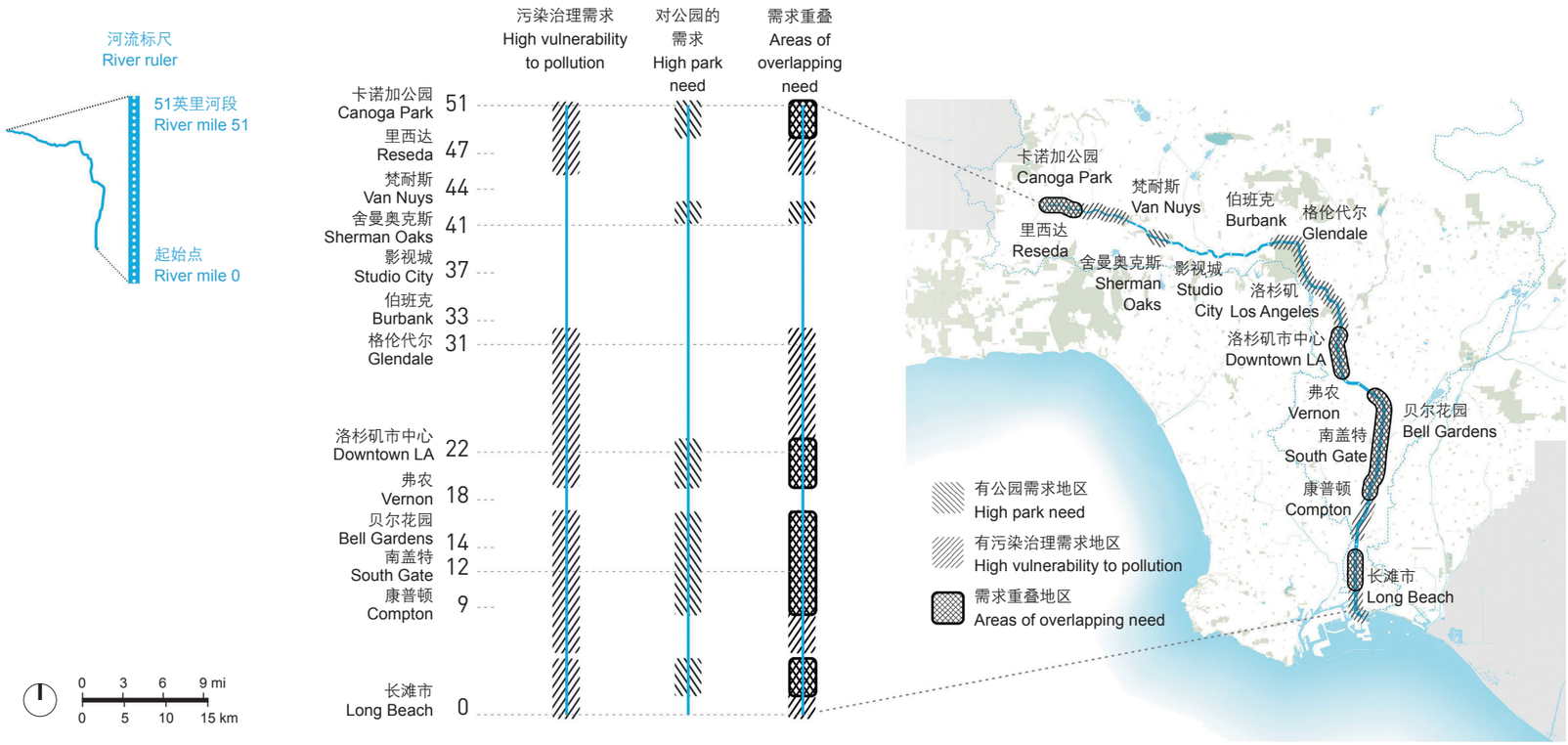
Then, in some years, the river would reclaim its wide floodplain, reminding everyone of the full force of the LA River.

After flooding in the early 20th century, the State of California formed the Los Angeles County Flood Control District in 1915. Further efforts at channelization by the United States Army Corps of Engineers (USACE) and the Flood Control District continued through the 1930s when a series of floods caused damages and deaths far exceeding any previous record keeping. At this point, USACE fully channelized the LA River over the next two decades. The importance of Los Angeles to the national economy and industrial production had become too great to ignore the river that threatened rail lines, production processes, and the link to the growing port. Then the LA River became what it is today, locked in place of a single concrete channel with only a few moments where it resembles a more natural semi-arid river (Fig. 3). While the capacity of the channel varies along its length and is quite low in some reaches, during a 1% storm event (often identified as a 100-year event), the reach at downtown City of Los Angeles is designed to convey approximately 2,832 cubic meters of water per second, an astonishing quantity of water for a mostly dry concrete channel.[3]

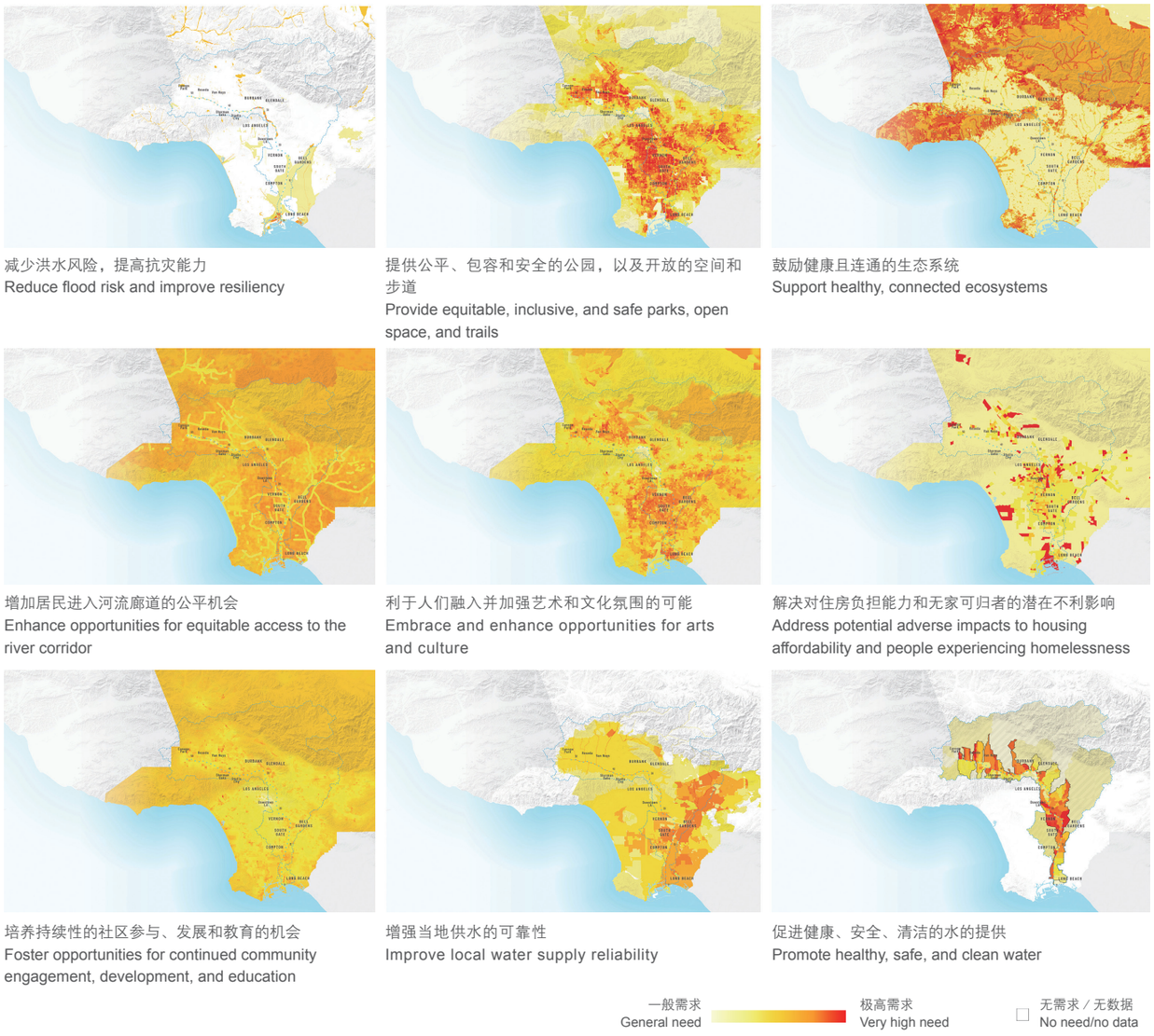
In addition to the devastating environmental impact of channelization of the LA River, the social effects of the infrastructure took a toll on communities along the river, particularly in Southeast LA. There, redlining and other tactics placed racial restrictions on communities along the river, and industrial facilities within the river corridor began to leach environmental toxins into the soils of many adjacent sites[4]. Today, the jurisdictional complexity of the LA River combined with the legacy of channelization create unique design challenges.

3 A Vision Unimplemented for Public Open Space

In parallel to the efforts to channelize the river, protect people and built-up development from floods, brighter visions for rivers, parks, and open spaces for the Los Angeles region were not lacking. In 1930, the Olmsted Brothers and Harland Barthlomew and Associates created a plan for Los Angeles that imagined roughly 71,000 acres of parkland with rivers and washes like the LA River as greenway spines. The plan states, "Continued prosperity (in Los Angeles County) will depend on providing needed parks, because, with the growth of a great metropolis here, the absence of parks will make living conditions less and less attractive, less and less wholesome.... In so far, therefore, as the people fail to show the understanding, courage, and organizing ability necessary at this crisis, the growth of the Region will tend to strangle



8



9. 为了响应9个总体规划目标，这些分析图展现了整个洛杉矶县的需求与机会的分布情况。
10. 洛杉矶河流总体规划包括了200多个面积从不足0.4hm²到超过61hm²的、已规划的重大项目和待开发的项目选址。

9. Corresponding to the nine Master Plan goals, these analysis maps explore how a range of needs and opportunities are distributed throughout LA County.
10. The LA River Master Plan locates over 200 planned major projects and proposed project sites from less than one acre to over 150 acres in size.

itself."[5] While it is easy to blame the Great Depression, a profoundly impactful period of United States history, or the 1930s flooding along the river for the failed completion of the vision, more than anything, a lack of clear governance hindered this comprehensive plan.

Los Angeles historian William Deverell wrote that there was one "crucial error" in the plan. Given the large cost of the plan, the local Chamber of Commerce did not like the proposed idea that a new governance structure would need to be formed, thereby taking their power[6]. This unfortunate situation kept the plan from any level of significant implementation. The lack of implementation led to severe disparities across LA County in terms of access to open space. While LA County has a goal of 4 acres of local parks per 1,000 residents in unincorporated areas and 6 acres of regional parks per 1,000 residents countywide,[7] some communities have less than one acre per thousand people[8].

In 1986, environmental activists came together to demonstrate renewed interests in the LA River; however, this time, ecological health and remnant habitat was at the forefront[9]. In 1996, the first progressive planning effort for the LA River was completed by Los Angeles County. This plan acknowledged the river right-of-way and adjacent lands as potential places for smarter water management and recreational opportunities[10].

In 2007 the City of Los Angeles continued efforts for planning for the upper 32 miles of the river[11]. The plan imagined a riparian ecosystem, large regional storage to keep flows low enough in the channel to establish vegetation, and denser housing development stepped back from the river corridor to make space for a selectively

widened channel. Since 2007, the city has made progress on the proposed bikeway connecting the river as well as some off-channel parks and one potentially significant river signature project at a former rail yard[12]. However, the main tenets of the plan—riparian restoration, large regional storage, and the removal of private property—created significant barriers to full implementation. The plan noted a fully riparian river would, on average, need to be five times wider than its current width. Given this complexity, the plan offered that large regional storage is needed to achieve the plan's designs and supply a total needed storage capacity[11]. With the level of development throughout the watershed, the amount of storage space needed to attenuate flows is not available in the geographic areas where it would be needed to manage flows.

The complexity of the planning history of the LA River, governance, and on-going social issues of the region combined with the real need for flood risk management and jurisdictional intersections create an on-going discussion around the future of the river.

4 Flood Management Along the LA River

The current LA River flood management system is designed to move water as quickly as possible to the ocean during larger rain events to prevent urban flooding while also retaining this precious resource for groundwater recharge during smaller, more frequent events. The concrete of the channel and even the piers of bridges are designed to reduce friction so water moves more quickly. Much of the channel can convey a 1% storm event; however, a number of sections of the channel are under this capacity (Fig. 4). Reimagining this dual-purpose system as a multi-benefit river system requires understanding how precisely engineered the river channels are. Small changes or removal of concrete can significantly increase the water surface elevation, potentially causing overtopping moments.

It seems logical to increase infiltration in the upper watershed to reduce flows in the channel when the greatest peak flows occur; however, hydrological studies show that even reducing watershed impermeability by 50% would

现状条件
Existing conditions

- 洛杉矶河里程标识点 LA River mile point
- 洛杉矶河河道 LA River channel
- 支流和溪流 Tributaries and streams
- 洛杉矶河流域边界 LA River watershed boundary
- 主要道路和高速公路 Major roads and highways
- 铁路线 Railroad lines
- 地铁线及车站 Metro transit line and station
- 多用途步道和 I 类自行车道 Multi-use trails and class I bikeways
- 输电线路 Transmission lines
- 现状私有通行权 Existing private right-of-way
- 现有公园 Existing park
- 透水和不透水地表 Pervious and impervious surface

洛杉矶河总体规划设计方案
LA River Master Plan design proposals

- 中型、大型、超大型的重大规划项目 M, L, and XL planned major project
- 中型、大型、超大型的拟建项目场地 M, L, and XL proposed project site
- 超小型和小型的规划项目 XS and S planned project
- 超小型和小型的拟建项目场地 XS and S proposed project site
- 现有出入口节点 Existing access point
- 有待改进的现状空间出入口节点 Existing access point to improve
- 已规划的及拟建的多用途步道和 I 类自行车路线 Planned and proposed multi-use trails and class I bikeways
- 拟建的区域连接环路 Proposed regional connectivity loop

0 3 6 9 mi
0 5 10 15 km

10

only take a few percentage points off of flood flows in the channel during large storm events. Even though green infrastructure strategies and localized stormwater management are critical for the LA River watershed water quality and water conservation, they cannot resolve the need to channel water around urban development during the biggest storms.

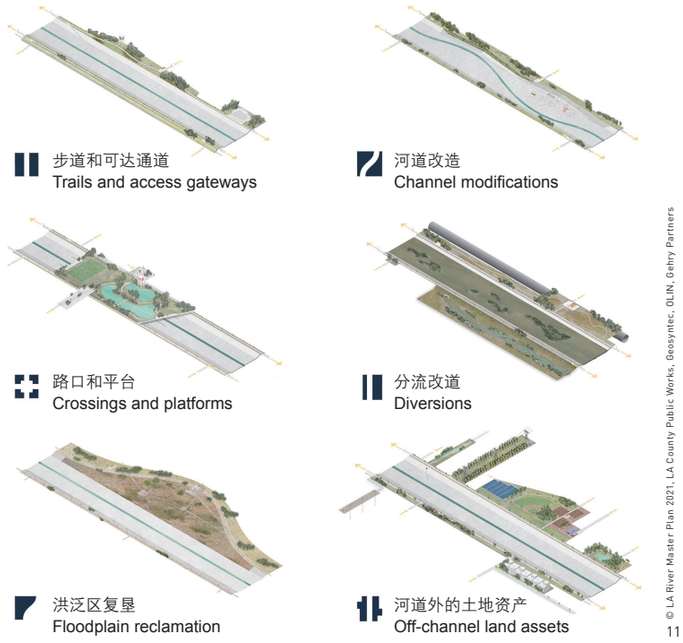
5 The LA River Index and Creating a River–Mile System

In 2014 and 2015, under the leadership of a non-profit organization named River LA, a team of designers at OLIN, Gehry Partners, and Geosyntec began a pro-bono in-depth research effort to catalogue datasets for the entire river to better understand water resources, environmental and social needs associated with communities along the LA River (Fig. 5). In 2016, this research culminated in the development of the LA River Index, a website devoted to LA River data partially funded by a grant through two state conservancies and a local municipality (Fig. 6).[13]

One key development of the LA River Index was to create a river–mile system for the LA River, allowing people for the first time ever to understand the river in one reference system. The LA River historically did not have a system that is common for other major rivers in the United States as it was never a river used for navigation. The research completed for the Index and specifically the river–mile system were critical steps toward building a regional understanding of the LA River to prioritize equitable design for the upper and lower river. The study showed the inequity between the upper and lower river, ecological fragmentation, severe lack in access to open spaces, public health issues related to pollution, and transportation needs.

Perhaps most strikingly, studies in the Lower River near river mile 11.8 indicate that even adding a single patch of grass in the center of the channel could reduce the capacity as much as 5% (Fig. 7). Vegetating only the side embankments of the channel with trees could reduce capacity up to 50% ~ 60%[14]. The concrete of the channel is extremely smooth, so this lack of friction allows water to quickly flow into the ocean. The studies suggest that it is unrealistic to entirely remove the existing channel built a century ago.

However, as mentioned above, a series of environmental and social problems have accompanied the channelization of the LA River. The Index research demonstrated that the aquifers below the LA River Basin, on a regional scale, have space in them that could hold more water if large scale recharge projects are implemented. To balance flood management and ecological function as well as social benefit, designing more park spaces that can hold water along the channel could store water during a rainfall allowing water to then be treated and infiltrated or injected into the aquifer. The work completed for the LA River Index website demonstrated that additional space for water storage is available in the region's aquifers, social equity can be improved, and channel capacity for when it is needed should be maintained.



11

11. 总体规划的设计和实施工具被囊括为一个“工具包”，共包括6种设计原型。
12. 该项目展示的是某个位于洛杉矶河总体规划中的拟建项目地点。通过平台公园和人行天桥，可以创建横跨洛杉矶河与710号州际公路的新纽带。

11. The Master Plan's tools for design and implementation include a "kit of parts," with six design typologies.
12. This is an example project that could be located at one of the proposed project sites identified in the LA River Master Plan. It creates new connections across the LA River and the 710 Interstate with a platform park and a pedestrian bridge.

6 The LA River Master Plan

In 2016, the Los Angeles County Board of Supervisors voted to update the 1996 LA River Master Plan. The 1996 Plan was a significant milestone for the river as it was the first time since the Olmsted-Bartholomew Plan of 1929 that the LA River was imagined as more than a flood management channel. In the 21st century, however, the 1996 Plan was dated due to rapidly changing social, climate, and economic conditions. Further, with the advent of more readily available technology, a wealth of knowledge was now available about the river and watershed. In 2018, LA County Public Works Department began work on the Master Plan with the consultant team led by

Geosyntec, OLIN, and Gehry Partners and the engagement led by River LA. Prior to this effort, no plan brought together all 51 miles of data for the river in a single comprehensive database for planners and decision makers. This plan is based on a literature review of over 140 planning documents for the LA River and over 50 global precedent projects ranging from large multi-jurisdictional infrastructure projects like the Chicago Tunnel and Reservoir Plan[15] or Boston's Big Dig[16] to urban semi-arid rivers like the South Platte River Greenway[17].

The LA River Master Plan is based on over 2.5 years of community engagement that includes thousands of participants across LA County and reaches nearly one million people digitally[14]. The plan is a community and data-based framework for decision making. Those who hope to find the precise location of each tree, structure, or trash receptacle along the 51-mile river will never find what they are searching for within the LA River Master Plan's pages. The plan is process-based, recognizing that the 25-year implementation period for the plan may bring changing needs of communities or due to climate change that requires flexibility. Within the past 18 months alone, the needs for a flexible plan that can address some complex and evolving topics such as climate change, housing crisis, and racial equity has been demonstrated by the COVID-19 pandemic.

6.1 Data-Based Framework

Working from the river–mile and data system that began with the LA River Index, the Master Plan team developed a data-based methodology for decision making that would highlight community needs. Fundamental to this methodology was the creation of the LA River Ruler System. Oftentimes the complexity of large systems planning becomes overwhelming with hundreds of maps, making it impossible to determine what data to focus on.

The LA River Ruler is a linearized representation of the 51-mile LA River (Fig. 8). The team used Geographic Information System (GIS) mapping and linear referencing to project data along the ruler. The result is a series of over 200 rulers that were created from LA River datasets. This method allows for a truly transdisciplinary process between Engineering, Landscape Architecture, and Planning, and visual patterns can be quickly recognized along the river. For example, it is easy to understand where park needs and environmental burden overlaps, or where flood risk and housing issues collide.

Based on the data, the LA River Master Plan Steering Committee, Departments in LA County, and the design team worked to define which data were most critical relative to each goal of the Master Plan. The team developed nine need maps related to the goals of the Master Plan to demonstrate where community needs are highest.

6.2 Goals, Sites, and Design Typologies

Each of the goals of the LA River Master Plan are interconnected and important to the success of implementing the plan. Ranging from water topics such as flood risk reduction and resilience to social topic such as affordable housing, the goals of the master plan recognize that infrastructure plans need to consider a range of topics to support community needs, environmental justice, and equity (Fig. 9). LA County is currently experiencing an affordable housing crisis, which further exacerbates an on-going rise in the number of persons experiencing homelessness. Creating investment for the LA River could improve community requirements to mitigate the impact of displacement, so the communities that river improvements are intended to serve can afford to remain in their neighborhood. Creating and preserving affordable housing and supporting stronger tenant protections, inclusionary zoning, and building community equity will be critical for municipalities along the LA River while open space improvements are made.

To create physical connections of open spaces along the river and an equitable cadence of parks, amenities, and access, the master plan prioritizes publicly owned land, underutilized rights-of-way, and the river channel itself.

© LA River Master Plan 2021, LA County Public Works, Geosyntec, OLIN, Gehry Partners

12

Fortunately, over 86% of the river right-of-way is within public ownership①. The resulting network of potential sites includes projects from previous planning efforts, proposed improvements in existing access points, and new extra-small, small, medium, large, and extra-large sites that fill gaps in the cadence of river parks, access, and improvements (Fig. 10). This approach is critical to ensuring one section of the river is not left out of investments. Linking trails along the river is critical to the overall vision, which is to create 51 miles of connected public open space seamlessly interwoven into the daily lives of LA County residents.

The Master Plan recognizes that creating a 51-mile fully riparian ecosystem that needs to be 3 ~ 7 times wider than the current channel is not realistic in the highly urbanized context of LA County without significant displacement of private property owners on the scale of 20,000 ~ 100,000 people and numerous other critical infrastructure. Given this, the master plan proposes six design typologies within a "kit of parts" that are feasible design ideas in sections of the LA River, depending on location and need (Fig. 11). No single design solution works everywhere given the different channel conditions along the river and the diverse communities along its banks. Within the typologies there are 65 components that can meet needs along the river and support various biodiversity and ecosystem function goals. Increasing native habitats, buffering fragile ecosystems, and removing invasive plants are critical to supporting a robust, connected ecosystem in the LA River watershed. It is possible to create riparian and upland habitat connectors, enhance degraded habitat areas, create wildlife links into the channel, and even link wildlife across wildlife bridges between habitats. In addition to the main volume of the plan, these topics are addressed in detail in the appendices of the plan, which include design guidelines for LA County permitting along the LA River corridor and tributaries.

① "LA River Right-of-Way" dataset was created as part of the LA River Master Plan project based on "Los Angeles County Flood Control District Right-of-Way Parcels" dataset, available on the LA County GIS Data Portal.

6.3 Project Examples

While the LA River Master Plan does not include specific projects, it demonstrates how the goals, opportunity sites, and "kit of parts" can be used by local communities to develop projects that meet community needs. A series of site-based and system-based project examples are included in the plan to show how communities could use the plan, but they are subject to future engagement and decision making at a local level.

Site-based projects include parks and other multi-benefit projects that are in a single location and range from small items like access points or river pavilions to large regional parks, water capture wetlands, and side channels. One example of a site project is a large habitat and park bridge, called a platform in the "kit of parts," which could encompass several hectares of thriving habitat in an area with high park and ecosystem needs within a high-density area. The goal of this type of intervention is to elevate ecosystem services, park programs, and water quality interventions above the concrete of the channel, while connecting users across the river and allowing large flood flows to pass underneath safely in large storms (Fig. 12). Another example utilizes a dry arroyo side channel, called divisions in the "kit of parts," to accommodate additional flows when the river channel is infrequently at capacity. This side channel could maintain consistent habitats and water quality benefits as well as connect and buffer existing open spaces (Fig. 13, 14).

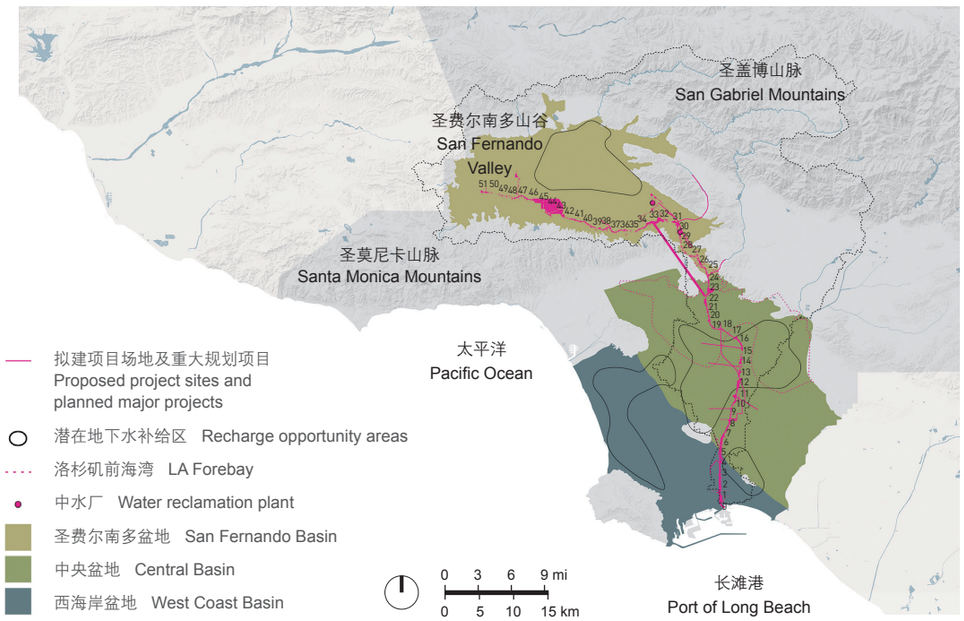
System-based projects rely on several sites or linear features working together to resolve a need. For example, regional connectivity loops create recreation and active transportation opportunities along the river and laterally from the river. Another system-based example

© LA River Master Plan 2021, LA County Public Works, Geosyntec, OLIN, Gehry Partners
13

© LA River Master Plan 2021, LA County Public Works, Geosyntec, OLIN, Gehry Partners
14

13. 这是另一个可能的项目实例——费拉罗运动场侧渠。它坐落在费罗拉运动场和5号州际公路之间，以原生植被与干河床为项目特色，可在现有运动场附近建设额外的步道和开放空间。
14. 在爆发洪水时，这条水渠可发挥其基础设施作用，将水输送至下游，以降低这片地区的遭受到洪涝灾害的风险。
15. 结合拟建的项目场地和已规划的重大项目地址，有助于创建沿河分布的雨水收集和储存系统。图上黑色轮廓线内为规划中认为的有极大可能会获得地下水补给的区域。

13. This is another example of a potential project—Ferraro Fields Side Channel. Nestled between an existing park at Ferraro Fields and the 5 Interstate, it features native plants and dry stream beds and provides additional trails and open space adjacent to the existing athletic fields.
14. During flood events, this channel plays an infrastructural role, transporting water downstream around this area of higher flood risk.
15. Combining the proposed project sites and planned major projects helps create a stormwater capture and storage system along the river. The black outlines show areas with promising recharge opportunities.



is a regional groundwater recharge strategy that links several sites to create surface water storage capacity to help capture stormwater and recharge the regional groundwater basins with an additional 50,000 acre feet② of water on an annual average basis (Fig. 15). Finally, as the LA River forms a backbone of the Los Angeles County Drainage Area, flood risk management strategies are recommended that allow for maintaining, and in some cases increasing, the river's flood conveyance capacity while also creating multi-beneficial attributes such as improved habitat conditions and access into and along the channel.

6.4 Implementation

The LA River Master Plan framework links specific actions and methods to departments in LA County that facilitate the implementation of a specific goal. Local hiring, green jobs training, and river operations and maintenance staff topics are also included to encourage community participation in river improvements and increase equitable opportunities. Hyper-local community engagement processes for specific projects are intended to guide multi-benefit parks and infrastructure, tailoring specific typologies for unique community needs along the 51 miles.

Several funding sources are already in place for capital projects along the river, such as a recently passed LA County bond measure to improve water quality[18]. Other sources of existing and potential funding are identified in the plan and associated with specific actions. Nonetheless, the scale of reimagination of the river will require on-going capital investment, an increased budget for operations and maintenance, and collaboration among several local, state, and federal entities. Creating building blocks toward implementation and shared governance is critical so the LA River Master Plan does not suffer a similar fate as the Olmsted–Bartholomew plan nearly a century ago.

7 "Master" Plan vs. Framework Plan

One of the most significant departures of the LA River Master Plan from traditional master planning is that projects are not prescriptive. The plan, which is designed as a framework plan, is intentionally flexible, allowing for unknown scenarios in the future. While increasingly common in landscape architectural practice and in particular theories of ecological urbanism and landscape urbanism[19], this type of indeterminate framework plan can be unsettling for communities and stakeholders that want to know exactly what project will be developed on a precise timeline, what it will look like, and exactly how much it will cost.

Rather than specifically outlining every project, every tree location, and every intervention, the LA River Master Plan links needs mapping to potential project design components and invites communities to engage in the reimagination of the river. The LA River Master Plan's needs mapping bears resemblance to Ian McHarg's suitability analyses overlays, brought into the 21st century to include

② One acre foot of water represents one acre of land covered in water one foot deep and is enough to supply three to four families with water for a year.

more cultural and social justice issues. Recognizing that the LA River Master Plan is a current project demonstrating the spirit of this methodology, it is one of the projects highlighted in the book *Design with Nature Now*[20]. In the book, Laurie Olin pointed out the relationship between McHarg's process and the LA River Master Plan process[21].

In her essay "Processcapes," Judith Stilgenbauer discussed the history of balancing process with formal design in the profession of Landscape Architecture. She wrote that "a strong focus on indeterminacy and adaptability can work against the creation of well-crafted, usable landscapes. Thus the key question at hand is: how much process is too much process? How do we as designers strike a project-appropriate balance between the potentially conflicting design goals of process and placemaking?"[22] Stilganbauer advocated for a delicate balance between the intentionally designed and the indeterminate, process-driven aspects of a project. The LA River Master Plan seeks to find this balance by defining parameters and strategic directions while inviting many communities and designers to use the tools to reimagine their river. The success of this strategy will no doubt be best judged in retrospect; however, the flexibility of the plan has already proven valuable as the COVID-19 pandemic shifted many local, state, and federal priorities already during the planning processes.

8 Conclusion: Connected Public Open Space

From its natural history as a flashy river to its full channelization in the 20th century, the LA River is poised to be reimagined in the next two and a half decades, not as a fully riparian natural river and not as a single-benefit flood channel, but rather an urban open space with multi-benefit, community projects that support ecosystem function, resilience, and justice.

The LA River Master Plan proposes that "the iconic LA River flows through a 51-mile connected public open space that is seamlessly woven together with neighboring communities. It is an integral part of daily life in LA County—a place to enjoy the outdoors and to get across town, a place to appreciate the serene and to bring all people together, a place to celebrate a thriving urban habitat and understand infrastructure, a place to learn from the past and to shape the future."[14] The LA River Master Plan is based on a goal-driven framework that uses data and public engagement to help define community needs. These needs inform which "kit of parts" components may be most applicable for a specific section of the river. There is not a singular design solution that can work everywhere along the river or within the watershed. It is critical to use multiple design tools in order to create a multi-benefit river system with social benefits.

Overcoming past injustice, systemic racism, pollution, and environmental degradation is not a small task. Many lessons of the LA River Master Plan can be useful for other large planning projects. In particular, one key element is understanding that changing conditions and unique community needs require scalable, anticipatory, and flexible design frameworks. **LAF**

PROJECT INFORMATION

LOCATION: Los Angeles County, California, USA
SIZE: 51 miles
CLIENT: Los Angeles County Public Works
LANDSCAPE DESIGN: OLIN
CHIEF DESIGNERS: Laurie Olin, Richard Roark, Jessica M. Henson, Mark Hanna, Frank Gehry, Tensho Takemori, Meaghan Lloyd
PROJECT TEAM: Geosyntec, Gehry Partners, River LA, Street Level Advisors LLC
COLLABORATORS: Rick Jacobus, Chris Landau
DESIGN PERIOD: 2014 ~ 2016 (LA River Index), 2018 ~ 2021 (LA River Master Plan)
COMPLETED TIME: 2046

REFERENCES

[1] Los Angeles County. (2021). *LA River Master Plan Public Draft*. Los Angeles, CA: Los Angeles County.
[2] Natural History Museum of Los Angeles County, Higgins, M. L., Pauly, B. G., Goldman, G. J., & Hood, C. (2019). *Wild LA: Explore the Amazing Nature in and Around Los Angeles*. Portland, OR: Timber Press.
[3] Los Angeles County Department of Public Works. (2019). *Los Angeles County Drainage Area Review*. Retrieved from https://westsidecouncils.com/wp-content/uploads/2019/02/LACDA_Review_Study_Main.pdf
[4] Reft, R. (2017, November 14). Segregation in the City of Angels: A 1939 Map of Housing Inequality in L.A.. *KCET*. Retrieved from https://www.kcet.org/shows/lost-la/segregation-in-the-city-of-angels-a-1939-map-of-housing-inequality-in-l-a
[5] Hise, G., & Deverell, W. (2000). *Eden by Design: The 1930 Olmsted-Bartholomew Plan for the Los Angeles Region*. Los Angeles, CA: University of California Press.
[6] Deverell, W. (2013). Dreams Deferred: Parks and Open Space. In D. W. Wit, & A. J. Christopher (Eds.), *Overdrive: L.A. Constructs the Future, 1940-1990* (pp. 22-33). Los Angeles, CA: The Getty Research Institute.
[7] Los Angeles County. (2015). *Los Angeles County General Plan 2035*. Los Angeles, CA: Los Angeles County.
[8] Los Angeles County Department of Parks and Recreation. (2016). *Los Angeles Countywide Comprehensive Parks and Recreation Needs Assessment*. Retrieved from https://lacountyparkneeds.org/
[9] Gumprecht, B. (2001). *The Los Angeles River: Its Life, Death, and Possible Rebirth*. Boston, MA: Johns Hopkins University Press.
[10] Los Angeles County Public Works. (1996). *Los Angeles River Master Plan*. Retrieved from https://ladpw.org/wmd/watershed/LA/LARMP/
[11] City of Los Angeles. (2007). *Los Angeles River Revitalization Master Plan*. Retrieve from https://lariver.org/master-plan
[12] City of Los Angeles Bureau of Engineering. (n.d.). *Taylor Yard G2 Projects*. Retrieved from https://tayloryardriverprojects.lacity.org/
[13] River LA. (2016). *LA River Index*. Retrieved from http://riverlareports.riverla.org/
[14] Los Angeles County Public Works. (2021). *LA River Master Plan 2021*. Retrieved from http://larivermasterplan.org/
[15] Tunnel and Reservoir Plan (TARP). (n.d.). *Metropolitan Water Reclamation District of Greater Chicago*. Retrieved from https://mwrd.org/tunnel-and-reservoir-plan-tarp
[16] Boston Big Dig, Central Artery / Tunnel Project, Massachusetts. (n.d.). *Road Traffic Technology*. Retrieved from https://www.roadtraffic-technology.com/projects/big_dig/
[17] River and Trail Information. (n.d.). *The Greenway Foundation*. Retrieved from https://www.thegreenwayfoundation.org/river-amp-trail-info.html
[18] Los Angeles County. (n.d.). *Safe Clean Water Program*. Retrieved from https://safecleanwaterla.org/
[19] Corner, J. (2006). Terra Fluxus. In C. Waldheim (Eds.), *The Landscape Urbanism Reader* (pp. 23-33). New York, NY: Princeton Architectural Press.
[20] Steiner, F., Weller. R., M'Closkey, K., & Fleming, B. (2019). *Design with Nature Now*. Boston, MA: Lincoln Institute of Land Policy.
[21] Olin, L. (2019). A Few Choruses Low Down, but Not So Blue for Ian. In F. Steiner, R. Weller, K. M'Closkey, & B. Fleming (Eds.), *Design with Nature Now* (p. 29). Boston, MA: Lincoln Institute of Land Policy.
[22] Judith, S. (2019). Processcapes. In J. Hou, B. Spencer, T. Way, & K. Yocom (Eds.), *Now Urbanism: The Future City is Here* (p. 93). New York, NY: Routledge.