



1 果园和新水池总览  
Overview of the orchards and the new pool

## 西班牙卡尔德斯德蒙特维镇温泉果园灌溉系统修复 RECOVERY OF THE IRRIGATION SYSTEM AT THE THERMAL ORCHARDS IN CALDES DE MONTBUI, SPAIN

CICLICA事务所[空间·社区·生态]、CAVAA建筑事务所 /  
CICLICA [space · community · ecology], CAVAA Architects

水是生命之源，对水的社会性和生产性管理所产生的景观，是水随时间流逝而呈现的空间表达形式。在传统的城市中，大部分的城市和城郊活动都围绕水而展开，这使得人们可以通过城市与其领域间的关系来理解城市。E·A·里格利认为，这种关系建立于一种有机的生产模式之上——通过日常生活实践中的自我管理和生产，居民在水的使用过程中发挥着积极的作用，他们会根据城市范围内水资源的分布来调整使用方式<sup>[1]</sup>。水资源曾是一种公共资源，因而居民普遍了解应该如何将它作为社会资源和文化遗产加以利用。

1999年，科学家J·纳雷多和A·瓦莱罗指出，自工业革命以来，城市系统的发展及其与土地的分离决定了人们与水的关系<sup>[2]</sup>。水资源的管理已由社区直接使用的模式转变为一种公共市政模式，而这种模式很可能使水变为一种私有商品<sup>[3]</sup>。随着经济的发展，由此导致的水资源与使用者之间的分离，使得使用者愈发被动，原先的管理模式转变成为了以需求为导向的系统。至此，传统的基础设施日渐废弃，并逐渐被遗忘。社区中的水资源被无形地“偷走”，丧失了管理机构的

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### 摘要

位于巴塞罗那大区名为“低地果园”的温泉花园因废水污染而面临严峻的环境恶化问题。温泉果园灌溉系统修复项目恢复了场地的园艺景观，构建了全新的可由灌溉社区自主管理的公共空间，彰显了作为非物质文化遗产的传统水资源管理措施在实现城市可持续发展过程中的重要价值。

### 关键词

社会代谢；城市空间；水文循环；参与式行动研究

### ABSTRACT

The Hortes de Baix thermal gardens, located in the metropolitan region of Barcelona, had been deteriorated by wastewater contamination. The project recovers the horticultural landscape as a new self-managed open public space empowering the irrigation community and recognizing the key value of traditional water management as intangible heritage towards urban sustainability.

### KEY WORDS

Social Metabolism; Urban Space; Water Cycle; Participatory Action Research

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**项目地址:**  
巴塞罗那市卡尔德斯德蒙特镇

**项目面积:**  
3.7hm<sup>2</sup>

**项目委托:**  
卡尔德斯德蒙特镇市政厅

**景观设计:**  
CICLICA事务所[空间·社区·生态]

**建筑设计:**  
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**项目团队:**  
卡尔德斯德蒙特镇低地果园丁协会、Aleix Rifà (水利工程)、Joaquim Arcas (CICLICA事务所)、Adrià Martin (CICLICA事务所)、Esocai公司、Aquadipòsits公司、Vivers Ter公司、Pont de Querós公司

**设计时间:**  
2013年5月~2015年9月

**建设时间:**  
2013年5月~2015年9月

**建成时间:**  
2015年9月

**所获奖项:**  
2016年度欧洲城市公共空间奖  
2017年度Bauwelt建筑奖

**LOCATION:**  
Caldes de Montbui, Barcelona

**AREA (SIZE):**  
3.7 hm<sup>2</sup>

**CLIENT:**  
Caldes de Montbui Town Hall

**LANDSCAPE ARCHITECTURE:**  
CICLICA [space · community · ecology]

**ARCHITECTURE:**  
CAVAA Architects

**CHIEF DESIGNERS:**  
Marta Serra Permanyer, Elena Albareda Fernandez, Jordi Calbeto Aldoma

**PROJECT TEAM:**  
Gardeners Association of the Hortes de Baix de Caldes de Montbui, Aleix Rifà [hydraulic engineer], Joaquim Arcas [CICLICA], Adrià Martin [CICLICA], Esocai, Aquadipòsits, Vivers Ter, Pont de Querós

**DESIGN PERIOD:**  
May 2013 ~ September 2015

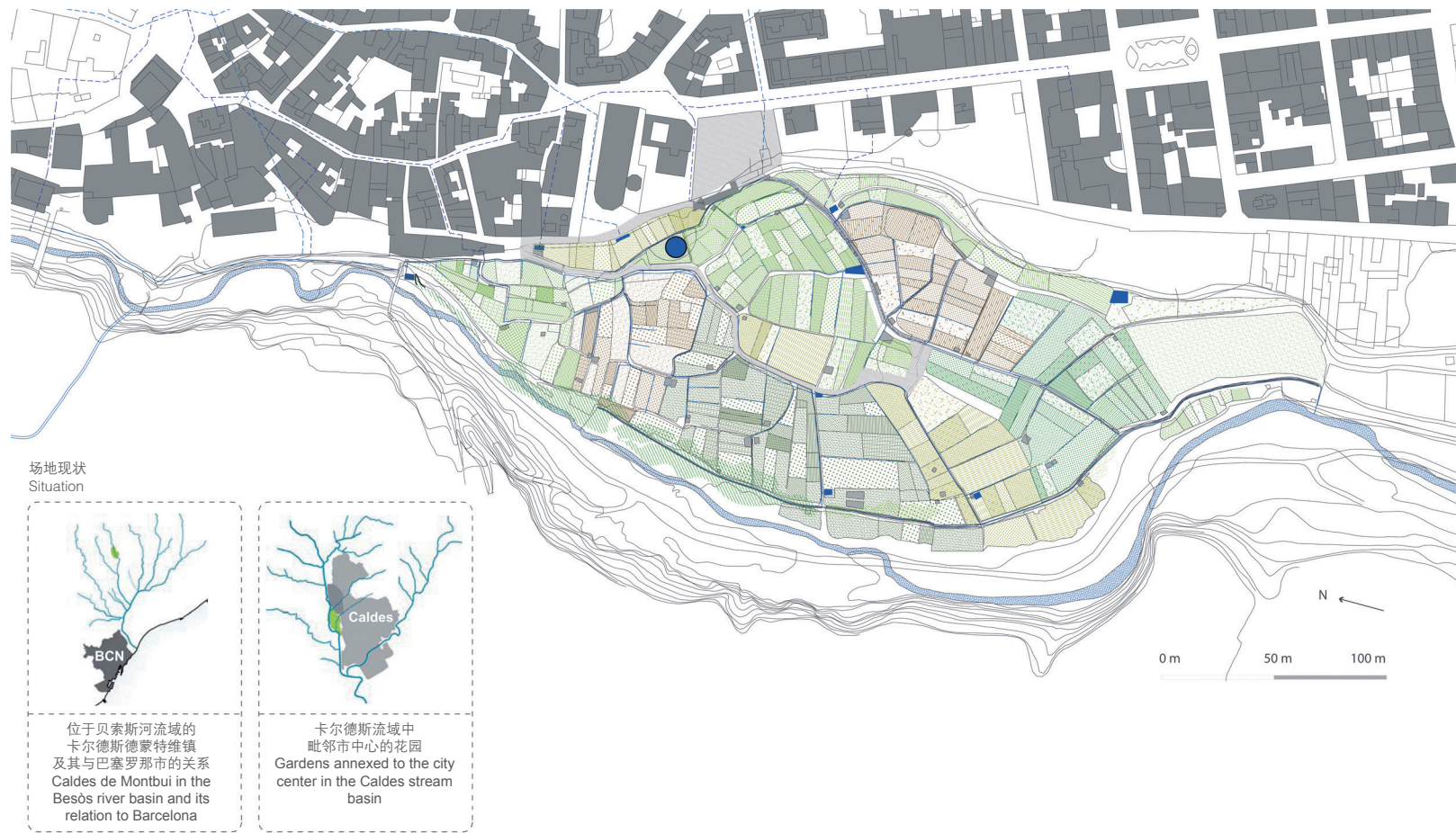
**CONSTRUCTION PERIOD:**  
May 2013 ~ September 2015

**COMPLETION TIME:**  
September 2015

**AWARDS:**  
Winner of the European Prize for Urban Public Space 2016  
Bauwelt Award 2017

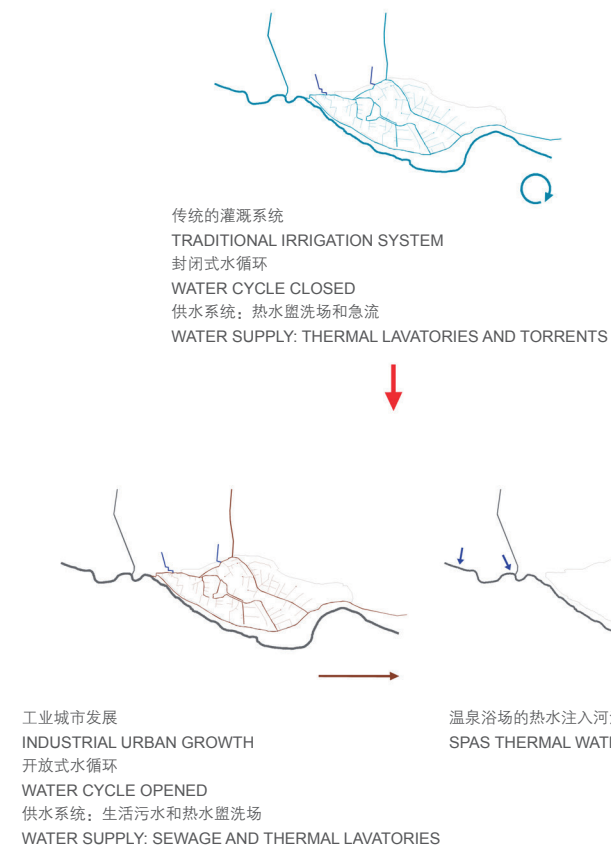
2. 总平面图
3. 历史条件与项目概况

2. Site plan
3. Historical conditions and project information

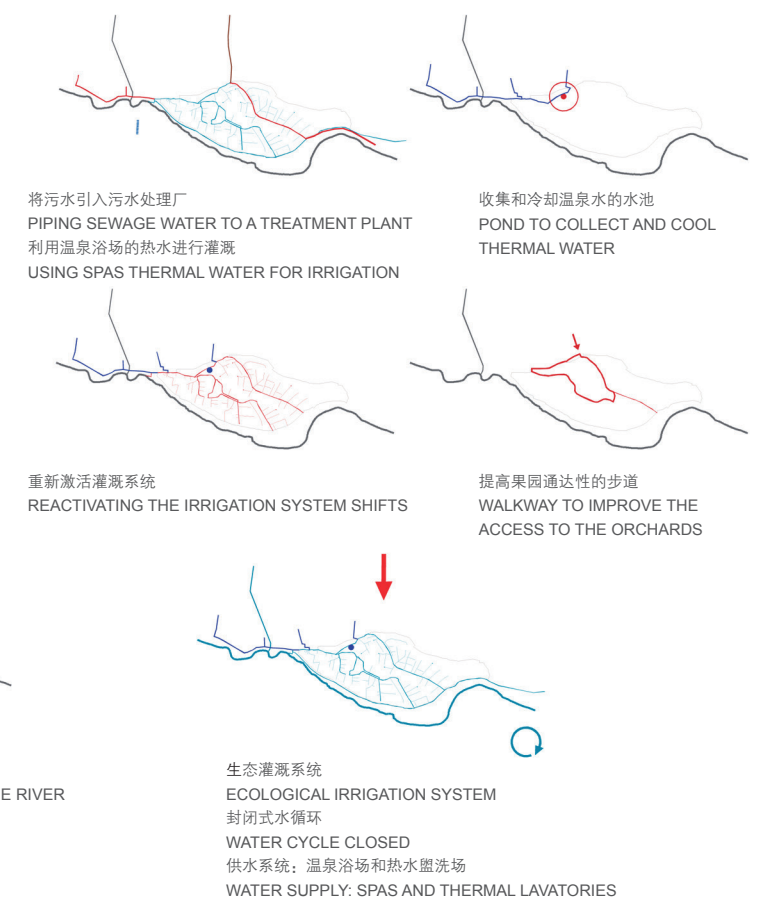


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**历史条件**  
Historical conditions



**项目概况**  
Project information



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社区亦因社区感缺失而深受影响<sup>[4]</sup>。

然而，若从系统性和综合性的角度来了解水资源管理，我们即会发现，传统的管理方式可称得上非物质文化遗产。除物质层面的意义外，这种遗产肯定了传统知识的重要性，及其在物质、文化、社会和经济方面的代表性，它能够对资源进行有机管理<sup>[5]</sup>，而这正是改变当前城市社会代谢状态的关键模式<sup>[6]</sup>。

城市外围的灌溉用水管理，将这一水的非物质文化遗产扩展至农业活动本身。在多数城市及其周边地区，这一由来已久的传统活动保证了许多家庭的食物供给，提高了城市自给自足的能力。而在这些地区生产本土园艺产品，不仅可以显著提升产品的可追溯性，确立品质保障，更能够促进对农民日常生活实践及传统文化的保护<sup>[7]</sup>。由于并不依

赖机械化或工业化来生产，且不需要交通运输，这种邻近生产也促生了低化石能源消耗量的城市食品消费模式。

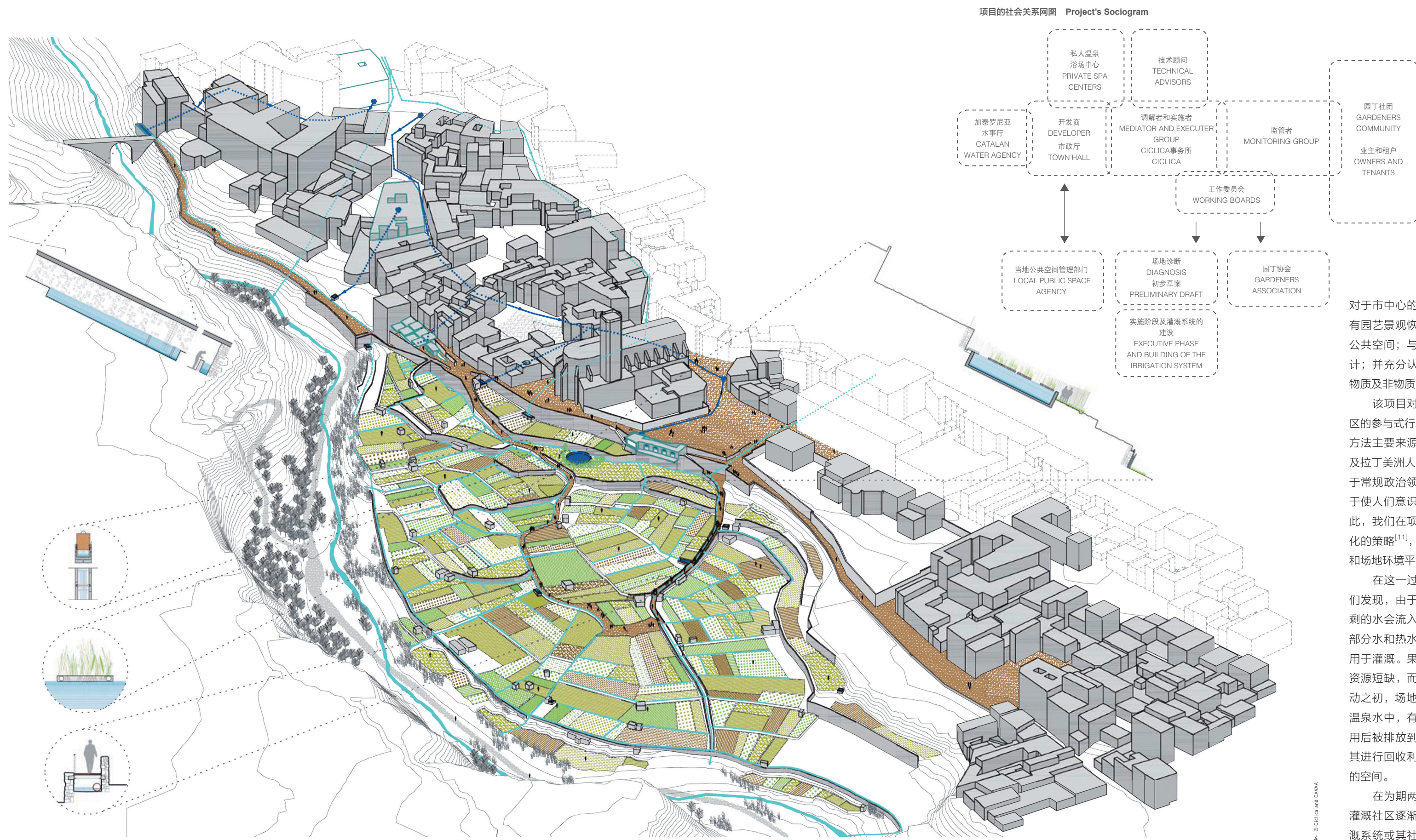
因此，正如前文所述，对于水资源的管理也是社区的日常工作之一。唯有使社区恢复活力，才能改善水资源和农业区域的管理。而通过重新激发参与资源管理的利益相关者的积极性，公众记忆最终得以延续<sup>[6]</sup>。

在这一理论框架之下，我们将介绍由本文作者所开发的项目。该项目位于一个名为“低地果园”的城市外围地区。低地果园是一处历史悠久的灌溉空间，占地3.7hm<sup>2</sup>，毗邻卡尔德斯德蒙特镇的核心区域，该镇是罗马人在巴塞罗那大都会区建立的一座温泉小镇。在20世纪，小镇的景观曾面临环境不断恶化、社会关系退化的窘境。造成外围景观的这一特殊发展过程的主要原因包括：供

应当地灌溉系统的河流遭受污染，空间可达性不足，以及灌溉社区的崩散。

过去，这些果园主要利用热水盥洗场所富余的水和流入灌溉干渠的雨水进行浇灌。这条由约3m高的石墙筑成的运河是灌溉系统的主要组成部分。但随着城市的发展，运河逐渐被掩盖，大量污水从城市中心排入，使其成为一个开放的下水道。这不但影响了园艺产品的质量，更让人们因其气味难闻和景色欠佳而避而远之。有限的洁净水让人们深深感受到水资源作为公共资产的重要性，人们迫切希望传统灌溉系统能够作为一种遗产重新融入市民的生活中。

该项目由市政公共空间委员会提出，表达了当地居民改造灌溉系统的诉求。市议会提出，要力求提供更加清洁的水资源用于灌溉、引导明渠中污水的流向，并提高场地



4. 项目轴测图和社会关系网图  
4. Axonometry and sociogram of the project

对于市中心的可达性。为此，我们提议将私有园艺景观恢复为鼓励粮食自给自足的新型公共空间；与灌溉社区和利益相关者协同设计；并充分认识到传统水资源管理方式作为物质及非物质文化遗产的重要价值。

该项目对于场地的干预主要通过基于社区的参与式行动研究（PAR）来制定。PAR方法主要来源于保罗·弗莱雷的教育学理论及拉丁美洲人民的经验<sup>[9]</sup>。参与式方法可应用于常规政治领域，但在这里，其主要功能在于使人们意识到景观感知框架的转变<sup>[10]</sup>。因此，我们在项目中提出了可促进这种视角变化的策略<sup>[11]</sup>，这是另一种能够促成适当转变和场地环境平衡的重要方法。

在这一过程中，通过与园丁的协作，我们发现，由于管理不善，私人温泉浴场中过剩的水会流入河流中。因此，我们建议将这部分水和热水盥洗场中使用过剩的水回收并用于灌溉。果园中温泉水供应不足并非由于资源短缺，而在于资源管理不善。在项目启动之初，场地中每天自然涌出的1 000m<sup>3</sup>的温泉水中，有三分之二在经私人温泉浴场使用后被排放到河流中，场地中几乎没有可对其进行回收利用的水资源汇集、补给或冷却的空间。

在为期两年的参与式行动研究过程中，灌溉社区逐渐恢复，且能够在不改变现有灌溉系统或其社会管理模式的情况下，实施一

些有限的干预措施。该项目的投资资金为93 881欧元，与其同步推行的还有“市政就业计划”。此后，场地将由灌溉社区维护，而最终的问题归市政府管理。

该项目的首要目标是提出一个计划，以恢复由园丁组成的社区的活力，巩固其结构、代表性及义务，并最终实现温泉资源的有效管理。在这层意义上，通过创建协会协同管理果园资源和空间，及其基础设施，灌溉社区已经被赋予了实际的管理权。

该项目的另一目标是通过运用知识和目前的技术潜力（基于资源管理的城市生态学策略<sup>[12]</sup>），在充分理解传统资源管理原理的基础上，促进可持续城市设计，以应对社会及环境挑战，同时促进城市社会代谢。

这一目标主要分两个阶段施行，即灌溉系统的可持续管理和场地可达性的改善。作为促进社区主导进程的一部分，温泉浴场中过剩的水将会回收灌溉果园中以确保供水。为此，项目建立了一个新的公共水池来汇集和冷却温泉水。在这里，我们对原有的灌溉系统进行了保留和再利用，水流在重力作用下流动，而无需引入任何新的机械化装置。废水被引入污水收集器中，原有的主渠道得以恢复，新建立的路径亦提高了该地区的可达性。步道由渠道内部的石墙提供支撑，因此不会改变渠道走向外观。

由此，场地中增添了更多的能够凸显园

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艺场所自我建设特征的元素，包括花岗石、陶瓷手工砖、手动闸门、铁丝网和栅栏。我们重新栽植柳树，因为以往人们常用柳枝制作成柳篮，盛物后放入热水中加热。最后，项目开发了一个创新的试验系统——植物污水处理系统，该系统利用种植在漂浮花园上的植物吸收残留的有机物质，取代了通过水池水流波动来抑制有机物质生成的方式。

我们可从三个层面对项目的成果进行评估。首先，在政治方面，政府一直致力于尊重本地的发展，并长期而紧密地参与其中，尤其是创建了前所未有的园丁协会。同时，工作委员会的创立也确保了灌溉空间的自我管理，它负责建立内部规则，及时与市议会沟通，并推进历史遗产的宣传，促进当地文化知识代代相传。其次，在生产水平方面，

洁净水资源的获取可以推动有机农业的发展，增加灌溉轮次。而从长远来看，培育出的农业产品也将受到游客的青睐。最后，在市民层面，果园也成为了公共场所，促进了人们对土地空间的认知，增强了其融入感，且具有教育意义。

新的社区和生态策略也对我们的建筑团队提出了挑战，我们需要担当起协调和观察的角色，协同外部合作者，寻求来自其他领域的创新指导。这促使我们不断开发新的决策方法，并反思在解决项目技术问题过程中的沟通方式。**LAF**

注释

本文由玛塔·塞拉·柏曼雅、叶莲娜·阿尔芭雷达·费尔南德斯和乔迪·凯尔贝托·阿尔多马撰写。

5. 施工中的果园和水池  
6. 与灌溉社区共同进行的参与式行动研究

5. The orchards and the new pool during building process

6. Participatory action research with the irrigation community

Water is life, and the landscapes generated by its social and productive management are its spatial expression over time. In the traditional city, water carried out most of the urban and peri-urban activities, allowing the city to be understood in relation to its territory. Referring to E. A. Wrigley, this relationship is based on an organic productive model where the citizens had an active role as users of water through everyday life practices of self-management and production, adapting the use of this resource to its availability in its territory<sup>[1]</sup>. Water used to be a public good and citizens knew how to deal with it since it was a social resource, a cultural asset.

Scientists J. Naredo and A. Valero stated in 1999 that the growth of urban systems and their disconnection with its territory has conditioned our relationship with water since the industrial revolution<sup>[2]</sup>. Its management has changed from a model where the communities were using it directly, to a public municipal model risking becoming a private commodity<sup>[3]</sup>. The caused disconnection between water and users that, together with economic development, led the users to adopt a passive role which turned the management

model into a demand-based system. Thus, traditional infrastructures became obsolete, falling into a process of oblivion. Water has been “stolen” from the community, a community deprived of agency and affected by the loss of sense of community<sup>[4]</sup>.

However, if we understand water management from a systemic and integrated point of view, it is possible to read the traditional management as an intangible heritage. Beyond its material dimension, this heritage recognizes the traditional knowledge and its physical, cultural, social and economic representation that enabled an organic management of resources<sup>[5]</sup>, which means a key model to transform our current urban social metabolism<sup>[6]</sup>.

The management of water to irrigate the periphery of the city extends the intangible heritage of water to the agricultural activity itself. This is an age-old traditional activity in many urban and periphery spaces that guarantees food sustenance to many families, allowing the city to be more self-sufficient. Local horticultural products produced in those spaces not only stand out for the traceability of their production as a guarantee of their quality, but also

trigger the preservation of farmers’ daily practices and their traditional knowledge<sup>[7]</sup>. This proximity production also fosters an urban food model of low consumption connected to fossil energies, because of the non-mechanization or industrialization of production, and because it does not require motorized transportation.

So, as we pointed out before, management of water heritage is the community’s daily practices as well. Working to improve the management of water and agricultural areas is not possible without working towards the reactivation of the community. Recovering the active role of stakeholders involved in resource management opens up the opportunity to recover public memory<sup>[8]</sup>.

Within this theoretical frame, we introduce the project developed by the authors of this paper. The project is located in a peripheral land called Hortes de Baix (low gardens). Hortes de Baix is an historical space of irrigation consisting of 3.7 hm<sup>2</sup> annexed to the main core of the village, Caldes de Montbui, a thermal city founded by romans in the metropolitan region of Barcelona. This space has suffered the gradual environmental and



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social degradation of its landscape. This particular process of peripheral landscapes of the 20th century is here mainly caused by the water pollution of a local stream that supplies the irrigation system, a lack of security of accessibility to the space and the breakdown of the irrigation community.

These orchards were historically watered with the surplus of thermal washing places and the stream rainwater that poured into the main irrigation canal. This canal, formed by stone walls almost 3-meter high, is the main element of the irrigation system. But with urban growth, the stream was covered and poured by much of the sewage from the urban center. The canal has become an open sewer. This has caused health risk for the horticultural production, as well as for its public accessibility (extreme bad odors and visual effect). The limited availability of clean water triggered the claim for water as a public good asset, as a heritage to

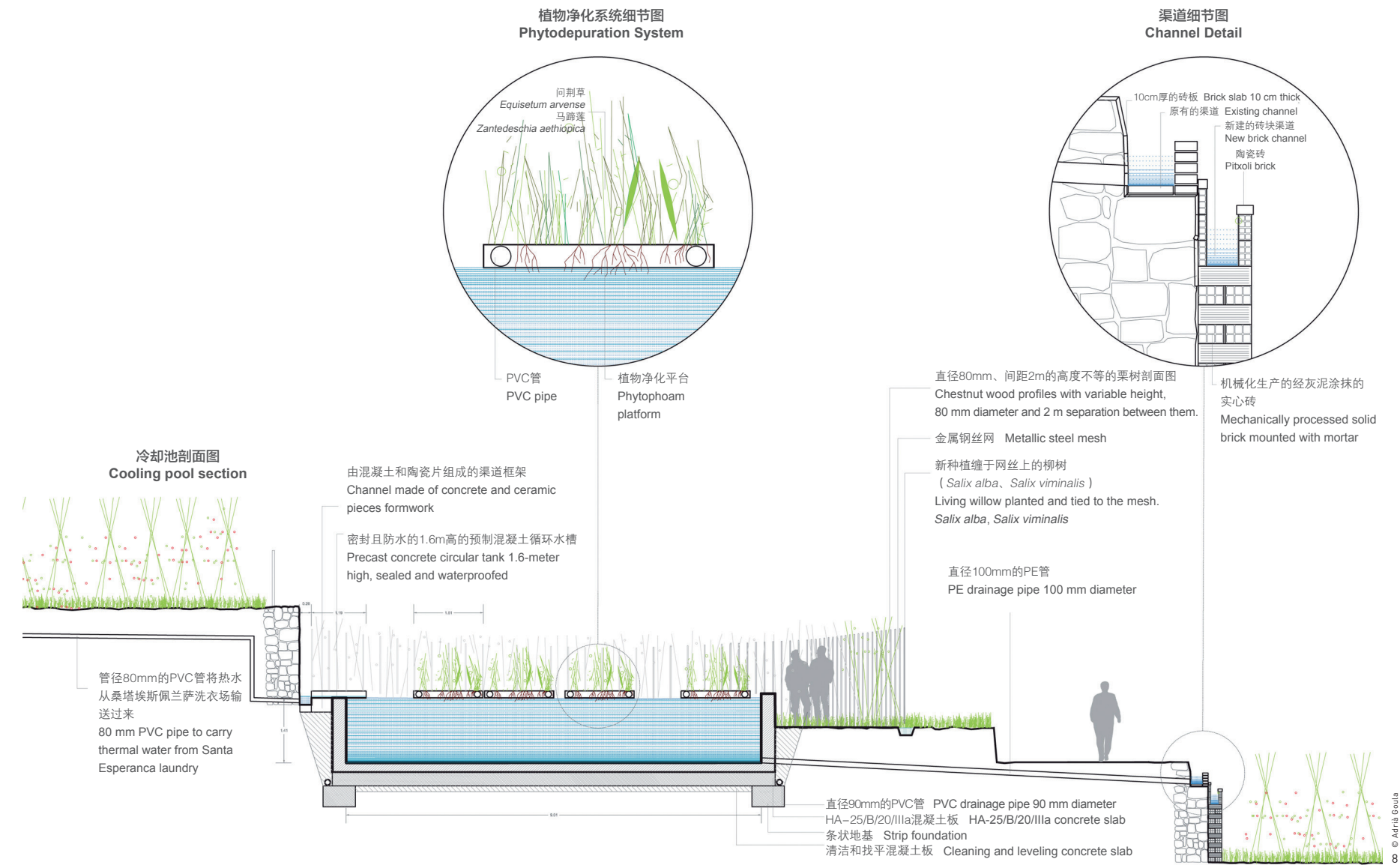
reintegrate into the citizen imaginary.

The project was born within the municipal Public Space Board, which gives voice to local initiatives to improve it. The City Council commissioned the assignment to solve the need of more clean water for irrigation, to channel the wastewater open flow and to facilitate accessibility from the city center. We proposed to recover the private horticultural landscape as a new public space that encourages food self-sufficiency; to co-design the process with the irrigation community and stakeholders; and to recognize the key value of traditional water management as a tangible and intangible heritage.

The intervention is developed through Participatory Action Research (PAR), a community-based participatory research. This approach comes mainly from the Paulo Freirean pedagogy and Latino-American experiences<sup>[9]</sup>. Participatory methodologies allow performing the conventional

7. 新水池、果园和灌溉水渠
8. 冷却池、植物净化系统、渠道施工细节

7. The new pool, the orchards and the main drought
8. Actions detailed of the cooling pool, phytodepuration system and channel



political sphere, but especially they enable awareness for the transformation of perceptual frameworks of the landscape<sup>[10]</sup>. Thus, we propose tools which facilitate this change of perspective<sup>[11]</sup>, another approach which is essential for a proper transformation and balance of the environment.

Throughout this process and together with the gardeners, we detected an inadequate management of the water surplus from private thermal spas poured into the stream. So we proposed to reuse it

for irrigation as well as the surplus water from thermal washing places. The lack of thermal water in the orchards did not respond to a shortage in thermal water supply but to an inadequate management of this resource. At the time that the project began, two-thirds of the 1,000 m<sup>3</sup> of water that outcrop every day in a natural way were discharged to the river once they have been used by the private spas, without having spaces of retention, compensation or cooling for their reuse.

For two years of participatory action



physical space of the orchards and their infrastructures.

On the other hand, the second goal is to promote a sustainable urban design from the understanding of the traditional management of resources by using the knowledge and the current technical possibilities (strategies of urban ecology based on the management of resources<sup>[12]</sup>), to respond to social and environmental challenges while mobilizing the urban social metabolism.

This second goal has been developed through two stages: the sustainable management of the irrigation system and the walkway to improve accessibility. As part of the community-driven process, the surplus of water from thermal spas was recovered to irrigate orchards ensuring water supply. For that, a new public pool is built there to accumulate and cool thermal water. From there, we keep and recycle the existing irrigation system to deliver flooding turns by gravity operation, avoiding introducing any new mechanized device. Wastewater is channeled to the sewage collector, allowing recovering the existing

main canal with a new walkway to improve access to the area. This is supported inside the stone walls to not alter the canal traces appearance.

The presence of elements from horticultural self-construction identity is enhanced, including granite stones, ceramic handmade bricks, manual floodgates, wire meshes and fences. We reintroduce live willow, formerly used to make willow baskets heated by thermal water. Finally, an innovative pilot system is developed — phytotreatment with macrophytes planted on floating gardens, to absorb residual organic material without altering the pool's oscillation condition.

The results of the project allow evaluating the project at three levels. First, the political: The Government has committed itself to dignify this place and to the long and intense participation process that culminates with the creation of a gardeners' association hitherto nonexistent. A working board with commissions is created to ensure self-management on the irrigated space, the establishment of internal rules, the communication with the city council, the visibility of its historical heritage and the

9. 汇集和冷却温泉水的新水池及漂浮花园中用于水处理的大型植被
10. 用于汇集和冷却温泉水的新水池，主要由混凝土砌成，便于维护。
11. 汇集和冷却温泉水的新水池及由新种植的柳树围成的天然篱笆
9. New pool to accumulate and cool thermal water and phytotreatment with macrophytes planted on floating gardens
10. Detail of the new pool to accumulate and cool thermal water built with concrete to allow an easy maintenance.
11. New pool to accumulate and cool thermal water and living willow creating a natural fence

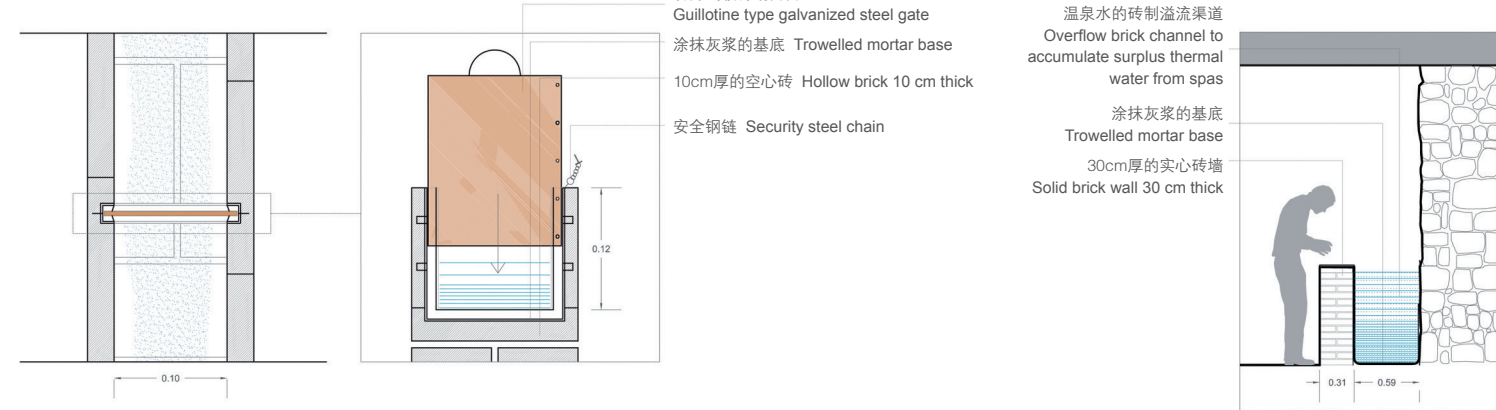


research, the irrigating community was recovered and empowered to agree on some bounded interventions without altering the existing irrigation system or its social management. The project was executed with EUR 93,881 and a Municipal Employment Plan. The maintenance is taken over by the irrigation community and eventual problems are managed by the municipality.

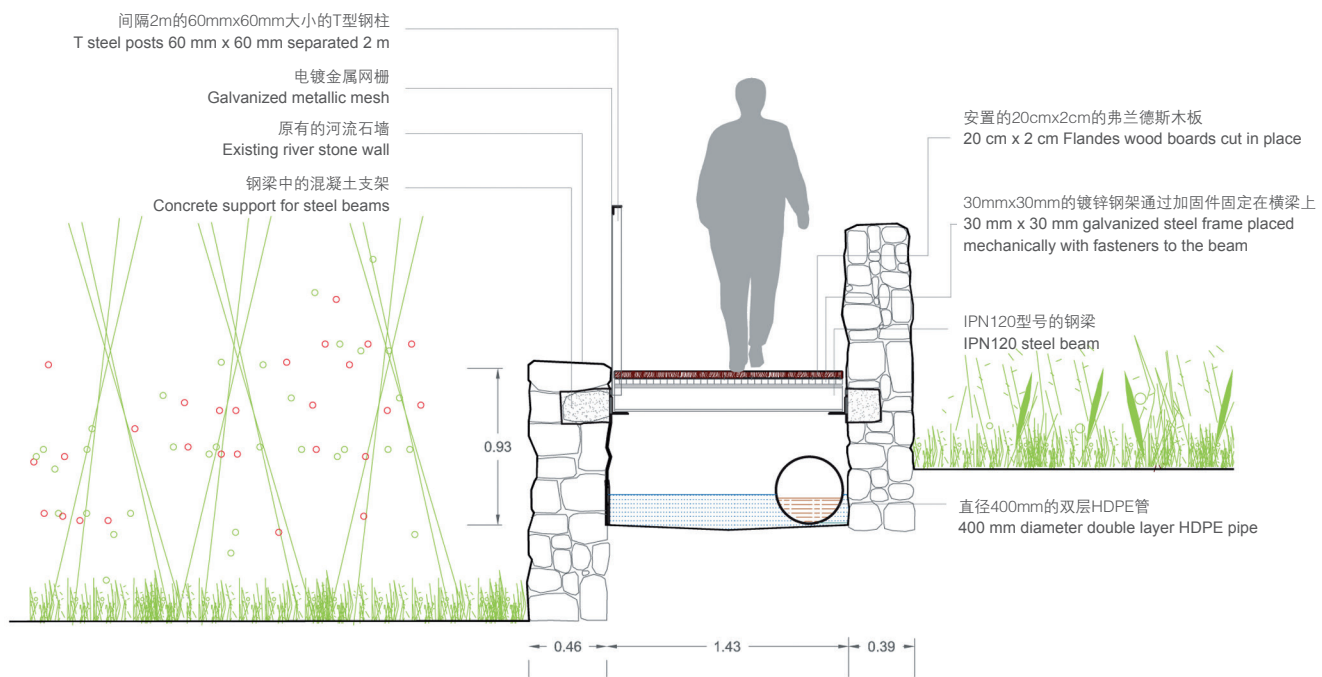
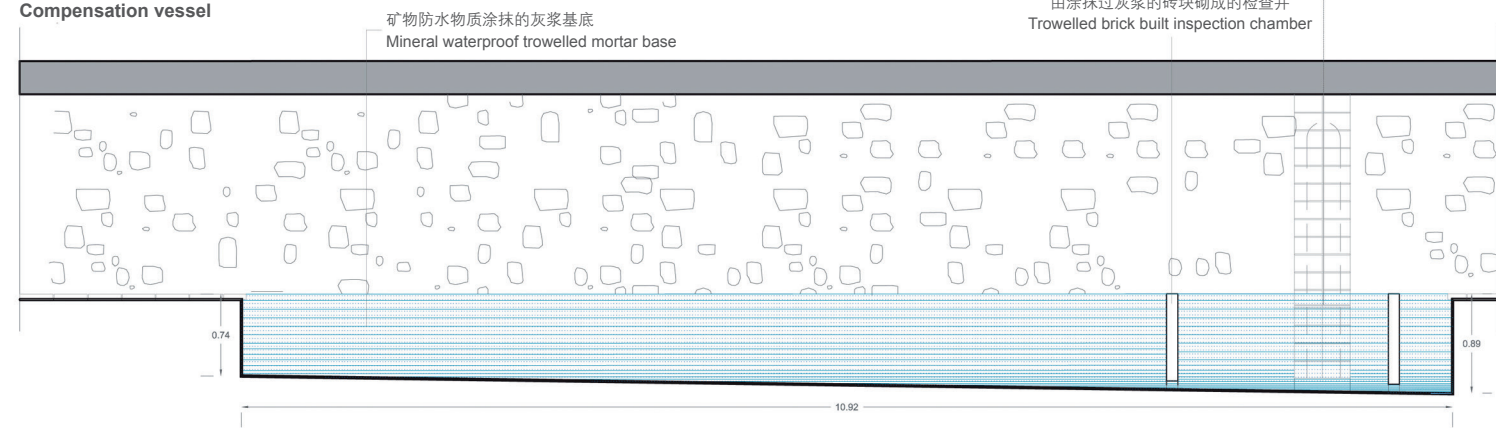
The first goal of the project is to propose a plan to reactivate the community of gardeners in order to consolidate their structure, representation and commitment to efficiently manage the thermal water resource. In this sense, the community of irrigators has been empowered by creating an association to collectively manage the resources and the



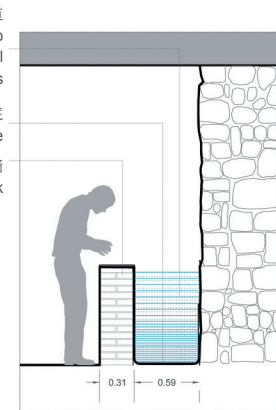
灌溉水渠平面图和剖面图  
Drought plan and section



补水容器  
Compensation vessel



补水容器剖面图  
Compensation vessel section



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necessary intergenerational transfer of local knowledge. Second, the productive level: obtaining clean water allows the practice of organic farming and increases irrigation turns. In the long term, visitors would be expected to consume the cultivated products. And finally the civic level: the orchards become an open public space, promoting recognition, inclusion and education of the agrarian space.

The new community and ecological approach also challenged our architecture team to assume the role of mediators and observers by searching for innovative references from other fields by integrating external collaborators. This has allowed us to develop new tools of decision-making, to rethink the communication of the technical issues of the project. **LAF**

NOTE

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- 灌溉水渠及补水容器细节图
- 步道细节图
- 溢流渠道细节图，它将主渠道与水池连接起来，主要由本地常用的手工陶瓷砖砌成。
- 新步道的建立可提高场地的可达性，促进果园成为开放的公共空间。
- Actions detailed of the drought and compensation vessel
- Details of walkway
- Detail of the bypass channels that connect the main drought with the new pool built with ceramic handmade bricks commonly used in the area.
- New walkway to improve access to the area allowing the orchards to become an open public space.