

Urban Aridities: New Adaptation Strategies for Consolidated European Cities

For many long-established cities in Europe, the negotiation with aridity has not been a founding premise, yet it's increasingly becoming a concern that disrupts traditional relations with water and unsettles acquainted morphological, social and environmental structures. The paper, arguing that the challenge of identifying suitable responses to fast climatic shifts in already dense and rigidly defined urban contexts is both technical and cultural, investigates the possibility for a different adaptive trajectory that embraces aridity as a new structural component of ecologies, aesthetics, and behaviours, rather than addressing it with compensatory or infrastructural solutions. Without overlooking potential catastrophic outcomes, or suggesting generalized and transferable models, the paper draws on a range of European contemporary urban experiences in which aridity already constitutes an explicit or implicit design parameter, with the purpose to contribute in building more resilient adaptation pathways for others. The landscape features of European cities are often tied to ideals of lushness and permanence, no longer sustained by the same climatic regime that produced them. The issue lies as much into the adaptability of established forms that don't allow traumatic interventions, as in the cultural friction between emerging and inherited ecological conditions caused by the current accelerated changes. This contribution proposes to accommodate, and guide, some irreversible transitions by overturning the conventional image of care, experimenting with vegetational scarcity, low maintenance practices, and accepting intermittent landscapes that can integrate the existing palimpsest of practices, relations, memories and attachments, allowing us to inhabit change itself.

Keywords: aridity, Europe, urban landscape, climate change, adaptation

Consolidated European Urban Landscapes, Climate and Water

In this paper, urban landscape refers primarily to the historically sedimented spaces through which European cities have materialized their identity: parks and gardens, tree-lined streets, cultivated grounds, public open spaces and the infrastructures that sustain them. These are not to be considered as isolated elements, but as socio-ecological configurations that have been organised together, and cannot be understood independently from their relationship with climate, and, above all, water. Aridity, understood here as a broader shift towards increasing dryness and the uncertainty it entails, thus enters contemporary European landscapes more than as a new environmental pressure, but as an emerging condition that brings latent vulnerabilities, emergencies and urgencies into view¹. As aridity becomes increasingly

¹Colafranceschi, D. 2023. Paesaggi lungimiranti. In L. Marinaro, S. Melli, M. L. Olivetti (Eds.). *Arido*, cit. 5-8.

1 persistent, inherited forms of inhabitation start to diverge more and more from
 2 the climatic circumstances within which they were originally shaped, and in
 3 consolidated European cities, where these relationships are deeply embedded in
 4 material structures, ecological systems and cultural expectations, aridity is both
 5 particularly difficult to accommodate and increasingly necessary to understand
 6 as a condition of future inhabitation. Cities have never existed independently
 7 from the environmental conditions that sustained them, and long before climate
 8 became an object of scientific measurement or political concern, it already
 9 played a fundamental role in the evolution of urban life, influencing
 10 settlements' locations, morphologies and expansions, and also the ways in
 11 which they were inhabited. In cities, prevailing winds orientated streets and
 12 buildings, water availability shaped systems of cultivation and sanitation,
 13 vegetation rooted in the same seasonal rhythms that regulated production and
 14 public life. Although not generally uniform, the relative long climatic stability
 15 of the Holocene has been identified, by a growing body of interdisciplinary
 16 researches², as the only planetary state known to have supported the emergence
 17 of civilization, allowing the development of agriculture, of permanent
 18 settlements and, ultimately, of complex human societies. The millennial
 19 coevolution of relationships between climatic surrounding and situated
 20 practices produced a *palimpsest*³, where each generation inherited an already
 21 transformed environment and introduced new layers, continuously rewriting on
 22 the material substrate and its cultural meanings. Few territories have
 23 experienced the same prolonged human occupation as the European continent,
 24 where cities developed in a context in which resources, although obviously
 25 never equally distributed nor permanently abundant, remained sufficiently
 26 available throughout their long history⁴. Forms of inhabitation and management
 27 emerged from this continuity, progressively consolidating over generations,
 28 and what had developed in correspondence with a given environmental regime
 29 slowly acquired more the character of ordinary, rather than of a consciously
 30 negotiated practice. Surely, floods, droughts and climatic oscillations
 31 repeatedly affected Europe, sometimes as severely as during the Little Ice Age,
 32 that profoundly reshaped agricultural production, ecological dynamics and
 33 settlement patterns between approximately 1300 and 1850. Yet, environmental
 34 changes unfolded over temporal horizons long enough to allow practices and
 35 knowledges to readjust progressively and organically and, over time, to turn
 36 the whole territory itself into the repository of successive, gradual
 37 transformations. In Emilio Sereni's reading of the Italian agrarian landscape⁵,
 38 for instance, emerges how this long-term stability produced cultural and

²The core reference for this environmental framework is the Planetary Boundaries framework, originally developed in 2009, see: Steffen, W. and Rockström, J. 2024. Reflections on the Past and Future of Whole Earth System Science. *Global Sustainability*, 7, 32 (May. 2024), DOI: 10.1017/sus.2024.15

³Corboz A. 1983. The Land as Palimpsest. *Diogenes*, 31, 121, (Mar. 1983), 12-34. DOI: 10.1177/039219218303112102

⁴Sachs, I. 1974. Environnement et Styles de Développement. *Annales. Histoire, Sciences Sociales* 29,3 (May.2018). 553–70. DOI: 10.3406/ahess.1974.293493.

⁵Sereni, E. 1961. *Storia del paesaggio agrario Italiano*. Laterza.

material features that are, sometimes still, unmistakably recognizable. Cities and environment were held together by a network of goods, institutions, labour and resources, that persisted as a distinctive feature of European urbanization⁶. For centuries, urban centers seamlessly unfolded into the surrounding lands upon which lied their material dependence, as shown in one of the earliest depictions of landscape: Ambrogio Lorenzetti's fresco "Allegoria del Buon Governo", both evolving alongside one another.

Figure 1. "Effetti del Buon Governo in campagna", Ambrogio Lorenzetti (1338-1339, Sala della Pace, Palazzo Pubblico, Siena)



Source: analisidellopera.it., 2019

The same process found expression in the spaces through which urban life was experienced. Streets, infrastructures and public spaces accumulated and absorbed new functions through successive transformations, to accommodate new functional requirements and aesthetic preferences. As Peter Clark observes⁷, the longevity of the European city lies in the continuous reorganization of the existing structures in response to changing political orders, economical shifting and fluctuating social conditions, sometimes abrupt and violent. In the long evolution that shaped city's morphology, the environmental conditions were never questioned and when public gardens, parks, riverside promenades and tree-lined streets progressively became part of the ordinary structure of the European city, their development relied on seasonal rhythms that could be taken for granted. Vegetation could mature over generations, many public spaces could be inhabited outdoors for extended periods, and their maintenance did not require continuous adaptation. This process thus extended beyond the physical organization of the city, shaping the ways in which its landscapes came to be perceived and valued, gradually

⁶Hohenberg, P. M. and Hollen Lees, L. 1995. *The Making of Urban Europe, 1000-1994: With a New Preface and a New Chapter*. Harvard University Press.

⁷Clarks, P. 2009. *European Cities and Towns: 400-2000*. Oxford University Press.

turning the contingent into the ordinary. As Simon Schama has shown⁸, landscapes are repositories of cultural memory, shaped by material processes that acquire cultural meanings, through which societies recognize themselves. If what had developed under particular conditions acquires the appearance of something intrinsic, it also influences ideas of ordinary /beauty, care and civic life and the materially remains from past ways of inhabiting a place teach successive generations what to recognize as familiar, desirable and, eventually, worth preserving. In this scenario, the present climatic transition thus reaches beyond the dimension of physical maintenance or technical adaptation, as it begins to rapidly disrupt the temporal continuity through which landscape forms have historically been established, maintained and culturally assimilated. What had once been gradually incorporated into the ordinary experience of the city is now confronted with a rate of change that alters, within a relatively short period, both the conditions sustaining those forms and the expectations through which they continue to be recognized. This is particularly relevant, then, for many European cities, well-shaped over centuries in their cultural and natural spaces, often unprepared to deal with new climatic regimes⁹, especially when faced with a water scarcity that begins to extend beyond occasional episodes, and into territories where it had never constituted a structural assumption of urban development.

Dwelling the Aridity

The difficulty lies not in the coexistence of urban life and aridity itself, as the earliest urban civilizations developed in the Near East, within arid and semi-arid contexts. Although nourished by large rivers, such as the Nile or the Tigris and Euphrates, these territories were characterized by highly variable rainfall, making flood regulation and retaining-distribution systems essential for stable human presence. Where water was never, “simply”, available but had to depended on collective forms of organization, canals, embankments, reservoirs tanks and irrigation were integral components of the urban landscape, through which cities could persist over time. As Christophe Girot recalls¹⁰, one of the earliest large-scale urban landscape interventions can be traced to the construction of the Faiyum Oasis, under the reign of Senusret I (c. 1895 BC), where the hydraulic infrastructures transformed part of the Libyan Desert into a productive, inhabitable, territory. The relationship between aridity and urban form extended beyond water management, to the spatial organization of cities themselves. Narrow streets, compact fabrics and internal courtyards evolved not only as environmental devices, regulating solar exposure, retaining cool night air and moderating daytime temperatures, but

⁸Schama, S. 1996. *Landscape and Memory*. Alfred A. Knopf.

⁹Olivetti, M.L. 2023. Nuovi ritmi ed equilibri per i paesaggi urbani nell'epoca dell'aridità. In L. Marinaro, S. Melli, M. L. Olivetti (Eds.). *Arido Progetti e azioni per paesaggi lungimiranti*. DeriveApprodi. 15-23.

¹⁰Girot, C. 2016. *The Course of Landscape Architecture: A History of Our Designs on the Natural World, from Prehistory to the Present*. Thames & Hudson.

also as cultural expressions accommodating domestic activities and social interactions. and the management of water did not simply support urban life but structured it, organizing the sequence of streets, courtyards, gardens and cultivated land. This relationship was not confined to specific historical periods or geographies, indeed European cities have never shared a single climatic history and while some were shaped by comparatively water availability, some developed within conditions of scarcity. Urban settlements spread across the Mediterranean basin too have always been familiar with the continuous negotiation with recurrent droughts, and scarcity was absorbed into the features of the landscape, giving form to infrastructures, social spaces and everyday uses through which settlements were consolidated. Cultivated lands heavily depended on irrigation, and access to water influenced the relations amongst households, plots and agricultural production. In the documented case of Nasrid Granada¹¹, the irrigated land surrounding the city was connected to the city center through distribution systems that divided the territory, firstly according to family-based arrangements, then to plot allocations and, later, to the exchange of allotted periods independently of land ownership. The distribution of water even followed the daily sequence of Islamic prayers, making its circulation part of the daily organization of life. The resulting urban form and patterns of inhabitation, appeared to have developed around, and not in opposition to, the constraints imposed by the careful organization of limited resources, as if scarcity was a design principle incorporated in the urban landscape, rather than a condition to overcome. Such arrangements developed in response to a wider context of ecological variability that Sullivan's account of drylands as non-equilibrium systems¹² helps clarify: where fluctuations are intrinsic to the environment, adaptation cannot consist in bringing conditions back to an ideal, fixed state, but in developing practices capable of responding to their variations.

Accelerating Transitions

The growing anthropogenetic impact altered these historical conditions, as human activities, for the first time in history, have come to be considered geological agents, capable of modifying Earth System processes at a pace so rapid that is referred to as the Great Acceleration¹³. The matter of increasing temperatures or decreasing water availability is exacerbated by the temporal horizon within which these processes now unfold. Climatic transformations once developed across generations, increasingly occur within the lifespan of existing infrastructures, institutions and urban landscapes, compressing the

¹¹San José, C. T. 2005. A Social Analysis of Irrigation in Al-Andalus: Nazari Granada (13th-15th Centuries). *Journal of Medieval History*, 31,2 (Jan. 2012), 163–183. DOI: 10.1016/j.jmedhist.2005.03.001.

¹²Sullivan, S. 1996. Guest Editorial: Towards a Non-Equilibrium Ecology: Perspectives from an Arid Land. *Journal of Biogeography*, 23,1 (Jan. 1196), 1–5. DOI: doi.org/10.2307/2846012

¹³McNeill, J. R. and Engelke, P. 2016. *The Great Acceleration: An Environmental History of the Anthropocene since 1945*. Belknap Press.

1 adaptive processes through which settlements had long accommodated
 2 variability. Aridification exemplifies this shift. Unlike the historical formation
 3 of arid regions, which unfolded through extended environmental trajectories,
 4 contemporary phenomena rapidly expand across territories whose ecological
 5 organisation accumulated under different climatic conditions. The increasing
 6 possibility offered by technological systems, moreover, progressively displaced
 7 the long processes of adjustment. This transformation did not occur in the
 8 absence of climatic knowledge, in fact, research devoted growing attention to
 9 the reciprocal relationships between cities and climate. Yet, as Hebbert and
 10 Janković observe¹⁴, this knowledge rarely entered planning and design as a
 11 formative component of urban development. Climate gradually ceased to be
 12 treated as one of the conditions through which settlements emerged and
 13 evolved, becoming instead an external domain to be measured, predicted and
 14 technically regulated. The abrupt and radical advances in engineering, fossil-
 15 fuel energy and environmental technologies during the 20th century, fostered
 16 the belief that cities could become largely independent from their local climatic
 17 context, and capitalistic economic imperatives progressively promoted a
 18 generic functional model of the modern city. The large body of thought that
 19 rose against this, not coincidentally in the USA¹⁵, informed the discourse on
 20 urban landscapes and how it does, and should, not suspend environmental
 21 dynamics but continuously reorganize with them. Kallipoliti's reconstruction of
 22 ecological design¹⁶ places these positions within a much broader
 23 epistemological approach which persisted across architecture, planning and
 24 engineering without ever becoming the dominant framework through which
 25 urban development was conceived. Rather than fully replacing technological
 26 modernization, it unfolded alongside it, as an alternative way of interpreting
 27 the reciprocal relationship between settlements and environmental processes,
 28 but never fully becoming the dominant trajectory. Hassan Fathy's project for
 29 New Gourni belongs to this historical transition as one of the few attempts to
 30 recover situated knowledge embedded in the long environmental adaptation of
 31 settlements to arid climates, confronting a rapidly consolidating model of
 32 technocratic modernization and revealing its growing inadequacy to foster the

¹⁴Hebbert, M. and Jankovic, V. 2013. Cities and Climate Change: The Precedents and Why They Matter. *Urban Studies*, 50,7, 1, (Apr. 2013), 332-1347. DOI: doi.org/10.1177/0042098013480970

¹⁵Amongst many others, is worth mentioning Mumford's call for an *organic city*, Spirn's interpretation of it as an ecosystem, and McHarg's ecological planning perspectives as the most influential contributors against the modern fracture between “natural” and “artificial”, that later found the most complete expression in Latour's broader critique to the western duality of nature and culture. For further knowledge see: 1) Mumford, L. 1961. *The City in History: Its Origins, Its Transformations, and Its Prospects*. Brace & World. 2) Spirn, A. W. 1984. *The Granite Garden: Urban Nature and Human Design*. Basic Books. 3) McHarg, I. L. 1969. *Design with Nature*. Natural History Press. 4) Latour, B. 1993. *We Have Never Been Modern*. Harvard University Press.

¹⁶Kallipoliti, L. 2024. *Histories of Ecological Design: An Unfinished Cyclopedia*. Lars Müller Publishers.

universal aspirations of urban development¹⁷. Recent debates on arid urbanism bring the focus back on this subject, as the *Cities Alive* report¹⁸ that revisits historical and contemporary arid settlements in order to contribute in spreading environmental understanding and situated knowledge to face socioecological pressures connected to increasing water shortages. Yet, if the changes are as destabilizing in their physical impacts as they are in how their manifestations is perceived, adaptation acquires a different meaning.

*The 17th of October and summer still*¹⁹

In 1813, writing to her sister Cassandra, Jane Austen casually remarked that summer seemed unwilling to give way to autumn. A surprised observation, showing little more than amusement for an exceptional season, where a warm October still was a noteworthy unusual oddity for the English weather. Two centuries later, we sadly grew to be increasingly familiar with such anomalies like warming seasons, prolonged summer conditions and recurrent heatwaves. Across much of Europe, the evidence suggests that this is not the result of individual anomalous years, but of a broader climatic transition. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change²⁰ identifies Europe as one of the regions where anthropogenic warming is progressing most rapidly, with temperatures increasing at approximately twice the global average, accompanied by more frequent and persistent heatwaves, declining soil moisture and increasingly severe droughts. The European State of the Climate reports produced by the Copernicus Climate Change Service in 2024²¹ describes the same tendency, showing successive years of prolonged hydrological deficits, reduced river discharge, record-breaking summer temperatures and widespread vegetation stress extending well beyond the Mediterranean basin.

¹⁷Designed by Hassan Fathy between 1946 and 1952 for the resettlement of Old Gournah, the project reinterpreted traditional earthen construction and local building knowledge within a contemporary architectural programme, although it remained only partially realized. For further knowledge see: Fathy, H. 1969. *Architecture for the Poor: An Experiment in Rural Egypt*. The American University in Cairo Press.

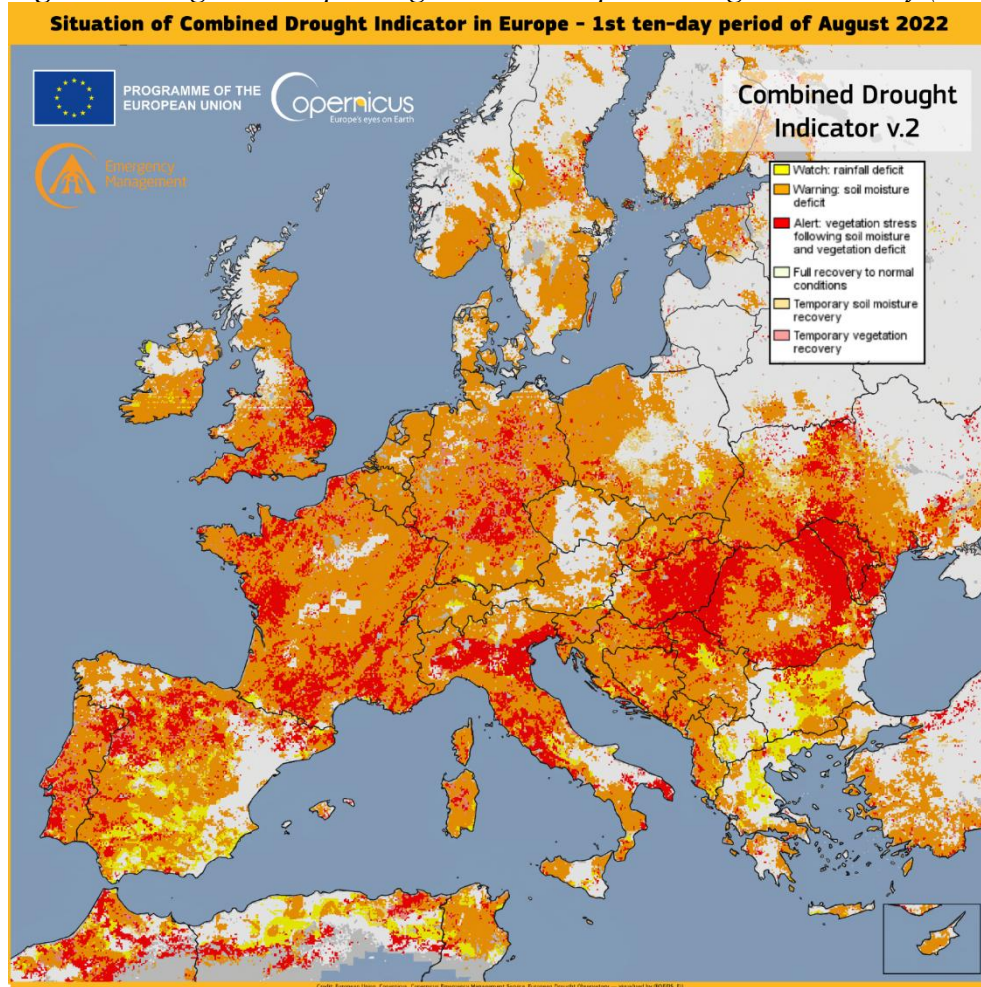
¹⁸Arup. 2018. *Cities Alive: Rethinking Cities in Arid Environments*. London: Arup.

¹⁹This is a reference to a passage in a Jane Austen's letter to her eldest sister Cassandra (Letter 121, Tuesday 17 - Wednesday 18 October 1815. *Cassandra Austen*, Chawton)

²⁰IPCC. 2023. *Climate Change 2023: Synthesis Report*. Geneva: Intergovernmental Panel on Climate Change. <https://www.ipcc.ch/report/ar6/syr/>

²¹Copernicus Climate Change Service. 2024. *European State of the Climate 2023*. Bonn: ECMWF. <https://climate.copernicus.eu/>

Figure 2. Drought in Europe - August 2022. European Drought Observatory (EDO)



Source: www.copernicus.eu, 2022.

As mentioned, climatic fluctuations have always accompanied European environmental history. What distinguishes the present scenario is their increasing recurrence and, above all, their fast expansion. Following the extensive lack of rainfall between 2018 and 2019, a national survey in Germany historic parks²² documented widespread physiological stress and mortality among mature urban trees, exposing the growing inadequacy of management practices established under comparatively stable hydro-climatic conditions. During the summer of 2022, the browning of Hyde Park and other historic urban greenspaces similarly became a recurring image in the British press. Comparable situations are recorded across all Europe, from North to South, with different intensities and histories.

²²Kühn, N., Wörner, A. and Rohde, M. 2024, January 26. *Parkschadensbericht – Präsentation* [Report translated from German using online translation tools]. Technische Universität Berlin. <https://www.tu.berlin/news/pressemitteilung/historische-parkanlagen-leiden-unter-klimastress>

1 **Figure 3.** *Picture and caption for drought in Hyde Park, London- August 2022*



2
3 Source: www.dailymail.com (12/08/2022).

4
5 These episodes did not attract attention because drought had never
6 generally affected urban vegetation before, but because they interrupted
7 environmental expectations that had remained largely unchanged over
8 generations. In southern regions, throughout the Mediterranean basin, dry
9 summers are part of the ordinary ecological cycle, and water scarcity is neither
10 exceptional nor unexpected, though it is necessary to highlight that even where
11 it was one of the conditions through which cities, agricultural systems and
12 public spaces progressively evolved, prolonged droughts are challenging
13 planting strategies and water infrastructures established during the 20th century.
14 In the main part of Europe, at the same time, extensive tree canopies,
15 permanent lawns, large public parks and broad vegetated avenues progressively
16 became ordinary components of urban life, influencing the ways in which
17 urban nature has been imagined, represented and maintained. Much of the
18 European landscape tradition developed within this environmental continuity,
19 progressively transforming climatic conditions into cultural expectations.
20 Professor Hulme argues²³ that climate is not experienced only through
21 atmospheric measurements, but through recurring environmental patterns that
22 shape expectations, habits and shared understandings of place. This means the
23 transition concerns some European cities more than others, in a particularly
24 specific way, as in the image of *Rome leaving for Tunis* used by Annalisa
25 Metta to explain how the southward displacement of climatic conditions
26 influences all those *subtle substances*²⁴ through which our everyday places have
27 long been experienced and given identity. This familiarity, precisely, is
28 progressively destabilised by contemporary climate change, no longer with

²³Hulme, M. 2021. *Climate Change*. Routledge.

²⁴Metta, A. 2023. Verso sud. Paesaggi e latitudini migranti. In L. Marinaro, S. Melli, M. L. Olivetti (Eds.). *Arido Progetti e azioni per paesaggi lungimiranti*. DeriveApprodi. 93-103.

singular exceptional weather events, but gradually modifying the recurrent environmental conditions that had long sustained the ordinary functioning of urban landscapes. Irrigation, engineered soils and increasingly sophisticated maintenance continue to prolong that continuity, allowing many public landscapes to retain their ecological and spatial characteristics despite accelerating environmental change. Their short-term effectiveness is undeniable, but at the same time they reveal how the persistence of familiar landscapes progressively depends upon forms of compensation. This is where the contemporary European question begins. The issue is no longer confined to improving ecological performance, but concerns the possibility of transforming cities whose material, ecological and cultural structures simply cannot be rebuilt *ex novo*.

Consolidated Cities: Between Persistence and Transition

Contemporary climate policies often translate this challenge into quantitative objectives: increasing tree cover, restoring ecological connectivity, expanding permeable surfaces or strengthening ecosystem services. These objectives remain fundamental, yet they rarely distinguish between territories where urban transformation can proceed through large spatial reconfiguration and those where change must instead negotiate with an already consolidated physical and cultural structure. Consolidation is not simply a matter of density or heritage protection, it describes successive layers of infrastructures, vegetation, property boundaries, public spaces and historical meanings, that progressively reduce the degree of freedom through which environmental processes can be reorganised. Every intervention enters a system that is already functioning, already inhabited and often already protected. Available soil is limited, underground infrastructures constrain rooting conditions, public space performs multiple and frequently conflicting functions, historical vegetation itself constitute part of the cultural heritage. Every modification inevitably redistributes existing balances, ecological as much as social and cultural, and adaptation therefore cannot be addressed as the mere addition of ecological components into a neutral urban fabric. Among these balances, water occupies a particularly critical position, since the vegetation and soils through which many existing landscapes are valued are also dependent upon regimes of irrigation, drainage, retention and seasonal availability that are increasingly difficult to reproduce under changing climatic conditions. Large-scale ecological restoration, metropolitan Blue-Green Infrastructure networks and extensive landscape retrofitting, often assume spatial margins that consolidated urban fabrics rarely possess²⁵. Even where these strategies remain technically desirable, their implementation frequently encounters material constraints that cannot simply be overcome through better design. Historic centres, 19th century

²⁵Dmitruk, M.T., Martyka, A.M. and Ortyl, B. 2026. Integration of Green and Blue Infrastructure in Compact Urban Centers: The Case Study of Rzeszów. *Sustainability*, 18, 1650 (Feb. 2026). DOI:doi.org/10.3390/su18031650

districts and mature public landscapes operate within physical configurations that have accumulated over centuries and where every transformation requires compromises amongst environmental performance, everyday use, heritage values and economic feasibility. Adaptation here therefore enters landscapes where ecological, historical and social values cannot be disentangled from one another. Nature-based Solutions have consequently acquired a central role within this debate, as they appear more suitable for operating within these constraints, for their capacity to reactivate ecological processes without requiring radical spatial reconfiguration. Rain gardens, permeable surfaces, bioswales, urban forests or small-scale stormwater infrastructures can gradually improve environmental performance while working with the existing city rather than against it²⁶. In consolidated contexts this incremental character represents a decisive advantage, since adaptation rarely coincides with the construction of new landscapes, but more often with the reinterpretation of those already in place. Existing parks and gardens, above all, acquire a strategic importance that extends well beyond their recreational or aesthetic role. They already constitute established ecological infrastructures, host mature vegetation, permeable soils, biodiversity and complex ecological interactions that would require decades to be recreated elsewhere²⁷. Their position within dense urban fabrics also makes them one of the few spaces where climatic adaptation can operate with an immediate environmental effect while maintaining a direct relationship with everyday urban life. Yet, these same qualities can carry more complex implications, sometimes still overlooked. First of all, as already discussed, existing vegetation frequently possesses historical significance, spatial configurations respond to long-established patterns of use, and maintenance practices are often inseparable from cultural expectations accumulated over generations. Improving one dimension may inevitably transform another.

More significantly, Nature-based Solutions effectiveness profoundly depends upon the environmental conditions within which they operate, whereas much of the contemporary framework through which they have been theorised and standardised emerged in temperate and relatively humid regions of the Global North²⁸. Measures conceived to increase vegetative cover or restore moisture, presented as universally applicable responses, often assume environmental conditions that prolonged drought and increasing evaporative demand progressively undermine. As water availability becomes less predictable, some interventions require growing irrigation, maintenance and

²⁶Kabisch, N., Korn, H., Stadler, J., and Bonn, A. (Eds.). 2017. *Nature-based solutions to climate change adaptation in urban areas: Linkages between science, policy and practice*. Springer. DOI:doi.org/10.1007/978-3-319-56091-5

²⁷Lin, H. and Li, X. 2025. The Role of Urban Green Spaces in Mitigating the Urban Heat Island Effect: A Systematic Review from the Perspective of Types and Mechanisms. *Sustainability*, 17,13, 6132 (Mar. 2025). DOI:doi.org/10.3390/su17136132

²⁸Mirsafa, M., Castaldo, A.G. and Lemes de Oliveira, F. 2025. Enabling nature-based solutions for climate adaptation in cities of the Global South: planning dimensions and cross-cutting pathways for implementation. *Environment, Development and Sustainability*. Springer Advance Online Publication. (May 2025). DOI:doi.org/10.1007/s10668-025-06256-7

technical support precisely to preserve the ecological configurations they were intended to protect²⁹. Rather than questioning the ecological value of Nature-based Solutions, this reveals that their long-term performance cannot be separated from the climatic trajectories within which they are implemented. The problem is equally temporal: ecological restoration unfolds through rhythms measured in years or decades, while climatic conditions continue to shift throughout the lifespan of the intervention itself. Moreover, these transformations are not neutral, as numerous studies have shown that successful greening strategies may also trigger profound socio-economic consequences. New amenities frequently become drivers of real-estate appreciation, increasing property values and living costs, while progressively excluding precisely those communities already more affected by climate change³⁰. Ecological improvement, social justice and urban regeneration do not automatically coincide, particularly where available public space is limited and environmental interventions inevitably redistribute opportunities, investments and forms of access. These observations are not meant to diminish the importance of Nature-based Solutions, rather, they aim to help clarify the conditions within which they can meaningfully contribute to adaptation. The question gradually shifts from how to preserve familiar ecological configurations to how existing landscapes can continue to evolve when the climatic conditions that originally sustained them are progressively disappearing. It is within this displacement that another possibility begins to emerge: not simply mitigating aridity, but considering it as one of the new environmental conditions through which future urban landscapes will increasingly have to be reimagined.

Embracing Aridity as a New Adaptive Trajectory

Within contemporary debate, this transition is producing increasingly differentiated responses, that have already, substantially, modified the environmental agenda of urban design, progressively moving attention from exclusively technological responses towards the active role of soils, vegetation, water and ecological processes within the city. Their contribution has been fundamental in demonstrating that climate adaptation cannot be reduced to engineering performance alone, but depends upon the capacity of urban landscapes to recover ecological functions that 20th urbanisation had often marginalised. Much of this work, however, continues to develop around a common, latent, premise: environmental quality remains mainly associated

²⁹Seddon, N., Chausson, A., Berry, P., Girardin, C. A. J., Smith, A. and Turner, B. 2020. Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Philosophical Transactions of the Royal Society B*, 375, 1794, 20190120. (Jan. 2020). DOI: doi.org/10.1098/rstb.2019.0120

³⁰See, amongst many others: Anguelovski, I., Connolly, J.J.T., Cole, H. et al. 2022. Green gentrification in European and North American cities. *Nature Communications*, 13, 1, 3816. (Jul.2022). DOI:doi.org/10.1038/s41467-022-31572-1

1 with permanent greenery and ecological stability, even if it means that
 2 adaptation would come to coincide with increasingly sophisticated ecological
 3 strategies, rather than questioning the environmental assumptions upon which
 4 they originally developed. Irrigation systems become more complex,
 5 maintenance intensifies, soils require continuous technical support and planting
 6 schemes demand constant adjustment in order to preserve ecological balances
 7 established under different hydro-climatic conditions. None of these practices
 8 should be interpreted negatively, *a priori*, as maintenance has always
 9 represented one of the principal instruments through which landscapes survive
 10 their own history, particularly within historic European cities, where care has
 11 never been ancillary to their constitutive dimensions. What increasingly
 12 emerges, however, is a gradual displacement of its role, no longer solely the
 13 companion of an ordinary evolution, but progressively compensating for the
 14 growing distance between different realities and necessities of the living
 15 systems. The distinction may appear subtle, yet it profoundly changes the
 16 meaning of adaptation. Preserving existing landscapes remains indispensable,
 17 yet at the same time, they are becoming progressively more unstable than ever.
 18 The project is therefore confronted with two equally legitimate but increasingly
 19 divergent objectives: preserving inherited ecological configurations and
 20 responding to climatic trajectories that no longer necessarily sustain them. This
 21 opens to a possible different understanding of adaptation, one in which
 22 changing environmental conditions may become part of the transformation
 23 rather than something to be continuously counteracted. Roggema's elucidation
 24 of dry urbanism describes this through three trajectories: reversing, coping and
 25 embracing³¹. The first seeks to restore previous conditions through ecological
 26 and technological intervention; coping attempts to improve the capacity of
 27 existing landscapes to withstand increasing climatic stress; embracing, by
 28 contrast, accepts aridity as a condition with which the project is expected to
 29 work and incorporate rather than compensate for. This distinction matters less
 30 as a taxonomy than as a change in the object of adaptation. If reversing and
 31 coping ask how a landscape can remain within a recognisable environmental
 32 regime, embracing asks what happens when that regime can no longer be
 33 assumed as the horizon of the project. Aridity is no longer something that the
 34 landscape has to resist in order to remain what it was; it becomes one of the
 35 conditions through which what the landscape can become is negotiated. Its
 36 relevance does not lie in the definition itself, nor in a conceptual superiority
 37 compared to other strategies, as they in fact describe three different and
 38 potentially complementary ways of positioning design in relation to
 39 environmental issues. It introduces a shift, that unravels through a different
 40 way of conceiving the project itself. If aridity is understood not simply as an
 41 environmental constraint but as a possibility to reshape the way landscapes are
 42 conceived and built, the project can move beyond preserving inherited
 43 configurations and the cultural frameworks through which they continue to
 44 acquire meaning and create new ecological balances within changing climatic

³¹Roggema, R. (Ed.). 2024. *Dry Urbanism. Designing for Drought in the City*. Springer.

conditions. The point is not the introduction of new species into new locations, but the gradual reformulation of a culture from within its own geography, opening the possibility for new ones to emerge rather than simply reproducing those already associated with arid environments. Beth Chatto's Gravel Garden, established in 1992 on one of the driest sites in eastern England, represents one of the earliest and still most influential examples of this shift. The project originated from a simple inversion, quite significant for a horticultural tradition historically associated with abundance, permanence and the uninterrupted reproduction of favourable conditions. Rather than correcting local settings through irrigation, planting was organised around the site's existing hydrological regime, allowing soils, species and seasonal cycles to establish a relatively stable equilibrium with limited external intervention. Water was not eliminated, but reassigned a different role, so was design, and once establishment had taken place, ecological continuity no longer depended upon its continuous artificial supply. Comparable question reappears few years later at the *RHS Hyde Hall Dry Garden* (Chelmsford, UK, 2001), although under different premises. Here the issue was no longer confined to the drought tolerance of individual species, but extended to the future of British horticulture itself as climatic conditions progressively diverge from those within which it developed. Planting trials did not seek to reproduce landscapes belonging to other climatic regions, such as the Mediterranean, rather they explored how existing traditions may continue to evolve where dryness had never constituted the ordinary premise of design.

Figure 4. *"A touch of frost in the Dry Garden." RHS Garden Hyde Hall during winter*



Source: www.facebook.com/rhshydehall (21/01/2020).

A similar approach can be observed in a growing number of experimental gardens developed across Europe over the last two decades, with implications that become broader as it moves beyond the private garden and into the wider

urban domain. At the Krämeracker Primary School in Switzerland, for instance, a playground of gravel, sand and stone provides spaces for gathering and movement while allowing the ecological and seasonal differences of the site to remain visible. Although not conceived as a response to drought, its material language draws from characteristic features of the surrounding territory and its mining tradition, incorporating surfaces that would conventionally be perceived as sterile rather than replacing them with continuous vegetation. The project therefore introduces a first shift in what landscape can be expected to provide: ecological and spatial value no longer necessarily depends upon abundance, nor upon the continuous presence of vegetation. A second shift emerges when this principle moves from the acceptance of sterile conditions to that of a less ordered landscape. In Grønningen-Bispeparken in Copenhagen, grass-covered depressions, native planting, wilder areas and changing water levels deliberately interrupt the uniformity of the former lawn. What might otherwise be read as neglected or unfinished becomes part of the way the park works and changes over time. Variation no longer represents an incomplete stage towards a stable maturity, but becomes one of the ordinary conditions through which urban green spaces are experienced and maintained. Although differing considerably in composition, maintenance regimes and botanical choices, the two projects move away from the expectation of permanent visual completion, each unsettling a different premise of the conventional landscape: the first, that abundance is a condition of quality; the second, that order is a condition of care. The comparison with cities already shaped by aridity becomes relevant from here, where scarcity and fluctuation have historically participated in the organization of space, rather than appearing later as conditions that existing landscapes have to accommodate, such negotiations between environmental variability and the organization of urban space have a much longer history.

North VS South: From Xeriscaping to Landscaping

The comparison with southern cities is relevant not to offer a ready-made response to the climatic transition, but because they expose a different relationship between environmental variability and landscape production. The projects discussed above begin to loosen some of the assumptions through which landscapes of the North have traditionally been constructed and maintained: abundance as a condition of quality, continuity as a condition of ecological value, and order as a visible expression of care. In Mediterranean contexts, these premises have historically been less stable. Water scarcity, seasonal dryness and fluctuating environmental conditions have participated more directly in the organisation of urban and cultivated landscapes, making adjustment part of their ordinary functioning rather than a distinct adaptive operation. This difference should not, however, be understood as a distinction between landscapes that know how to adapt and landscapes that do not. Contemporary drought is also challenging southern cities, where as much as the Global North, planting systems and water infrastructures established during

1 the 20th century are increasingly confronted with conditions beyond those for
 2 which they were conceived. What differs, is the role aridity has played in
 3 shaping these landscapes through a longer process that can still be traced in
 4 contemporary projects, where adaptation does not necessarily appear as a new
 5 environmental layer, but as the reorganisation of relations already existing in
 6 the city. In Cartuja Qanat, Seville (Servando Álvarez Domínguez, 2018–2022),
 7 the qanat is brought back into the contemporary city as part of a system,
 8 combining water circulation, air movement and shade, recalling a form of
 9 environmental adjustment in which climatic comfort was produced through the
 10 interaction of several elements rather than through the continuous consumption
 11 of water to sustain vegetation. In Porxos d'en Xifré, Barcelona (Sergio
 12 Carratalá & MataAlta Studio, 2019), an unused rooftop is transformed into a
 13 Mediterranean dry garden, combining wild planting, cultivation and spaces for
 14 everyday use with rainwater collection and energy production. The roof
 15 becomes productive and inhabited while accepting a drier and less
 16 homogeneous vegetation, showing how the reduction of water consumption
 17 can coincide with a different spatial and social use of the landscape rather than
 18 with its impoverishment. The same attitude can be recognized in the green roof
 19 of the Greek Ministry of Economics and Finance in Athens (2008), that moves
 20 this relationship into the building itself, where vegetation contributes to
 21 thermal performance and therefore participates directly in the environmental
 22 functioning of the structure. The same possibility extends beyond the question
 23 of dryness itself, towards situations in which the landscape is allowed to
 24 remain open to processes that have not yet reached a definitive condition.
 25 Jardins d'Emma, Barcelona (EMF – Estudi Martí Franch, 2014–2016),
 26 occupied the former Germanetes site while its future was still being negotiated.
 27 Its temporary occupation, more than simply a provisional solution, became a
 28 way of allowing the site to acquire uses and meanings during a period in which
 29 its final form could not yet be determined. In Junk to Park over Ancient Athens
 30 (doxiadis+, 2011), the uncertainty was inherent to the archaeological condition
 31 of the site, awaiting future excavation. Demolition materials were retained and
 32 reused, while the construction of the park involved local inhabitants and
 33 volunteers. The intervention did not attempt to erase this condition in order to
 34 produce a finished landscape, but it worked through it, allowing the place to
 35 become part of the neighbourhood while remaining open to a future
 36 transformation. What these projects make visible is a different position from
 37 which the landscape can be transformed. In each case, something that could
 38 have remained a limitation, a residual condition or a secondary function
 39 becomes part of the project: the circulation of air, the dryness of a roof, the
 40 temporary character of a site, the material already contained in the ground, or
 41 the thermal behaviour of a building. The intervention does not necessarily add
 42 an ecological component to an otherwise unchanged spatial structure. It allows
 43 existing conditions to acquire a different role, and in doing so makes the
 44 boundary between adaptation and ordinary less clear. The southern experiences
 45 considered here therefore extend the question beyond the survival of vegetation
 46 or the capacity of a landscape to withstand drought. Xeriscaping has made

1 water availability a central criterion in reconsidering what can be planted and
 2 maintained, but these projects suggest that the implications of aridity can
 3 extend beyond the planting itself, affecting the organisation and use of space.
 4 They show how water, ground, materials, buildings and patterns of use can be
 5 brought into relation as the conditions under which they operate continue to
 6 change. The same climatic condition can acquire different meanings within
 7 landscapes shaped by different relationships between environmental conditions
 8 and urban life. What may appear as deterioration in one context may already
 9 belong to the ordinary functioning of another, while what requires a deliberate
 10 project in one geography may be embedded in the material organisation of
 11 another. Aridity thus becomes a way reconsidering a familiarity progressively
 12 destabilised by effects of climatic change that cannot be entirely understood
 13 through what physically changes within the landscape.

14
 15 *More Than the Eye Can See*
 16

17 The alteration of environmental conditions does not immediately produce
 18 a different image of the city. Parks remain parks, gardens remain gardens, and
 19 streets continue to be inhabited as streets, while the conditions that had made
 20 their appearance ordinary become progressively less certain. What changes
 21 first may therefore be almost imperceptible: a lawn that dries earlier, a tree
 22 canopy that becomes less continuous, soils that remain exposed for longer
 23 periods, or vegetation that follows a different seasonal rhythm. These
 24 variations may appear limited, yet they acquire a different significance once
 25 they are read against the expectations accumulated around a place. Landscapes
 26 have always changed in advance of the meanings through which they were
 27 later understood. New agricultural practices, unfamiliar species, public parks
 28 and infrastructures gradually became part of everyday experience through their
 29 repetition, use and representation, until their contingent origins were no longer
 30 visible. The present transition reopens this interval under different conditions.
 31 Environmental changes are now taking place within the lifetime of landscapes
 32 and expectations formed under another climatic regime, so that the processes
 33 through which new conditions could once become ordinary are increasingly
 34 compressed. This helps explain the uneasiness produced by changes that are
 35 not necessarily signs of ecological failure. A lawn becoming brown, a canopy
 36 becoming more open or a planting scheme following a different seasonal
 37 rhythm may still belong to a functioning landscape, while being experienced as
 38 evidence that something has gone wrong. The landscape can therefore begin to
 39 operate according to another ecological rhythm while continuing to be read
 40 through the previous one. What is disrupted is not necessarily its capacity to
 41 support life, but the correspondence between its appearance and the conditions
 42 through which that appearance had acquired meaning. Lingiardi's notion of
 43 *mindscapes*³² helps to frame this relationship: places are sedimented within
 44 memory and experience, and these accumulated landscapes in turn shape the

³²Lingiardi, V. 2017. *Mindscapes. Psiche nel paesaggio*. Raffaello Cortina Editore

way new conditions are perceived. We do not encounter them independently from what has already taught us what a landscape should look and feel like. López-Piñero's reflection on the orange sky produced by contemporary wildfires³³ describes a similar distance between the phenomenon and the categories through which it can be understood. The colour is immediately visible, yet its meaning remains unsettled because the images through which the sky has historically been perceived have not changed at the same speed. Something similar occurs when drought alters landscapes whose appearance had long been taken for granted. What is perceived as decline may already belong to another environmental condition, while the image through which it is judged remains attached to the previous one. Granata's argument on new imaginaries³⁴ is useful here because their emergence does not necessarily depend on the production of new forms. Existing places may acquire different meanings as they are gradually experienced, used and represented differently. A landscape that dries seasonally, becomes more heterogeneous or relies less on irrigation may therefore continue to be recognised even as its appearance and functioning shift. The question is whether these differences can become familiar while the context is still unsettled, rather than being immediately read as departures from an established image. This may leave some elements to disappear, others to be altered, and others to take on roles that were previously secondary, without turning transformation into a rupture with what was already there.

Rethinking Permanence: From Old to New Perspectives

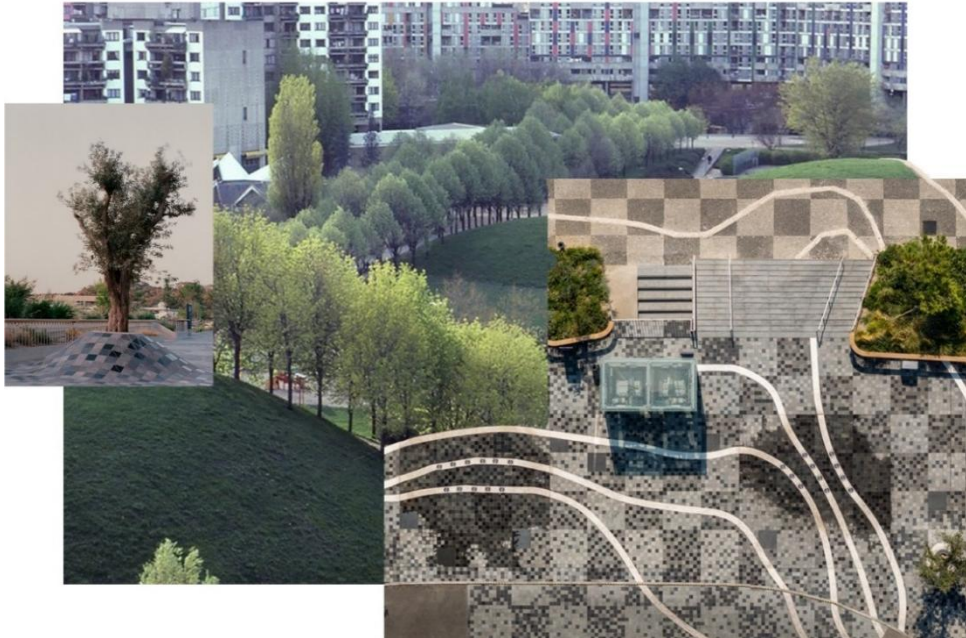
Aridity has gradually ceased to identify a geographical condition alone and has become a way of interrogating the European landscape at the moment in which one of the premises that silently accompanied its historical formation can no longer be taken for granted. The observation in *The Coming Insurrection*³⁵ that a world begins to dissolve when the forms through which it is collectively experienced no longer succeed in organizing reality offers, detached from its original political argument, an unexpected parallel. The streets, the parks and the gardens do not disappear, the correspondence between their forms and the circumstances that once made them ordinary does, and this distinction is central to understanding the present transition.

³³López-Piñero, S. 2024. What is the Color of the Wildfire Orange Sky? An Outline for an Aesthetic Sensibility under Climate Change. In Atak, T., Callejas, L., Scelsa, J. A. and Tandberg, J. (Eds.) *Pedagogical Experiments in Architecture for a Changing Climate*. Routledge. 31-43.

³⁴Granata, E. 2021. *Placemaker. Gli inventori dei luoghi che abiteremo*. Einaudi.

³⁵The Invisible Committee. 2009. *The Coming Insurrection*. Autonomedia.

1 **Figure 5.** “Changing imaginary”: A collage mixing two different projects, to
 2 show opposite approaches shaped by different climatic and temporal contexts
 3 in recreating local topography. In Parc Jean Verlhac (Grenoble, France.
 4 1974) Michel Corajoud uses ground reshaping and vegetation, while in Astir
 5 Marina and Public Realm (Vouliagmeni, Athens, Greece. 2024) Neiheiser
 6 Argyros uses pavements and textures



7
 8 Source: author's elaboration. pictures from www.landscapetheory1.wordpress.com (no date
 9 available) and www.ladezine.com (2025).

10
 11 Permanence has long represented one of the implicit values through which
 12 European cities have been recognised. Especially vegetative abundance and
 13 green continuity have contributed to this sense of stability, although none of
 14 these landscapes has ever been truly static. What makes the present transition
 15 different is the speed at which these changes are occurring, leaving less time to
 16 absorb them and for new arrangements to become ordinary. Irrigation,
 17 engineered soils and intensified maintenance can still sustain their established
 18 appearance, but only by compensating for circumstances that no longer support
 19 it in the same way. This makes the preservation of familiar landscapes
 20 ambiguous, and may become increasingly difficult to sustain without
 21 reconsidering what is expected to remain untouched. The difficulty lies in
 22 recognising these changes before they can be read as a loss. A landscape that
 23 no longer reproduces the same degree of greenery, order or seasonal continuity
 24 may still retain the structures and meanings through which it has been
 25 experienced, while acquiring other forms of ecological and social functioning.
 26 What was previously understood as a temporary deviation may gradually
 27 become part of its ordinary rhythms. Permanence may consequently give way
 28 to persistence, not as its opposite, but as a different way of understanding
 29 continuity when the circumstances that have sustained a landscape can no
 30 longer be taken for granted. Persistence does not require the conservation of a

particular state, but the possibility for something to continue while changing with what surrounds it. In consolidated cities, this means that continuity may reside in the capacity of existing structures to accommodate a different distribution of water, vegetation, shade, use and maintenance, rather than in their ability to reproduce their previous appearance. A mature tree may remain while the planting beneath it changes; a public space may retain its structure while parts of its vegetation become seasonal; a ground surface may acquire ecological or social functions that were previously secondary. What persists is therefore not necessarily the component itself, but the role that the landscape continues to play. The projects considered in the paper have made this shift visible in different ways. They do not belong to a single category, and not all of them were conceived as responses to aridity, but they share the possibility of questioning diffuse assumptions, sometimes deliberately and in others because they are simply no longer necessary for the space to function. What follows from this is not suggesting a general reduction of intervention, but has consequences on what is restored and what is allowed to change. When water becomes less available, the choice is not between maintenance and abandonment, it concerns where labour and resources are spent, and which parts of an inherited landscape are considered worth sustaining. The shift is therefore also a shift in what is considered normal: a dry lawn, exposed soil or a less ordered planting may initially appear as evidence that something is missing. If these conditions become recurrent, however, they may cease to be read only against the image of what was there before. This is not a matter of making decline desirable, but of allowing other forms of use, vegetation and seasonal variation to become part of the expectations attached to a place. A change of paradigm may begin here, with the possibility of designing and caring, for places in the city itself, without assuming that every alteration needs to be corrected, restored or compensated for, but also without treating the past as something to be left behind. This is what it may mean to inhabit change itself, and to let aridity become part of the way consolidated cities continue to evolve.

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