

Urban Aquaculture

**Water-sensitive transformation of cityscapes
via blue-green infrastructures**

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"Water is a source of life, power, comfort, and delight,
a universal symbol of purification and renewal.
Like a primordial magnet, water pulls at a primitive and deeply rooted part of human nature.
More than any other single element besides trees and gardens,
water has the greatest potential
to forge an emotional link between man and nature in the city."

Anne Whiston Spirn (1984)

*Für meine Eltern
Doris und Kurt*

*For my parents
Doris and Kurt*

ABSTRACT

Parallel growth and shrinkage challenges cities and their citizens globally regarding a sustainable transformation of infrastructures and life-styles. Facing local fresh water, food and everyday resource provision the question arises, how can human- and ecosystem-related livelihoods and life-qualities be regenerated in a multifunctional manner? Water as a universal medium of life, transport and creation plays a key role within this change process.

The present publication links natural and cultural questions relating to actual challenges of a water-sensitive city and landscape development. By starting with the relevance of water in its hybridity as a natural landscape element, cultural infrastructure, and the cradle of the city, the study researches characteristic facets of an urban aquaculture. It broadens the classic understanding of aquaculture by linking different perspectives from ecology, technology, design, history and future of the city and landscape. By supplementing the original meaning, the *water-farming culture* and part of agriculture, it integrates facets of *water-life culture* and *water-wellbeing culture* into an urban image of aquaculture.

Types of contemporary and traditional aquacultural infrastructures are the central research subject. Through their blue-green services (regeneration of freshwater, food, biodiversity) they are newly interpreted as specific blue-green infrastructures. In addition to the classic forms of water-farming (swimming gardens, fish ponds or water-farm greenhouses), the research investigates other types of urban water-wellbeing (bathing ships, urban river pools). Empirical case studies illuminate facets of an urban aquaculture at a citywide scale. The focus is on everyday life dealing with technical infrastructure and the accompanying, visible and invisible, physical landscape change. Furthermore, typological case studies investigate multifunctional design and service potentials of natural and cultural benefit at a project scale. These include characteristics such as effective use of space and resources through combined water and food production, the flexibility of design or possibilities of participation and applied learning along with infrastructural design and management processes. As a result, the types of blue-green infrastructure explored are highlighted as building-blocks and catalysts of water-sensitive urban development. The research concludes with an outlook on future challenges and fields of action and further research on a sustainable urban aquaculture. Possibilities of a further qualification at the design-built level of *aquitecture* and participative-communicative level of *aquupuncture* are addressed.

The study creates a practice-oriented knowledge base for integrated planning and design processes at the interface between urban design, multifunctional everyday infrastructures and landscape ecosystem services. It provides important impulses for cross-cultural dialogue in the sense of a learning-from by linking local knowledge and contemporary know-how.

ZUSAMMENFASSUNG

Paralleles Wachsen und Schrumpfen stellt Städte und ihre Bewohner weltweit vor Herausforderungen eines nachhaltigen Infrastruktur- und Lebensstilwandels. Im Hinblick auf die lokale Versorgung mit Frischwasser, Nahrung und alltäglichen Ressourcen stellt sich die Frage, wie menschliche und ökosystembezogene Lebensgrundlagen in multifunktionaler Weise regeneriert werden können. Wasser als universelles Lebens-, Transport- und Gestaltungsmedium übernimmt hierin eine Schlüsselrolle.

Die vorliegende Publikation verbindet natur- und kulturbezogene Fragestellungen angesichts aktueller Herausforderungen wassersensibler Stadt- und Landschaftsentwicklung. Ansetzend an der Bedeutung des Wassers in seiner Hybridität als natürliches Landschaftselement, kultureller Infrastruktur und Wiege der Stadt, erforscht die Arbeit charakteristische Facetten urbaner Aquakultur. Durch die Verknüpfung verschiedener Blickwinkel von Ökologie, Technologie, Design, Geschichte und Zukunft von Stadt und Landschaft erweitert sie dabei das klassische Verständnis von Aquakultur. Ergänzend zur originären Bedeutung, der „Wasser-Farmkultur“ und Teil der Agrikultur, integriert sie die Facetten „Wasser-Lebenskultur“ und „Wasser-Wohlfühlkultur“ in das städtische Bild von Aquakultur.

Zentraler Untersuchungsgegenstand sind zeitgenössische und traditionelle Aquakultur-Typen. Durch ihre blau-grünen Leistungen (Regeneration von Frischwasser, Nahrung, Biodiversität) werden sie als spezifische blau-grüne Infrastrukturen neu interpretiert. Neben klassischen Formen des Water-Farmings (schwimmende Gärten, Fischteiche oder Wasserfarm-Gewächshäuser) werden weitere Typen eines urbanen Water-Wellbeings (Badeschiffe, Flussbäder) beforscht. Empirische Fallstudien beleuchten auf der gesamtstädtischen Ebene Facetten einer urbanen Aquakultur. Fokussiert wird der alltäglich lebensweltliche Umgang mit technischer Infrastruktur und der begleitende, sicht- und unsichtbare, physische Landschaftswandel. Ergänzend untersuchen typologische Fallstudien auf der Projektebene multifunktionale Design- und Servicepotenziale mit natur- und kulturbezogenem Mehrwert. Dazu zählen Eigenschaften wie die effektive Raum- und Ressourcennutzung durch die kombinierte Wasser- und Nahrungsmittelproduktion, die Flexibilität des Designs oder Möglichkeiten der Partizipation und des angewandten Lernens bei infrastrukturellen Gestaltungs- und Managementprozessen. Im Ergebnis werden die untersuchten Typen blau-grüner Infrastruktur als Bausteine und Katalysatoren wassersensibler Stadtentwicklung herausgestellt. Die Arbeit schließt mit einem Ausblick auf künftige Herausforderungen, Handlungs- und Forschungsfelder einer nachhaltigen urbanen Aquakultur. Addressiert werden Möglichkeiten der weiteren Qualifizierung auf baulich-gestalterischer Ebene einer „Aquatектur“ und auf partizipativ-kommunikativer Ebene einer „Aquapunktur“.

Die Arbeit schafft eine praxisorientierte Wissensbasis für integrierte Planungs- und Gestaltungsprozesse an der Schnittstelle zwischen Stadtgestaltung, multifunktionalen Alltagsinfrastrukturen und landschaftlichen Ökosystemdienstleistungen. Es liefert wichtige Impulse zum kulturübergreifenden Dialog im Sinne eines Voneinander-Lernens, in dem es lokales Wissen mit zeitgemäßem Know-How verknüpft.

PREFACE

URBAN AQUACULTURE IN LANDSCAPE PLANNING AND URBAN DESIGN

The adaption and reconstruction of infrastructure systems is a key area of action in post-industrial cities throughout the world. Decentralization approaches, the search for multifunctional infrastructure systems, globalized production and consumption patterns of national resources and nutrition are culturally and planning driven processes that have and will continue to shape our cities in the future. Within this, the future development of cities cannot be discussed without taking water as resource for households, agriculture and industry into account. Water is a basic and global resource for mankind, which cannot be replaced. With more people than ever living in cities, water is an urban issue. Challenges such as resource shortages, flooding, supply security, and conflicting land and water uses can be met via the creation of innovative water infrastructures to adapt to changing climate and demographics and sustainable use of (waste) water-related resources.

Within this context, the research work of Grit Bürgow offers an enriching perspective on water – not only as a basic resource and amenity for urban life, but also as a landscape and design element within technical and cultural infrastructures of cities. She puts local water resource management at the beginning of a rethinking of water usage and the redesign of urban water infrastructure. She aims to redefine an AQUACULTURE as a potential for future urban design and landscape planning, as well as community building.

The term aquaculture originally describes a farming process integrating the growing of aquatic flora and fauna species. AQUACULTURE in Bürgow's understanding means much more: It incorporates manifold ways of water usage in everyday city life, with a special focus on the historic use of water(ways) for fishing and shipping goods, urban bathing and swimming culture. She considers aspects of integrated water and natural resource management, as well as potential for the implementation of blue-green infrastructure to food and biomass production within the city. Here, she cites a number of international examples and reflects on their potential for implementation to the urban context.

Obviously, the history of cities throughout the world is linked to water supply. Waterways were key settings for the foundation and development of human settlements. They have shaped city morphologies, basic infrastructure and resources for transport, manufacturing, and food production. The research presented revives an integrated concept of water usage: as an energy source, for urban food production, and as an urban amenity. This could initiate a discussion on the future role of water in urban development. It is a discussion that goes beyond the well known waterfront development and rain water management initiatives. The role of behavioral patterns and knowledge is addressed. Water is still taken for granted in Western cities. Bürgow's research also aims to present ways in which a more conscious perception and resource-conserving use of water could be reached through an engaging and participatory implementation of water infrastructure. It makes clear that sustainable development of cities can only happen based on the everyday and enhanced knowledge and actions of people. Bottom-up initiatives can already be seen in Western cities, including Berlin. In some cases, this bottom-up

activism and modus of the self-made city is backed up by scientific research and fostered by official city and landscape planning programs.

Bürgow not only analyzes approaches and ways towards an Urban AQUACULTURE, but she also identifies a number of challenges to overcome on the level of governance, implementation of relevant legal provisions, physical design, and stakeholder communication and participation. Potentials and challenges are the starting point for two strategic recommendations Bürgow entitles "Design-build strategy: Aquatecture" and "Participatory process strategy: Aquapuncture". The two strategies are at different levels: Aquatecture addresses architectural and urban design, while Aquapuncture highlights (temporary) spatial experiments and approaches to (built) environment participation and education.

Both approaches require a spectrum of skills and knowledge necessary for planners and designers. There is a need to be able to work and communicate across professional boundaries and with diverse groups. Urban aquaculture planning and design is a medium-sized multidisciplinary practice bringing together the skills of architects, planners and other types of designers and infrastructure engineers towards more dynamic, creative work that does not necessarily fit the definition of urban and landscape planning.

Bürgow's research offers a profound basis for this work, giving detailed information, drawing a thematic background and depicting case studies in text, quantitative data, and figures. She connects her knowledge as a researcher and her professional experiences in water infrastructure design and management. This book is a worthwhile read for the scientific community as well as for practitioners.

In the future, a number of stakeholders will be city builders of resource-efficient and livable neighborhoods. By debating Urban Aquaculture regarding its potentials and rich facets, a common and visionary understanding of water use, management, planning and design can be fostered.

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