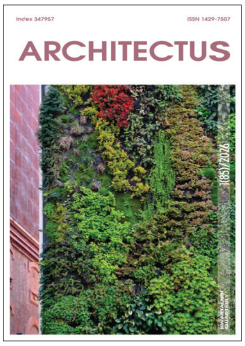

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Design and construction of the first Polish urban aquaponic farm – case study

Abstract

The article presents a case study on the design of an urban aquaponic farm in Poland. Such a farm was established in Wrocław as part of the research and implementation project Urban Stormwater Aquaponic Garden Environment (USAGE), financed by the state budget under the Applied Research Programme and by Norwegian Funds (Norway Grants). The planning and design of the farm was a multi-stage process that can be categorized into three main groups: (1) technological requirements of aquaponics, (2) public engagement, and (3) creativity and design expertise (urban and architectural). The described process resulted in the design and creation of the farm as a public space in the city, consisting of a composition of three modified shipping containers and additional elements, which – beyond its primary technological function – also serves as a meeting place and an educational venue.

Key words: aquaponics, sustainable food production, urban agriculture, water circulation, New European Bauhaus

Introduction

In recent years, the growing interest in urban food production systems has been embedded within broader environmental, climatic, and economic transformations. Ongoing urbanisation, climate change, the degradation of natural resources, the instability of global supply chains, and the increasing vulnerability of logistical systems to geopolitical crises have led to a situation in which local models of food production are gaining importance not only in ecological terms, but also as a matter of strategic relevance. In the academic literature, these phenomena are examined within the frameworks of concepts such as urban agriculture, vertical farming, glocalism, and the idea of so-called edible cities (or edible settlements) (Mougeot 2005; Despommier 2010; Viljoen, Bohn 2014; Barthel, Parker and Ernstson 2015).

Glocalisation, understood as the coexistence of global and local processes, emphasises the growing role of local production systems in enhancing the resilience of urban structures (Eigenbrod, Gruda 2015). Within this perspective, the food system ceases to be viewed solely as an economic sector and instead begins to be interpreted as a component of the city's critical infrastructure. Concepts of urban resilience and crisis resilience indicate that the capacity for local, stable, and scalable food production is becoming a key element in cities' adaptation to environmental, economic, and social uncertainties (Latawiec et al. 2014).

An important context for the development of urban farms is also provided by the concept of the circular economy, which redefines the ways in which resources, waste, and material flows are understood (Geissdoerfer et al. 2017). Aquaponic systems constitute a model example of the integration of biological and technological processes within closed cycles of matter and water, minimising resource losses while reducing the demand for synthetic fertilisers (Goddek et al. 2019). At the same time, they align with the concept of sitopia, which emphasises the systemic role of food in shaping the spatial and social structures of the city (Steel 2008).

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The development of urban food systems is also analysed within the frameworks of concepts such as food safety, food security, and food sovereignty, which emphasise the importance of local control over food production, availability, and quality (Lansdown 2011). In response to these challenges, contemporary cities are increasingly formulating their own food strategies (including Milan, Ghent, and Wrocław), integrating issues of production, logistics, environmental sustainability, and public education (Morgan, Sonnino 2010).

The significance of local food systems extends beyond technological considerations, encompassing cultural and social processes as well (Specht et al. 2014). Concepts such as slow food, which promote regionality, transparency, and the shortening of supply chains, as well as notions of neomedievalism – interpreted as a return to local, decentralised production structures – indicate a growing interest in models of self-sufficiency and independence. In this context, urban food production becomes part of a broader socio-spatial transformation (Viljoen, Bohn 2014).

The issue of food self-sufficiency extends beyond cultivation itself, encompassing the availability of water, energy, and raw materials required for fertiliser production. Under conditions of increasing pressure on natural resources and the instability of commodity markets, particular importance is attributed to technologies that enable the integration of cycles of matter, water, and nutrients within local production systems.

Against this background, aquaponics emerges as a solution that combines high resource efficiency, the ability to control the production environment, and the potential for implementation in urban conditions. Aquaponics is a food production system that integrates the cultivation of aquatic organisms with plant production in a controlled environment (Somerville et al. 2014). Fish provide nutrients that are transformed by microorganisms and utilised by plants as fertiliser, while plants and biofilters improve water quality, enabling its recirculation. This integration allows for efficient resource use, a significant reduction in water consumption, and a limitation in the use of synthetic fertilisers.

The urban aquaponic farm described in this article constitutes a case study demonstrating the potential of such solutions in the context of contemporary environmental and urban challenges. The project may be interpreted as an experimental attempt to implement the principles of the circular economy, urban resilience, and local food production within real urban conditions. Its significance extends beyond the technological dimension, encompassing spatial, social, infrastructural, and environmental aspects, and thereby providing an empirical contribution to the discourse on the role of urban food systems.

Container-based aquaponic farms – selected examples

One of the earliest projects of this type was Micro-Farms by Damien Chivialle, developed as part of the Mediamatic initiative in Amsterdam (Triboli, Chivialle 2025; Farhangi et al. 2020). The project is based on a standard shipping container equipped with an aquaponic system, while a greenhouse structure is installed on its roof. The entire installation functions as an autonomous food production module, operating within the urban environment as both a productive and educational unit.

A similar concept is developed in the British project GrowUp Box, which involves the adaptation of a shipping container into an urban farm combining fish cultivation with plant production in a hydroponic system (Garcia Menocal 2013; Crepeau 2014). The project is characterised by a compact layout, full water recirculation, and the use of renewable energy sources. Its aim was to create a scalable prototype that could be replicated within urban environments.

In turn, the Berlin-based example described in the article "Efficient City Farming" presents the adaptation of shipping containers as elements of infrastructure supporting urban agriculture and environmental education (Slow Travel Berlin 2013). In this approach, the container becomes a tool for experimentation, technological demonstration, and the development of ecological awareness within conditions of limited urban space.

All of the aforementioned projects confirm the potential of container-based architecture as a tool for integrating productive, educational, and social functions. The urban aquaponic farm in Wrocław described in this article develops these premises further by adapting container-based solutions to the local urban, climatic, and social context, and by employing them as part of a broader urban food strategy and a tool for enhancing urban resilience.

The Urban Stormwater Aquaponics Garden Environment (USAGE) project constitutes an interdisciplinary and international initiative implemented between 2021 and 2024, aimed at developing two aquaponic installations – located in Wrocław and Oslo. In both locations, multifunctional spaces were created, designed to support ecological food production, education, and integration with stormwater collection and treatment systems. A key premise of the project was the planning of an urban farm based on the expectations of local communities as well as specific urban conditions. In addition to production facilities, environmental education centres were established, along with new spaces for social interaction and activity within the city's green areas. As part of the project, a scalable model for urban farming was also developed, enabling its future implementation by municipalities as well as small and medium-sized enterprises. The project was funded by the state budget under the Applied Research Programme and by Norwegian Funds (Norway Grants).

Methods

The article is based on a qualitative research approach, with the case study serving as its primary methodological framework. This method is widely applied in urban, architectural, and environmental research, particularly in the analysis of complex, context-dependent spatial phenomena and innovative design solutions. The case study approach enables an in-depth examination of a phenomenon within its real functional, technological, and social context, integrating diverse sources of data.

The application of the case study method is justified by the nature of the project under consideration, which is experimental and prototypical, and strongly embedded in local conditions. The analysed object does not represent a typical solution, which limits the applicability of quantitative and comparative methods. Instead, this approach enables the reconstruction of the design process, the identification of key decisions, and the analysis of relationships between technology, space, and users. The study was exploratory and qualitative in nature.

The basis of the analysis is an urban aquaponic farm located in Wrocław, developed as part of a research and implementation project. The subject of the study includes both the physical structure itself and the processes of its planning, design, and realisation. The analysis encompasses spatial, technological, organisational, and social conditions. The case study includes an examination of the site at two scales: urban and local. At the broader scale, the analysis considers the farm's position within the functional and spatial structure of the city, its relationships with urban infrastructure, and its accessibility. At the local scale, attention is given to the immediate surroundings, solar exposure conditions, visual connections, and the character of the space in which the facility is situated. To illustrate the spatial context, cartographic methods were employed, in particular location maps presenting the position of the site within the urban structure. These maps serve both analytical and interpretative functions, enabling the assessment of relationships between the investigated development and the broader urban layout.

The design and implementation process was monitored at all stages by the authors involved in the project. The observation focused on spatial, functional, and technological aspects, as well as on interactions between participants in the investment process. Due to the direct involvement of the research team in the design and implementation of the farm, the study also exhibited characteristics of participant observation.

At the conceptual stage, individual interviews were conducted with representatives of the project's stakeholders. The aim was to identify their expectations, needs, and perceptions of the planned investment within the urban context. This method enabled the identification of qualitative factors such as spatial perception, social acceptance, and the expected functions of the facility.

An important component of the research process was systematic photographic documentation covering successive stages of the farm's construction and operation. The visual material served as a source of research data, enabling the analysis of the relationship between the object and its surroundings, its architectural form, and patterns of spatial use.

The applied approach is interdisciplinary in nature, integrating design, spatial, and social perspectives. Qualitative methods are particularly justified in this case, as the subject of analysis is the design process itself, as well as the complex relationships between technology, the urban environment, and users.

Planning of a modular aquaponic farm in Wrocław

Location

The project was planned within an urban environment, as determined by its functional and conceptual premises. Due to the need to integrate food production with urban infrastructure and ensure access for end users, a location within a large city represented the most justified solution. Wrocław was selected – a city characterised by unique hydrographic and cultural conditions. The presence of the Oder River, along with its numerous branches and canals, shapes not only the urban landscape but also the city's historical development and its relationship with water management. The long-standing tradition of aquaculture in Lower Silesia, exemplified by the Milicz Ponds, also proved to be an important criterion in the decision-making process.

This heritage constitutes a significant cultural and technological context for the development of modern food production systems such as aquaponics. Locating the farm in Wrocław made it possible to combine contemporary solutions with the city's local identity, its water resources, and its historical traditions.

The first stage of the planning process involved the selection of a specific site, aligned with the project's objectives. Key criteria included accessibility, distance from the city centre, legal feasibility, and the potential for recreational and educational synergy. Additional considerations encompassed the surrounding context, transport connectivity, the needs of the local community, the possibility of agreements with landowners, access to water and urban utilities, as well as soil conditions. Potential locations for the farm can be categorised according to accessibility and degree of privacy into three groups: (1) private spaces; (2) semi-public spaces (such as inner courtyards, residential estates, university campuses, and research complexes); and (3) public spaces (including squares, streets, and parks). This classification provides a framework for assessing both spatial integration and social accessibility of the proposed intervention. A separate but closely related issue concerns the relationship between the proposed structure and the surrounding existing (or planned) built environment, as well as regulatory constraints, including local zoning plans, permissions for temporary structures, minimum requirements for biologically active surfaces, and heritage and environmental protection. Within this context, at least three spatial configurations can be distinguished: (a) a freestanding structure, physically independent from other buildings; (b) an "attached" structure, directly adjoining existing buildings; and (c) an "integrated" structure, fully incorporated into other buildings or located within them. These configurations correspond to increasing levels of technological and organisational complexity.

The above classification can be structured in the form of a matrix, in which each field represents a distinct set of challenges and leads to a different spatial and functional character. From the perspective of the project objectives, the most relevant configurations were: 2a (semi-public spaces – freestanding structure), 2b (semi-public spaces – attached structure), 3a (public spaces – freestanding structure), and 3b (public spaces – attached structure). For the purposes of the pilot farm, variant 2a was selected as the most feasible option in terms of formal simplicity and technological requirements. Within the scope of further research, it would be justified to test additional configurations, particularly those involving interventions in representative public spaces – such as a significant urban square.

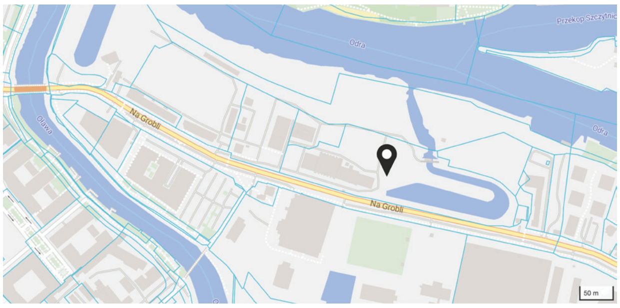

Fig. 1. Location of the aquaponic farm in Wrocław
(source: National Geoportal, elaborated by M. Jankowska)

Il. 1. Lokalizacja farmy akwaponicznej we Wrocławiu
(źródło mapy: Geoportal Krajowy, oprac. M. Jankowska)

Within the semi-public, freestanding configuration (variant 2a), a site belonging to the Wrocław municipal waterworks was selected. This choice was driven by thematic alignment – particularly issues related to water treatment and conservation – as well as the resulting openness to institutional collaboration. The historic and industrial character of the site had a positive impact on both the social reception of the project and the functioning of the farm itself. The facility was established approximately 4 km east of the Market Square, between the Oder and the Oława rivers, within the revitalised "Na Grobli" complex. This location is surrounded by buildings with academic, educational (including Hydropolis), industrial, and infrastructural functions, complemented by a residential component.

Urban analysis

Due to the considerable size of the site and the multiple possible locations for the farm within it, a general urban analysis of the plot was conducted. This included, among other aspects, the identification of visual axes, viewpoints, and access routes (the facility was positioned so as to remain visible from multiple vantage points and perspectives). Solar exposure conditions were also analysed (Fig. 2), with

Fig. 2. Location of the aquaponic farm in Wrocław
(source: Google Earth, elaborated by P. Pedrycz)

Il. 2. Lokalizacja farmy akwaponicznej we Wrocławiu
(fot. Google Earth, oprac. P. Pedrycz)

particular attention given to minimising shading from existing structures, maximising sunlight for plant cultivation, and introducing partial shading in the meeting area during midday hours. The potential for creating an intimate gathering space was also considered. As a result of these analyses, the farm was located in the area of a paved intersection in the central-eastern part of the site. A curved widening of a technical road, surfaced with large-format concrete slabs, forms a natural prefiguration of a public square, further defined by greenery on the western side. In order to fully exploit the design potential of this location, the farm was positioned along its eastern edge, partially extending onto a grassy area. At the same time, a sense of spatial enclosure was suggested through a recessed corner of the architectural form. Subsequent design decisions followed from the development of the enclosure for the research installation itself.

Diagnosis of local community

Due to the innovative nature of the programme, the design process did not follow a conventional trajectory, but instead evolved through the integration of expert knowledge and the expectations of the local community. Decisions made by experts were informed by ideas proposed by residents of Wrocław, while community-generated concepts were subject to expert evaluation. During the planning of the individual functions of the AquaFarm, key stakeholder groups were identified. From these, 20 representatives were selected, with whom individual, semi-structured interviews were conducted in order to better understand the expectations of the local community.

Preliminary technological and functional analysis

Following the detailed site analysis, the design of the installation infrastructure was initiated. Decision-making focused on the number and types of tanks, filtration systems, pumps, ventilation, lighting, monitoring systems, and other components required to maintain the health of both fish and plants. The selection of these solutions was determined by the operational characteristics of aquaponic systems, in which fish cultivation and plant production remain closely interdependent.

During the cultivation of fish or crustaceans in aquaponic farms operating within a closed-loop recirculating system (RAS – Recirculating Aquaculture System), compounds such as ammonia – originating from animal waste – are generated. Within certain concentration ranges, these substances are toxic to aquatic organisms; however, they simultaneously constitute valuable nutrients for plant growth (United States Environmental Protection Agency 2013; Camargo, Alonso 2006). Taking this relationship into account, the aquaponic system of the Wrocław farm was enclosed within food-grade adapted shipping containers and equipped with three aquaculture tanks for animal cultivation. Water containing waste products is pumped from these tanks into a unit equipped with both mechanical and biological filtration systems. Within the biological filter, appropriately selected bacteria convert ammonia into nitrates, which are less toxic to animals and more readily absorbed by plants. At the next stage, following biological filtration, the nutrient-rich water is directed to the plant cultivation area, located on a dedicated rack system, where two hydroponic methods are employed. In the NFT method (nutrient film technique), plant roots are continuously washed by a thin film of flowing water, whereas in the DWC method (deep water culture), roots are submerged in a deeper body of intensively aerated and continuously refreshed water (Chowdhury, Samarakoon and Altland 2024). Subsequently, water purified of substances harmful to aquatic organisms returns from the hydroponic system to the cultivation tanks, thereby completing the closed-loop cycle. In functional terms, the complex was designed to accommodate not only the aquaponic installation and the rainwater collection system, but also auxiliary and complementary spaces, including storage facilities and a dedicated meeting area.

Cost planning and management

Following the preliminary technological and functional analyses, an organisational and financial framework was developed for the initial phase of the farm's operation. Detailed analyses of technological performance and economic efficiency are being conducted within the USAGE project and will be comprehensively examined and reported upon after the completion of the full research period. At the initial stage, it was necessary to establish a set of assumptions and outline temporal and financial parameters that would enable the implementation of the farm within the allocated budget. Consequently, it was decided to realise the core of the farm in the form of the aquaponic installation itself, without the rainwater collection and treatment module or accompanying functions such as the meeting space and storage facilities.

As a result of market analysis, the decision was made to construct a modular facility using shipping containers. This solution is commonly employed in temporary projects or in contexts where the potential need for relocation must be considered (Giriunas, Sezen and Dupaix 2012). The modular structure of containers allows for flexible adaptation and future expansion of the facility. Containers can be combined in various configurations, forming larger structures or functional modules, and can be adapted to accommodate electrical, sanitary, and HVAC systems (heating, ventilation, and air conditioning). In the context of the selected site, the aforementioned advantages of modular construction played a significant role, particularly by enabling the phased implementation of the project. An additional benefit was the possibility of applying an analogous structural solution to the twin installation developed in Oslo. The use of container technology made it possible to achieve comparable systems in both locations, which is important for the comparative analysis of future results. Despite the historic character of the surroundings, the technical associations of container architecture did not pose a conflict, as the immediate context is defined by an industrial and infrastructural character. A key aspect of the design process was therefore the integration of the infrastructure into the urban context, with particular attention to aesthetics and accessibility for the local community.

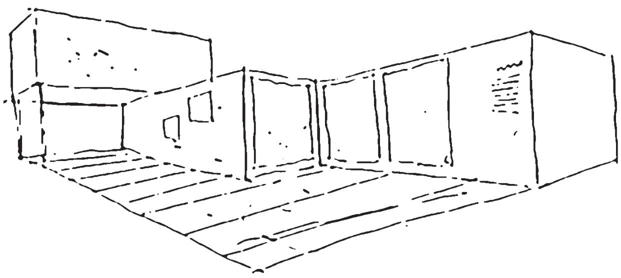

Fig. 3. Conceptual sketch of the architectural form of the aquaponic farm in Wrocław (drawning by P. Pedrycz)

Il. 3. Szkic formy architektonicznej farmy akwaponicznej we Wrocławiu (rys. P. Pedrycz)

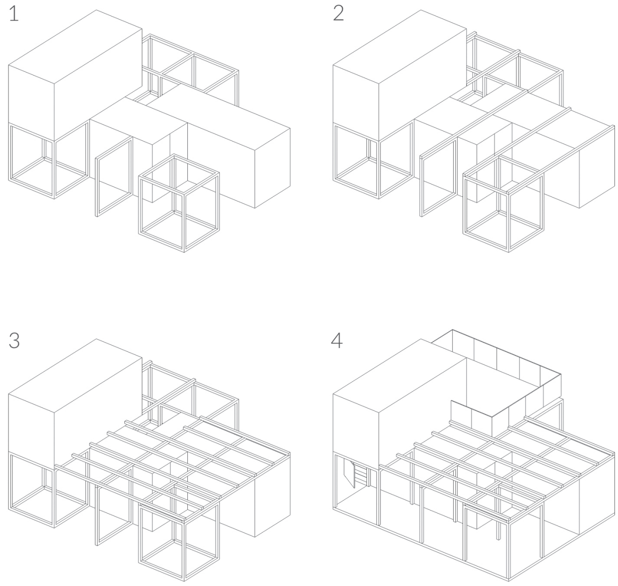

Fig. 4. Structural diagram of the terrace and green roof support system (elaborated by M. Jankowska)

Il. 4. Schemat konstrukcji wspierającej taras i zielony dach (oprac. M. Jankowska)

Architectural concept

A clearly defined architectural concept was necessary in order to obtain formal approvals and to establish a framework for the further development of the design. In pursuit of maximum modularity and compactness of the complex, as well as for educational purposes, a clear separation of functional zones into distinct containers was adopted. The red container houses the "animal" module, the blue container the plant module, and the green container auxiliary facilities and a meeting room. The roof surface is ultimately intended to exceed the footprint of the containers. This results not only from the increased demand for water collection, but also from broader design intentions. The roof was conceived as an installation for water capture and redistribution, a protective layer for the container units, and at the same time as an element shaping a welcoming space and reinforcing the identity of the place. This led to the introduction of a pergola structure, designed to provide pleasant shading from the southern side while also acting

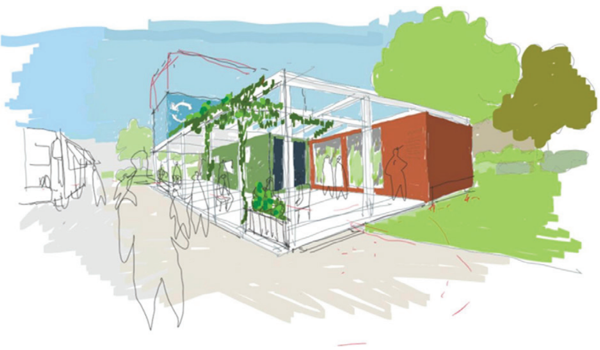

Fig. 5. Conceptual sketch of the aquaponic farm in Wrocław (elaborated by P. Pedrycz)

Il. 5. Szkic farmy akwaponicznej we Wrocławiu (oprac. P. Pedrycz)

Fig. 6. Architectural visualization of the aquaponic farm in Wrocław (elaborated by M. Jankowska)

Il. 6. Wizualizacja farmy akwaponicznej we Wrocławiu (oprac. M. Jankowska)

as an attractor for visitors. The modularity of the container system and its orthogonal arrangement formed the basis for a square modular structural grid applied to both the pergola and the green roof. The span of the grid corresponds to the width of a container. As the length of a container is not a multiple of its width, modular coherence was achieved by partially overlapping two containers in plan at ground level. The resulting architectural form, composed of adapted shipping containers, is bordered on one side by clusters of greenery and on the other by a historic building. The individually selected colour scheme of the containers is consistent with the façades of neighbouring structures and the surrounding natural context. A distinct local accent is provided by the blue container, positioned at the highest level as a deliberate "counterpoint" to the dominant water tower in the vicinity.

Planning permission

The aquaponic farm described in this study is located in an area not covered by a local spatial development (zoning) plan. This constituted an important condition for the design process, although planning status was not a primary criterion in the initial site selection. From the perspective of representativeness, the absence of a local plan may be regarded as an ambivalent condition. On the one hand, the lack of formal planning for a fragment of the city can be seen as a shortcoming, and ideally, future research should aim to test scenarios in which the farm is located within an area governed by a local spatial development plan. On the other hand, the absence of such a plan is a relatively common situation in urban contexts, particularly in central areas, where it is often assumed that the spatial structure is already consolidated.

The submission of an application for development conditions (planning permission) required the design team to define a range of parameters within the relevant formal documentation. The proposed development did not represent a typical application of this procedure, which is generally intended for the infill of homogeneous urban fabric with buildings of similar type and scale. In the case of the Wrocław farm, the situation involved the insertion of a relatively small structure within a complex of monumental industrial buildings of significant scale and historic character. During the procedure, and in accordance with its requirements, the proposal was consulted with relevant authorities – most notably the office of the regional heritage conservator. The project was approved, and the administrative decision granting development conditions was issued.

Technical design

The specific technical design of the Wrocław installation was based on positive experiences gained from an earlier Norwegian prototype. Both systems were manufactured by a specialised Norwegian–Turkish company, which produced the installations according to the provided specifications – primarily concerning the dimensions of the external enclosure and the required performance parameters. The technological design was conceived as preliminary and open to modification in response to ongoing operational experience.

The idea of self-sufficiency inherently implies a reduction in dependence on urban infrastructure networks. At the same time, however, the assumption of the farm's "urbanity" allows for – if not encourages – the utilisation of resources available within the urban environment. In the case described, the technological process is primarily associated with a demand for electrical energy, and to a lesser extent, water.

Construction of the aquaponic farm

Prior to the construction of the container-based structure, appropriate site preparation was required. This included clearing and levelling the terrain, as well as carrying out necessary earthworks. Structural stability and load-bearing capacity had to be ensured – for example, through the use of concrete foundation slabs (Giriunas, Sezen and Dupaix 2012). The main construction phase involved assembling the delivered containers in the designated spatial configuration. Depending on the design, containers can be stacked

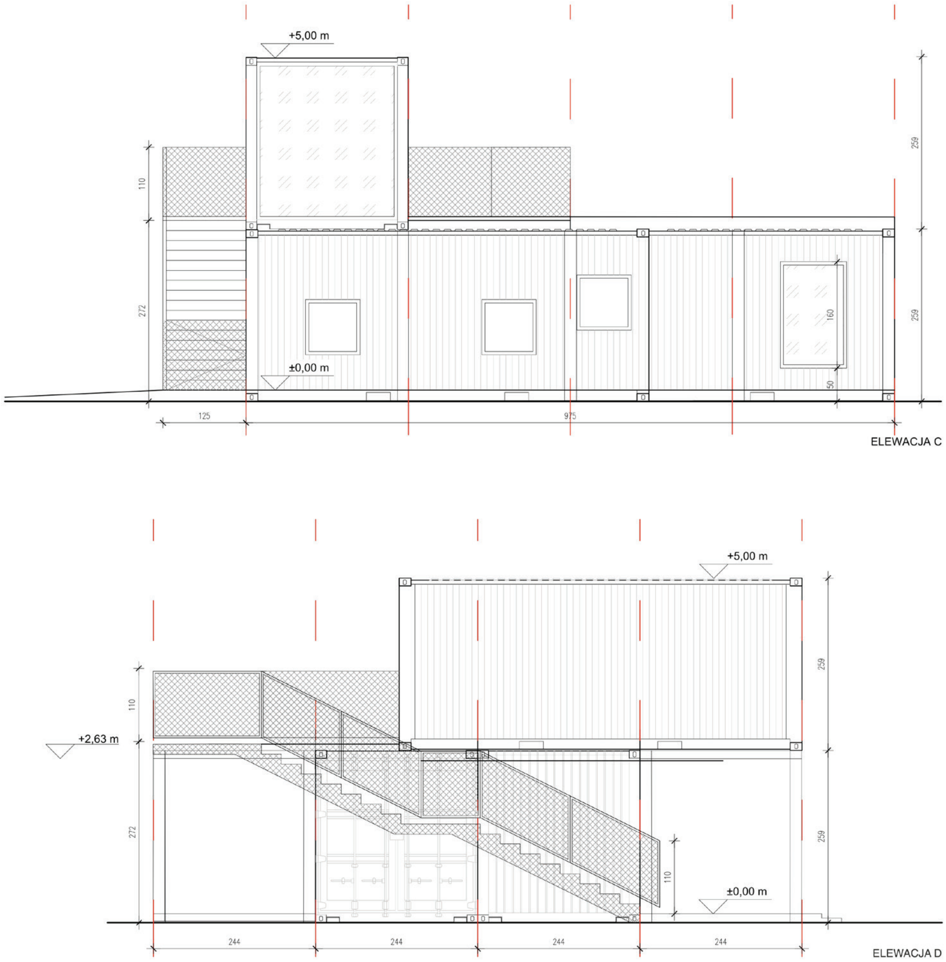

Fig. 7. Architectural elevation drawings of the aquaponic farm in Wrocław (elaborated by M. Jankowska)

Il. 7. Rysunki elewacji farmy akwaponicznej we Wrocławiu (oprac. M. Jankowska)

vertically, arranged side by side, or combined in other configurations. The farm was designed to allow for scalability and future expansion of the facility. Ensuring proper connections between containers was essential to create a stable and safe structure. Following installation, all necessary modifications and finishing works were carried out. These included cutting openings for windows, installing electrical, plumbing, and ventilation systems, applying thermal insulation, finishing walls, floors, and ceilings, and completing the external painting. Within the prepared containers, the installation of essential internal components was then undertaken, including fish tanks, filtration systems, and plant cultivation systems.

Green roof

A modular structure with a slight slope in one direction (towards the gutter) was installed on the roof of the containers. On this lightweight structural framework, a system of waterproofing and green roof layers was designed. These include mineral wool (serving as a retention and drainage layer), a substrate layer (for plant rooting), and a vegetation mat (in the form of a pre-grown mat with a sedum mixture). An alternative solution – based on the use of modular filtering planters – was also considered; however, it was ultimately rejected due to the higher estimated cost of implementation (Pérez et al. 2025).

Selection and cultivation of aquatic species and plants

Following a preliminary legal analysis, redclaw crayfish were selected for cultivation on the farm. Cherax quadricarinatus is an Australian freshwater crayfish species naturally occurring in northern Australia and New Guinea. The species tolerates water temperatures in the range of approximately 16–32°C, with optimal growth at 26–29°C; temperatures below 10°C or above 34–36°C may be lethal (Queensland Government 2025; García-Guerrero et al. 2014). Once an appropriate body mass is reached in cultivation (e.g. around

Fig. 8. First day of construction of the aquaponic farm in Wrocław (photo by P. Pedrycz)

Il. 8. Zdjęcie z pierwszego dnia budowy farmy akwaponicznej we Wrocławiu (fot. P. Pedrycz)

Fig. 9. Mizuna and Swiss chard cultivation within the aquaponic farm in Wrocław (photo by M. Jankowska)

Il. 9. Uprawa mizuny i buraka liściowego we wnętrzu farmy akwaponicznej we Wrocławiu (fot. M. Jankowska)

300 g), the crayfish may be harvested for consumption. One of the main limitations in closed-system aquaculture is strong territorial behaviour and competition between individuals, which may inhibit growth, particularly among younger and smaller specimens (Karplus, Barki 2004). To increase stocking density, it is necessary to provide adequate shelters, thereby reducing aggressive and cannibalistic behaviour. In the plant section, cultivation initially focused on leafy vegetables that germinate well at lower temperatures (including pak choi and Swiss chard). At a later stage, herbs and aromatic plants (such as coriander, lemongrass, and chervil) were introduced, along with vegetables such as watercress and watermelon radish. Currently, the development of strawberry cultivation technology is underway. Once appropriate methods are established, near year-round production of this crop will be possible, allowing for more effective utilization of the potential offered by aquaponic systems.

Fig. 10. Crayfish cultivation within the aquaponic farm in Wrocław – aquaponic farming system (photo by M. Jankowska)

Il. 10. Uprawa raków we wnętrzu farmy akwaponicznej we Wrocławiu – instalacja akwaponiczna (fot. Maria Jankowska)

Legal analysis prior to the establishment of the urban farm

The establishment of an urban farm requires compliance with numerous regulatory and administrative obligations. Assuming that the local land-use plan does not exclude agri-related activities, regulations extend beyond spatial planning issues to include, among others, food safety, the quality of water used within the system, and the labelling and packaging of final products. In the case of the Wrocław farm, approvals and required registrations with the State Sanitary Inspection (the District Sanitary-Epidemiological Station in Wrocław) and the Veterinary Inspection (the District Veterinary Inspectorate in Wrocław) were typically submitted on the basis of the intended cultivated species no less than 30 days prior to the commencement of production. Furthermore, the project team is obliged to verify at least once a year that the water meets the standards for water intended for human consumption when sourced from a private intake and used in production or direct sales. In addition, all personnel handling fishery products must possess a valid medical certificate confirming their fitness to perform work that may involve the transmission of infectious diseases, issued in accordance with regulations on the prevention and control of infectious diseases in humans.

Conclusions

The design of an urban aquaponic farm is a complex process, equally creative and analytical in nature. Paradoxically, this interdisciplinarity also constitutes a significant challenge. This results from the sectoral functioning of public authorities, as well as expert and academic communities. Although the topic of urban food production is generally met with positive reception and broad acceptance, it does not always receive active support. Many disciplines and sectors tend to perceive it as belonging to "others" and they do not fully identify with it. While it appears attractive to each of them, it is not considered a priority within any single field.

From this perspective, an important advantage of the implemented farm lies in its material and operational reality. The very fact of its successful realisation makes it possible to convince and engage stakeholders, while also allowing the concept to be tested in practice and potential barriers to be identified. The stages of the research project described in this article can be grouped into three main categories: (1) the determination of the technological requirements of aquaponics; (2) the outcomes of stakeholder engagement; and (3) the results of design creativity and expertise (urban and architectural). The sequence of these steps enables the formulation of a concrete set of issues that must be addressed in the planning of urban aquaponic systems. Each of these aspects warrants further, in-depth investigation in future research.

The USAGE team implemented a series of actions that led to the creation of the first urban AquaFarm in Wrocław accessible to residents. This project aligns with the European Commission's Farm to Fork strategy – one of the key initiatives within the European Green Deal – as well as with the concept of the agrihood, one of the most recent trends in spatial planning. This approach involves designing communities around farms that provide fresh and healthy food to local residents while simultaneously fostering social integration through shared green spaces. The project thus forms part of a broader trend related to the design of self-sufficient and sustainable urban environments, often referred to as sustainable urban neighbourhoods.

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Streszczenie

Projektowanie i budowa pierwszej polskiej farmy akwaponicznej – studium przypadku

Artykuł stanowi studium przypadku dotyczące procesu projektowania miejskiej farmy akwaponicznej, realizowanej jako element infrastruktury miejskiej o funkcjach produkcyjnych, edukacyjnych i społecznych. Farma taka powstała we Wrocławiu w ramach projektu badawczo-wdrożeniowego Urban Stormwater Aquaponic Garden Environment (USAGE), finansowanego ze środków publicznych ramach programu Badania stosowane oraz z Funduszy Norweskich. Celem autorów opracowania było zarówno przybliżenie technologii akwaponiki w kontekście urbanistycznym, jak i identyfikacja kluczowych wyzwań projektowych, organizacyjnych oraz decyzyjnych związanych z wdrażaniem tego typu systemów w warunkach miejskich. W tekście zaprezentowano kolejne etapy działań podejmowanych przez interdyscyplinarny zespół projektowy, ukazując potencjał rozwiązań akwaponicznych, a także ograniczenia procesu. Autorzy artykułu uporządkowali kluczowe zagadnienia oraz zidentyfikowali podstawowe punkty decyzyjne, które determinują ostateczny kształt przedsięwzięcia.

Słowa kluczowe: akwaponika, zrównoważona produkcja żywności, rolnictwo miejskie, cyrkulacja wody, Nowy Europejski Bauhaus