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Industrial heritage in the city landscape – introduction to research – adaptive reuse on the example of Tianjin

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Abstract

This study explores the adaptive reuse of industrial heritage landscapes in China, emphasizing their cultural, ecological, and urban significance. The research problem centers on the need to preserve and revitalize post-industrial areas while integrating sustainability and cultural identity. The primary objectives include a comparative analysis of strategies used in Tianjin, China. Methodologically, the study employed literature reviews, fieldwork, historical cartography, and case study analysis based on landscape representativeness and ecological design interventions. Key findings highlight the strategic role of ecological restoration, technological innovation, and creative placemaking in successful transformations. The research suggests that further studies in Poland should focus on testing adaptive reuse models in diverse regional landscapes, developing context-sensitive ecological design strategies, and evaluating long-term social and environmental impacts of post-industrial regeneration.

Keywords: industrial heritage, urban landscape, adaptive reuse, Tianjin

1. Introduction

Industrial heritage constitutes an important part of the cultural legacy of every country, region, and city. The Charter of Nizhny Tagil (TICCIH, 2003) defines industrial heritage as including "remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education". All elements — from machinery to landscape — should be subject to protection. Importantly, this document also identifies the most appropriate actions regarding industrial heritage: "the most important sites should be fully protected and no interventions allowed that compromise their historical integrity or the authenticity of their fabric. Sympathetic adaptation and re-use may be an appropriate and cost-effective way of ensuring the survival of industrial buildings" (4. III, TICCIH, 2003).

In recent years, increasing attention has been paid to circular architecture and upcycling. The idea of adaptive reuse has become increasingly prominent – not only in architecture but also in landscape design. This strategy is particularly significant for post-industrial areas, where cultural and ecological potential serve as key restorative drivers.

Adaptive reuse is based on the words 'adaptation' and 'reuse'. The term refers explicitly to changes that involve both a functional and a physical component (Vafaie, Remøy, Gruis, 2023). Historic building reuse is the process of reusing existing buildings or structures for purposes other than those for which they were originally designed, while preserving their historic or architectural features (Savoie, Sapinski, Laroche 2025). By giving new uses to ageing structures, adaptive reuse combines elements from heritage preservation with contemporary needs, ensuring their continued relevance in modern urban landscapes (Bullen, Love 2011). The benefits of these activities are extensive and diverse, encompassing both environmental and social and cultural benefits (Savoie, Sapinski, & Laroche 2025). Adaptive reuse is also considered one of the most sustainable methods of revalorization (De Gregorio et al., 2020).

The scale and nature of efforts undertaken to protect and adapt post--industrial areas and objects in Poland and China are highly diverse. Nevertheless, the key principles outlined in the aforementioned charter remain fundamental to both contexts. The strategic goals, tools, and expected outcomes, however, differ. In Poland, the main strategy is revitalization, understood as a comprehensive process of bringing degraded areas out of crisis through integrated social, economic, spatial, and technical actions.

Meanwhile, in China, the contemporary focus lies on heritage preservation, sustainable development of post-industrial areas, and the use of new technologies. Examples from Beijing (Wang, Duan, Zheng 2023) and Shanghai (Ma, Li, Lan 2023) demonstrate how adaptive reuse of post-industrial landscapes can effectively stimulate cultural and tourism revival in degraded areas, while also significantly improving environmental conditions (Grove, Zhang 2017).

The objective of the study was defined as follows:

- To provide a synthetic characterization of China's industrial heritage;
- To compare and assess the potential and directions of contemporary landscape reuse processes in Tianjin, China;
- To identify tools, methods, and strategies of adaptive reuse that contribute to improving landscape quality and sustainability — in relation to enhancing urban quality of life in Poland.

The general analyses encompassed all of China. Detailed case studies focused on the city of Tianjin — one of the world's largest industrial and port cities. The study considered areas with preserved buildings, structures, and

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technical infrastructure, whose contemporary renovation demonstrates a strong environmental and landscape component.

The research methods included literature review, analysis of iconography and historical cartography, field studies, and case analysis based on criteria such as representativeness, landscape significance, and the application of ecological tools and methods in the adaptive reuse process.

In recent years, research by Chinese scholars in the field of industrial heritage landscape renewal has primarily focused on sustainable development (Wu, Yang, 2025), value assessment (Cao, 2023), and spatial design (Duan, 2024).They have also begun to emphasize the importance of interdisciplinary collaboration, aiming to form systematic solutions (Yu, Qi, 2025). by integrating ecological restoration, cultural inheritance (Qi, 2025), and functional transformation (Wu, Yang, 2025).

At the policy level, the Chinese government has promoted the census of industrial cultural resources and the establishment of relevant databases, while local governments have facilitated project implementation through financial support and planning guidance. Practices across multiple regions show that China's industrial heritage renewal is evolving from mere spatial transformation toward a deeper integration of industrial development, ecological restoration, and cultural experience (Wang, Yue & Shan, 2025). However, challenges such as homogenized renovation and unclear industrial identity still require further resolution through the integration of regional characteristics.

2. Industrial heritage in China – history, characteristics, and strategies

The major industrial centres of China include cities such as Beijing, Shanghai, Guangzhou, Chongqing, and Tianjin. Many of these cities share a similar industrial past, with industrial development beginning mainly in the late 19th century (Zhong, 2013).

The current industrial heritage of Chinese cities has been shaped by three distinct periods: the history of industrial development in the 19th and 20th centuries; Chinese manufacturing practices during the socialist period between 1949 and 1978; the phase of urban transformation following the economic reforms that began in the late 1970s. The period before 1860 is referred to as the pre-industrial period, encompassing ancient technical monuments and sites of traditional handicraft industries such as metallurgy, salt production, ceramics, papermaking, tea, and printing (Yao, 2014).

It is also important to note that, apart from the process of industrialization itself, the character of China's industrial heritage has been influenced by the geographic distribution of industry. Due to the vast territory of China, individual regions developed unevenly, each with distinct characteristics in terms of natural environment, social context, and historical background. Consequently, the development of industry, the type of industrial heritage, and the heritage value attributes vary significantly between different regions and cities (Yao, 2014). Moreover, China's historical background has also led to visible influences of Eastern concepts of industrialization.

The typology of industrial heritage in China results from multiple factors, with a general overview presented in Table 1 and Table 2. The diversity of industrial heritage poses particular challenges, as it encompasses both historical and contemporary sites. The process of transformation and regeneration of urban centers that began in the 1990s and continues to this day has resulted in the destruction or demolition of many such sites (Xu & Aoki, 2018).

Table 1. General typology of the industrial heritage in China (author: Hao Tang)

By Industry Type	▸ Heavy Industry: Steel plants (e.g., Anshan Iron and Steel), Machinery manufacturing plants (e.g., Shenyang Heavy Machinery Plant), Mines (e.g., Huangshi Iron Mine) ▸ Light Industry: Textile mills (e.g., Shanghai Yangshupu Cotton Mill), Food processing plants (e.g., Tsingtao Brewery), Ceramics factories (e.g., Jingdezhen State-owned Porcelain Factory) ▸ Energy: Coal mines (e.g., Kailuan Coal Mine), Power plants (e.g., Nanjing Jinling Machinery Manufacturing Bureau) ▸ Transportation: Railway hubs (e.g., Yunnan-Vietnam Railway), Ports and wharves (e.g., Guangzhou Taikoo Cang)
By Architectural Form	▸ Factory Buildings & Workshops: Large-span steel structures (Shougang factory buildings), Sawtooth roofs (Textile mills) ▸ Infrastructure: Blast furnaces (Anshan Steel), Chimneys (Chongqing Eling Er Factory), Rail tracks (Huangshi Mining Park) ▸ Storage Facilities: Silos (Hangzhou Canal World), Warehouses (Shanghai 80,000-ton Silos)
By historical period	▸ Late Qing - Republic of China Era: Colonial industries (e.g., Hanyang Iron Works), National industries (e.g., Nantong Dasheng Cotton Mill) ▸ Planned Economy Period: Soviet-aided projects (e.g., Changchun FAW), Third Front Construction factories (e.g., Panzhihua Iron and Steel Plant) ▸ Post-Reform and Opening Up: Early development zone industries (e.g., Shenzhen OCT Electronic Factory
By use of landscape form	▸ Water area, mountainous Terrain, karst cave, linear space, utilizing original site industrial facilities, utilization combined with modern technology, not utilizing original site industrial facilities (display, art Installations), transformation involving pollution remediation

Table 2. Core characteristics of China's Industrial Heritage (author: Hao Tang)

Large Spatial Scale	▸ Concentrated contiguous distribution (e.g., Beijing Shougang Park covers 8.63 sq km) ▸ Massive building volume (e.g., Shenyang 1905 Cultural and Creative Park retains 100,000 sqm of factory space)
Diverse Historical Value	▸ Technological History: Preserves unique processes (e.g., Jingdezhen traditional wood-fired kiln techniques) ▸ Social History: Witnesses worker community culture (e.g., „factory life" memory at Chengdu East Suburb Memory Park) ▸ Architectural History: Blends Chinese and Western styles (e.g., Harbin Old Daowai Chinese Baroque architectural complex)
Significant Differences in Renovation Adaptability	▸ Easy to Renovate: Light industry factories (moderate height, good lighting, suitable for cultural/creative use) ▸ Difficult to Renovate: Heavy industry facilities (e.g., complex blast furnace structures requiring specialized reinforcement)
Distinct Regional Features	▸ Northeast: Predominantly heavy industry (Anshan Steel, Changchun FAW) ▸ Yangtze River Delta: Prominent textile and shipbuilding industries (Shanghai Yangpu Riverside, Wuxi Rong's Cotton Mill) ▸ Southwest: Dense concentration of Third Front Construction heritage (Sichuan Mianyang Nuclear Industry Site)

Fig. 1. Revitalization of the waterfront in Shanghai (photo by Katarzyna Łakomy)

At the same time, research on industrial heritage began in the 1980s, aiming not only at protection but also at defining appropriate objectives for revitalization (Sun & Ikebe, 2022). The year 2006 can be regarded as a milestone in the protection of industrial heritage. The State Administration of Cultural Heritage (SACH) in China organized the *Wuxi Forum on the Protection of Industrial Heritage*, which produced the "Wuxi Proposal", marking the symbolic beginning of a systematic approach to this issue. In the same year, the "Notice on Enhancing the Safeguarding of Industrial Heritage" was issued – an official document indicating growing national-level engagement in industrial heritage preservation (Zhang, Becue, Koutra & Ioakimidis, 2020; Yao, 2014).

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In contemporary regulations, industrial heritage is defined as the remains of industrial sites formed during the long-term process of industrial development in China, possessing significant historical, technological, social, and artistic value, and officially recognized by the Ministry of Industry and Information Technology.

Today, preliminary revitalization requirements involve analyses of three types of integrity: industrial network integrity, factory integrity, and production line integrity (including equipment). Based on these analyses, basic principles of protection and value assessment grades are formulated for various types of heritage. This framework aligns with the dual principle of authenticity and creativity (Xu & Aoki, 2018).

Recent studies have identified the most common contemporary strategies for industrial heritage revitalization, as summarized in Table 3.

Table 3. Contemporary strategies for Cultural Heritage Management in China (author: Hao Tang)

Preservation and Adaptive Reuse	▸ Structural Preservation: Shougang Park blast furnace converted into Winter Olympics viewing tower. ▸ Functional Replacement: Wuhan Qingshan Riverbank Park (industrial wharf → ecological slope protection).
Art and Technological Innovation	▸ Art Installation: Shijiazhuang Shigang rolling mill reassembled into sculpture. ▸ Digital Technology: Chongqing Industrial Culture Expo Park (turbine linked with sound, light, and electricity effects).
Ecological Restoration	▸ Water storage in mine pits (Maanshan Aoshan Mine), Greening of waste rock piles (Tangshan Nanhu Park).

Fig. 2. Traditional and modern landscape of Tianjin city (photo by Katarzyna Łakomy)

3. The city of Tianjin and adaptive reuse in the landscape

Tianjin is a major coastal city in northern China, located southeast of Beijing along the Bohai Sea. Covering about 11,900 square kilometers, it is one of China's largest cities and is divided into 16 districts. The Haihe River flows through Tianjin, giving the city its distinctive waterfront charm. It has developed rapidly in technology, manufacturing, and port logistics. Modern skyscrapers and historic European-style buildings reflect its diverse history (Yang 2025). The landscape is mostly flat, combining urban areas with rivers and canals that support both commerce and culture.

Tianjin, a pivotal hub of modern industrial development in China, traces its industrial roots to the Self-Strengthening Movement (1861–1895), when government-led enterprises like the Tianjin Machinery Bureau laid the foundation for industrialization. Subsequently, the rise of national capital diversified the industrial structure into textiles, chemicals, machinery, and other sectors, solidifying Tianjin's status as the Northern China Industrial Center (Yang, Li, 2024). After the founding of the People's Republic of China, Tianjin continued to innovate, evolving into a national leader in advanced manufacturing. Today, the city prioritizes high-end, intelligent, and green transformation, integrating industrial chain upgrades with technological innovation to build a modern industrial system (Wang, Yue, Shan, 2025). On the other hand, there is considerable attention paid to the industrial heritage, which is very diverse (Liu, Luo, 2024).

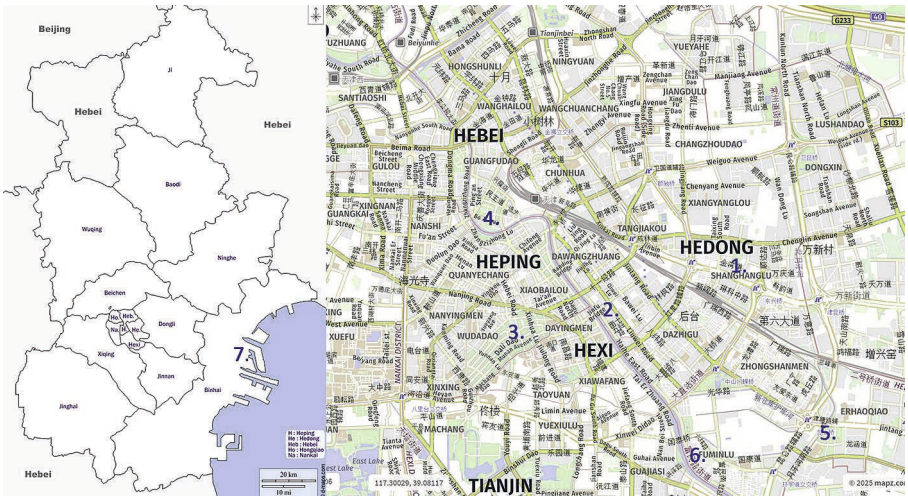

Fig. 3. Tianjin city and objects analysed in the research: 1. Qiaoyuan Park, 2. Jinmao Plaza, 3. Wudadao Historic District, 4. Haihe Riverfront, 5. No. 1 Machine Tool Industrial Park, 6. Mian 3 Creative Block, 7. TEDA Eco-Industrial Area (source: D-maps, Mapz, author Katarzyna Łakomy)

Analysis of Tianjin's urban landscape made it possible to identify several key zones of revitalization: 1. brownfield sites, 2. riverfront areas, 3. historic mixed-use districts, 4. former industrial complexes and facilities, 5. ecologically significant areas.

The main directions of transformation include:

- urban parks,
- revitalized waterfronts,
- multifunctional centers with strong cultural and artistic components,
- industrial and cultural parks, and
- so-called creative blocks.

In addition, a special zone has been established that can be described as technological-ecological. The city's colonial-era history also contributed to a distinctive urban structure, especially in the central districts, where former concession zones feature unique examples of European-influenced architecture (Sun, Hein, Song & Feng, 2018).

The city's adaptive reuse practices can generally be divided into two major categories:

- renewal – focusing on cultural activities and commercial spaces,
- reuse – emphasizing ecological restoration and technological integration.

Representative examples of these practices are presented in Table 4.

Table 4. Representative examples of reuse of devastated areas in Tianjin (author: Katarzyna Łakomy)

	Area name	origin	New function	realization	Initiator / investor	Designer
1	Qiaoyuan Park	shooting range/ illegal dump	urban park	2006–2009	Miasto Tianjin (Municipal Garden Bureau)	Turenscape (Kongjian Yu)
2	Jinmao Plaza	power plant	multi-functional center	2018–2023	Jinmao Group + Miasto Tianjin	Woods Bagot (Shanghai Studio)
3	Wudadao Historic District	historic district – former concessions	cultural district	since 2010 until now	Tianjin Cultural Heritage Bureau	Tianjin Urban Design Institute
4	Haihe Riverfront	wasteland, water irindustry area	waterfront (various passive recreation functions, landscape exposure function)	since 2003 until now	Tianjin Municipal Government + Urban Planning Bureau	Tianjin Planning & Design Institute (TPDI)
5	No. 1 Machine Tool Industrial Park	machine tool factory	industrial and cultural park	since 2020 till now	Tianjin Urban Renewal Bureau + Xinhua Industrial	Local urban planning offices
6	Mian 3 Creative Block	post-industrial buildings and areas/ cotton mill	creative blocks	since 2018 until now	Hedong District Government + local investors	Local design offices
7	TEDA Eco-Industrial Area	salt pan	eco-industrial park	since 1996 till now	TEDA Administration Committee	Sino-German Urban Ecological Design Center

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Qiaoyuan Park

Located in the central area of Hedong District, Tianjin. It borders Panshan Road to the south, Tianshan Road to the east, and spreads in a fan shape toward the Weiguo Road Overpass to the northwest, covering an area of 22 hectares. Before its construction, the site was an abandoned military shooting range, characterized by low-lying terrain, fish ponds, scattered garbage, stagnant sewage, and severe salinization. As a key project for Tianjin's urban environment improvement, it aimed to enhance the landscape and achieve "ecological restoration + livelihood services" to meet residents' needs for ecological green spaces and recreational areas (Topos: Qiaoyuan Park). The project implementation was divided into three phases: site cleaning and pollution control, landscape facility construction, and green planting & operation adjustment. The Tianjin Municipal Bureau of Landscape and Forestry took the lead in advancing the project, forming a special working group with the Municipal Bureau of Ecology and Environment (responsible for pollution supervision) and sub-district offices (responsible for resident coordination). The project also underwent expert technical review and collected public opinions. Ecologically, the project adopted the "soil leaching method" and constructed wetlands by draining salt from ponds. It also applied the "sponge city" concept to design rain gardens within the park (Topos: Qiaoyuan Park).

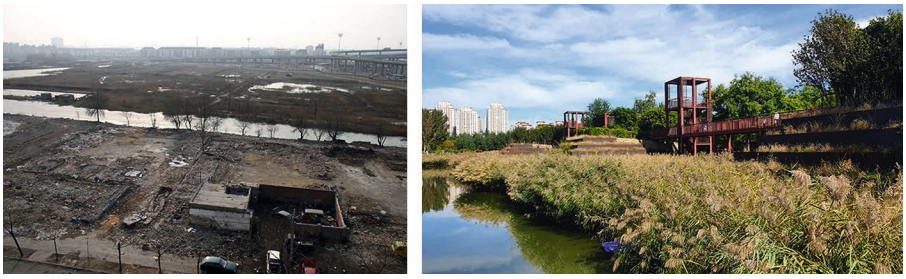

Fig. 4. Qiaoyuan Park before and after renovation (source: Zhuanian Zhihu, photo by Katarzyna Łakomy)

Jinmao Plaza

Built on the former site of Tianjin No. 1 Thermal Power Plant in Hedong District, which was shut down due to outdated equipment and backward production capacity. Adjacent to the Haihe River and located in the city's core business district, the surrounding area had a significant shortage of commercial, office, and cultural functions. As a practice under Tianjin's policies of "urban renewal and quality improvement" and "revitalization of industrial heritage", the project aimed to create a multi-functional complex integrating commerce, culture, and public spaces to meet the needs of urban populations for such functions. The project adopted a government-enterprise collaboration model: Jinmao Group and the Municipal Bureau of Planning formed a joint working group.

Fig. 5. Jinmao Plaza (photo by Tang Hao)

The enterprise took charge of investment, operation, and planning, while the government was responsible for compliance review, with the Municipal Bureau of Planning supervising the conformity of urban design. To attract urban crowds, the project optimized plot transportation, introduced diverse business formats

to improve functions, and retained the chimney and factory building framework through "structural reinforcement technology" while reconstructing the space.

Wudadao Historic District

Built in the 1920s–1930s during the Republic of China era. Once a high-end residential area for Chinese and foreign dignitaries and wealthy merchants, it was part of the former British concession. Planned based on the "garden city" concept, the block preserves a large number of European-style buildings (Fu & Verdini, 2025). However, some buildings suffered from disrepair, outdated pipelines, and illegal construction. Despite its prominent historical value, the block lacked systematic protection and activation, with insufficient tourism supporting facilities. The project prioritized protection while balancing the utilization of buildings. The Municipal Bureau of Cultural Relics took the lead in forming a working group with multiple departments, collecting opinions through publicizing plans and organizing seminars. It adopted a phased renovation model of "building restoration – business introduction – supporting facility improvement", encouraging the public to participate in activation through house leasing. A management office was also established to be responsible for daily maintenance and cultural activity organization. The project used "traditional craftsmanship + modern materials" to restore the building bodies and planned the construction of tourist service centers and other facilities to improve tourism support.

Fig. 6. Wudadao Historic District (source: China Industry Network, photo by Katarzyna Łakomy)

Haihe Riverfront

Long-term revitalization programs for the Haihe River channel and its waterfronts began in 2023, aiming to transform former industrial zones into recreational and scenic areas. Beyond general objectives such as urban redevelopment and image improvement, a key aspect of the project is the restoration of the ecological corridor. The master plan includes ten major projects: water treatment, reconstruction of flood embankments, road and bridge engineering, navigation infrastructure, park and flora development, landscape enhancement, night lighting, public works, and architectural renovation (Marinelli, 2024). Due to the huge project scale, the renovation was carried out in sections along the "upper reaches – middle reaches – lower reaches". It restored the ecology by cleaning up sludge, planting aquatic plants, and applying ecological revetment technology, and created landscapes by building water-friendly platforms. The government took

Fig. 7. Haihe Riverfront – Haihe Cultural Square in 1983 and today (source: Tianjin Transforms, photo by Katarzyna Łakomy)

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the lead in inviting bids to select the construction contractor, and invited residents to experience the area during the renovation to optimize facilities.

No. 1 Machine Tool Industrial Park

The predecessor of No. 1 Machine Tool Factory Industrial Park was Tianjin No. 1 Machine Tool Factory, established in 1951. Due to industrial upgrading and relocation, a large number of old factory buildings and machine tools were left behind. Although the site was idle, the industrial facilities carried the memory of Tianjin's industrial development and had important historical value. The project aimed to transform the site into an industrial cultural park integrating functions such as a museum and an art gallery. It was implemented in accordance with the development logic of "factory cleaning and heritage protection – landscape facility construction – cultural activity organization". A government-enterprise collaborative management model was adopted. Experts were invited to review the plan, and residents' needs were collected to optimize the design. Through structural reinforcement technology, the project retained the original factory buildings and machine tools, added an industrial exhibition hall to display history, and used the original factory roads to layout sidewalks and plant industrial-style plants to maintain the site's industrial characteristics.

Fig. 8. No. 1 Machine Tool Industrial Park (photo by Katarzyna Łakomy)

Hedong Art Blocks / Mian 3 Creative Block

Formerly Tianjin No. 3 Cotton Mill in Hedong District. After the factory was shut down in 2015, several red-brick factory buildings with intact structures but idle functions were left behind. At that time, Hedong District lacked carriers for the creative industry, and there was a demand for "industry-university-research" connection among design and art professionals from nearby universities. Responding to Hedong District's "industrial transformation and upgrading" policy, the core goal of the project was to introduce the creative industry through factory renovation and create a new growth point for the regional economy. The project retained the facades of the red-brick factory buildings to preserve industrial memories, while reconstructing the internal space to meet the needs of the creative industry. In terms of advancement, it adopted a phased opening model: first opening part of the factory buildings for trial operation, then gradually expanding the operation scope. It also formulated preferential policies to attract creative enterprises to settle in, and designed an exclusive LOGO and promotional brochures for the block to strengthen brand promotion.

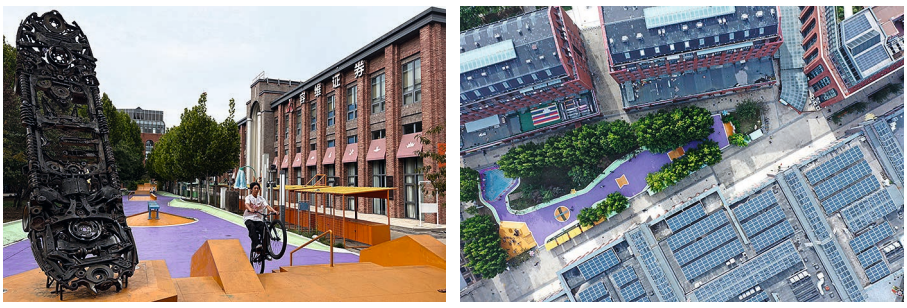

Fig. 9. Mian 3 Creative Block (photo by Hao Tang)

TEDA Eco-Industrial Area

The Tianjin Economic-Technological Development Area (TEDA), located within the Binhai New Area on the northeastern outskirts of the city, covers approximately 20 square kilometers. Like many other Chinese business developments, it integrates industrial, commercial, and residential zones. TEDA represents one of the most successful eco-industrial parks (EIPs) in China. In 1990, the TEDA Environmental Protection Bureau (EPB) was established, continuously improving environmental management capabilities and implementing innovative sustainability programs (Shia, Chertowa & Song, 2009).

The predecessor of TEDA Ecological Industrial Zone was a saltpan in Tianjin Economic and Technological Development Zone (TEDA), with severe salinization, low vegetation coverage, and high development difficulty. In the 1990s, TEDA needed to expand industrial space for "industrial upgrading", while facing the dual demands of "ecological protection" and "development promotion". Relying on the opportunity of Sino-German ecological cooperation, the project was launched, aiming to build a sustainable demonstration zone integrating "ecology + industry". In terms of advancement, the project adopted a phased implementation strategy: first carrying out soil improvement and infrastructure construction, then introducing environmental protection enterprises to continuously optimize the plot environment with the help of the enterprises. Technically, during the soil improvement phase, the "underground pipe drainage technology" was used to reduce soil salinity, and salt-tolerant plants were planted simultaneously to improve the ecology. After the settlement of environmental protection enterprises, an environmental monitoring system was established to monitor enterprise emissions in real time, ensuring the coordinated development of ecology and industry.

Fig. 10. TEDA Eco-Industrial Area before and after renovation (source: Teda, photo by Katarzyna Łakomy)

Based on the analysis of the above cases, several defining features of Tianjin's heritage identity and landscape-oriented adaptive reuse can be identified:

- large-scale implementation,
- integrated and cross-sectoral approach,
- promotion of tourism and culture,
- emphasis on ecological restoration,
- incorporation of new technologies,
- strong landscape exposure and visibility,
- of nature, technology, art, and landscape design.

The characteristics of the adopted directions of action are synthetically presented in Table 5.

The decision-making mechanisms for Tianjin's industrial heritage renovation projects are all based on "problem orientation" and "demand orientation". The "government-led" or "government-enterprise collaboration" model is selected according to the public attributes and market potential of the projects. This not only ensures the realization of public values such as ecology and culture but also enhances the sustainability of the projects through market-oriented operations, forming a mature decision-making framework of "policy guidance – multi-stakeholder participation – scientific demonstration".

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Table 5. The most important design tools and techniques used and their impact on the landscape (author: Katarzyna Łakomy)

	Area name	adopted directions of action	landscape design tools used	main landscape/ecological effects
1	Qiaoyuan Park	ecosystem services-oriented design	„adaptive palettes", phytoremediation, water retention, ecological succession, plant community design	soil remediation, improvement of the microclimate, habitats for fauna, noise minimization, biodiversity
2	Jinmao Plaza	sustainable urban regeneration	reuse of industrial structures, reuse of materials	protection of industrial heritage, activation of the waterfront, improvement of urban aesthetics
3	Wudadao Historic District	adaptive reuse of objects	protection of the historic urban layout and sites, creative placemaking, revitalization of greenery	preservation of landscape heritage, increase of tourist attractiveness
4	Haihe Riverfront	rejuvenation, an example of using river heritage in urban management	river restoration, promenades, walking paths, integrated ecological network	improving retention, increasing river accessibility, reducing the urban heat island effect
5	No. 1 Machine Tool Industrial Park	adaptive reuse of industrial area	reuse of industrial halls, museumization, wetland parks, reclamation, NBS	new recreational areas, environmental education, preservation of technical heritage
6	Hedong Art Blocks	art-led adaptive reuse	factory conversions, creative placemaking, reintroduction of urban greenery	creation of new cultural spaces, improvement of the microclimate, social activation
7	TEDA Eco-Industrial Area	principles of the eco-industrial park	guidelines of eco-industrial park design (China eco-industrial park demonstration program, 2000), green corridors, industrial symbiosis	sustainable energy and water management, soil remediation, improving the quality of the working environment and the quality of the natural environment

The conducted research made it possible to identify leading trends in adaptive reuse within the landscape of China, focusing on applied design solutions and their environmental impact. The most significant strategies include:

- Incorporate "Adaptive Palette" into "Ecological Restoration and Soil Remediation", as its "Wet-Dry Bubbles" and dynamic vegetation configuration essentially represent strategic approaches to enhance the site's ecological resilience and self-organizing restoration capabilities.
- Merge "Spatial Form and Spatial Syntax Planning Analysis" into "Urban Public Space and Landscape Design" as methodological tools for optimizing public space accessibility, visibility, and configuration.
- Combine "Material Circulation and Post-Industrial Aesthetics", "Low--Impact Development and Phased Implementation Strategies", and "Integration of Green Technologies and Standards" into "Sustainable Technologies and Standards", covering a trinity renewal framework encompassing materials, technologies, and standards.
- Establish "Community Participation and Post-Occupancy Evaluation (POE)" as an independent category of "Governance and Evaluation" to emphasize the closed loop of public participation and performance evaluation throughout the entire renewal lifecycle.

4. Summary

Preliminary research and case analyses in Tianjin indicate that the adaptation of post-industrial sites and landscapes in Tianjin is highly advanced in terms of applied technologies and contemporary design practices. Despite the region's distinct characteristics, many of the above approaches can serve as valuable references for Polish projects aimed at the proper protection and reuse of industrial landscapes – particularly in the management of:

- Water – wetlands, retention systems, and soft-edge renaturalization;
- Vegetation – successional phytoremediation;
- Infrastructure - adaptive reuse and integration of heritage elements;
- Landscape - creation of landmarks and creative placemaking.

In terms of water resource management, industrial heritage renovation often transforms abandoned sedimentation tanks and water pipelines into landscaped wetlands. These utilize aquatic plants and microbial systems for water purification while preserving the linear texture of industrial pipelines as distinctive features. A case in point is Tianjin Mian 3 Creative Block, which repurposed a textile factory's original circulation system to build a stormwater regulation system. Combined with permeable pavements and sunken green spaces, it formed a three-level rainwater management system of "source reduction-process control-terminal treatment," resolving waterlogging issues while creating an industrial-style waterfront space. The "flexible shoreline" design abandons hard revetments, instead using ecological gabions and vegetation buffers to restore hydrological functions, offering a replicable model for Poland's waterfront industrial heritage.

For vegetation management, China pioneered "progressive phytoremediation": first stabilizing soil pollutants in industrial sites with pioneer plants, then introducing native species to establish complex vegetation communities. Shenyang Tiexi Industrial Heritage Park selected heavy metal-tolerant plants like alfalfa, combined with microbial inoculation for soil improvement. Once the ecosystem stabilized, local species such as Chinese flowering crabapple and Chinese pine were introduced, forming vegetation systems with both restorative and ornamental value. This low-intervention, phased model reduces costs while preserving site history, making it highly relevant for soil-damaged areas like Poland's mining regions.

The core of infrastructure management lies in adaptive reuse of industrial structures, with China adhering to "structure priority, functional regeneration". Shanghai International Fashion Center transformed old factory steel trusses and looms into exhibition installations and partitions, endowing them with new functions. Beijing 798 Art Zone reinforced factory buildings and modified skylight systems, adapting 1950s Bauhaus-style structures to modern art exhibition needs. This "minimum intervention" functional conversion technique provides a pathway for Poland's idle factories to transition into cultural consumption spaces.

In landscape management, China activates heritage spirit through "landmark reconstruction" and "creative placemaking." Chengdu Eastern Suburb Memory converted chimneys into light art installations, while Guangzhou Redtory preserved cannery tracks to create landscape trails with supporting artistic activities. Both transformed industrial elements into unique landscape symbols, enhancing identity and vitality, serving as valuable examples for Poland's industrial landscape cultural value conversion.

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