Climate change related urban transformation and the role of cultural heritage

Matthias Ripp & Christer Gustafsson
(Eds.)

Foreword by Claire Cave

IL Sileno Edizioni

Geographies of the Anthropocene

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Matthias Ripp & Christer Gustafsson
Editors

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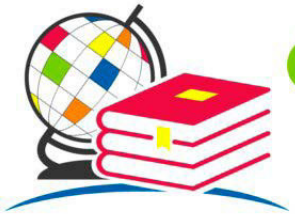

Geographies of the Anthropocene

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Geographies of the Anthropocene

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The book series “Geographies of the Anthropocene” edited by the Scientific International Publisher “Il Sileno” (Il Sileno Edizioni) will discuss the new processes of the Anthropocene epoch through the various worldviews of geoscientists and humanists, intersecting disciplines of Geosciences, Geography, Geoethics, Philosophy, Socio-Anthropology, Sociology of Environment and Territory, Psychology, Economics, Environmental Humanities and cognate disciplines.

Geoethics focuses on how scientists (natural and social), arts and humanities scholars working in tandem can become more aware of their ethical responsibilities to guide society on matters related to public safety in the face of natural hazards, sustainable use of resources, climate change and protection of the environment. Furthermore, the integrated and multiple perspectives of the Environmental Humanities, can help to more fully understand the cultures of, and the cultures which frame the Anthropocene. Indeed, the focus of Geoethics and Environmental Humanities research, that is, the analysis of the way humans think and act for the purpose of advising and suggesting appropriate behaviors where human activities interact with the geosphere, is dialectically linked to the complex concept of Anthropocene.

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6. Adaptive Reuse of Industrial Heritage in the era of Radical Climate Change Related Urban Transitions

Asma Mehan[1], Jessica Stuckemeyer

Abstract

The adaptive reuse of industrial heritage, a critical component in addressing radical climate change-related urban transitions, is increasingly pertinent. This paper distinguishes 'urban transitions' from 'urban transformation,' emphasizing a more gradual, adaptive approach to urban development under the pressures of climate change. It explores the repurposing of industrial buildings and spaces, maintaining their cultural and historical value while meeting current urban needs. Through a mixed-methods approach, the paper analyses how adaptive reuse contributes to sustainable urban development, examines the scale and impact of such projects from local quarters to city-wide implications, and discusses the potential negative consequences, including gentrification. The study spans various global regions, including Europe, the United States, Latin America, Canada, and Australia, using case studies to illustrate the effectiveness of adaptive reuse in promoting sustainability, revitalizing urban areas, and preserving cultural heritage. The paper questions the viability of traditional long-term sustainable urban development strategies in the face of rapid environmental and societal changes, suggesting a potential need for paradigm shifts in urban planning.

Keywords

Adaptive Reuse; Industrial Heritage; Climate Change; Radical Urban Transitions

[1] Huckabee College of Architecture, Texas Tech University, Lubbock, Texas, US 1800 Flint Avenue, Lubbock, TX 79409
Corresponding Author: asma.mehan@ttu.edu - jessica.stuckemeyer@ttu.edu
ORCID: https://orcid.org/0000-0002-4878-5367

1. Introduction

The adaptive reuse of industrial heritage, as explored in the case studies from my studio course, highlights its vital role in fostering sustainable and resilient urban development across various regions. These cases illustrate the transformative potential of adaptive reuse in different contexts: In Europe, the conversion of abandoned factories into mixed-use developments in Germany and the UK exemplifies how industrial spaces can be repurposed to serve contemporary urban needs while preserving cultural and historical values (Salama, 2015). Similarly, in the United States, the transformation of a disused industrial site into a public park in New York City demonstrates the creation of valuable urban green spaces (McPeek & Morthland, 2010). In Latin America, the conversion of an industrial building into a cultural center in Mexico City shows the adaptability of industrial heritage for community and artistic purposes. In Canada, repurposing an abandoned factory into a residential complex in Toronto addresses urban sprawl and housing issues. Finally, in Australia, the transformation of an industrial site in Melbourne into a community park highlights the role of green spaces in enhancing urban sustainability.

The backdrop of these adaptive reuse projects is set against the historical context of deindustrialization and decarbonization, where 'industrial heritage' has emerged as a key focus within heritage studies. To effectively implement preservation and adaptive reuse methods, it is crucial to classify 'industrial heritage' into distinct categories, considering factors such as the existing infrastructure, extensions, semi-open areas, and urban platforms (Mehan & Stuckemeyer 2023 a; 2023b). UNESCO's inclusion of various industrial legacies in its World Heritage List underscores the growing recognition of these sites' cultural and historical significance (Mehan & Casey, 2023; Mehan & Abdul Razak, 2022).

The studio projects align with the United Nations' Sustainable Development Goals (SDGs), yet they also strive to address local community needs and specific demands beyond these global objectives (Kincaid, 2002; Mehan & Mostafavi, 2023; 2022). Focusing on industries such as Natural Resources, automotive, technology, and textiles, these projects span diverse geographical locations, including North America, Latin America, Canada, Australia, and Asia. Each project targets either an abandoned or malfunctioning industrial site, proposing adaptive reuse strategies to revitalize post-industrial landscapes.

2. Methodology

This chapter addresses the socio-political and spatial-cultural challenges faced by post-industrial cities during deindustrialization, decarbonization, energy transition, and rapid technological innovation. Drawing from the 'Adaptive Reuse of Industrial Heritage' studio course at Texas Tech University, the research utilizes a multifaceted methodology that intertwines critical, historical, spatial, and analytical dimensions. This approach, highlighted in Qureshi (2020), is problem-oriented, aiming to evaluate and influence policies that foster new urban identities through adaptive reuse, aligning with sustainable local development objectives and the protection of industrial legacies (Mehan 2024; 2023a; 2023b).

The methodology integrates architectural, urban planning, and environmental sustainability perspectives, providing a comprehensive understanding of the impacts of adaptive reuse projects. It involves a comparative analysis of international case studies, highlighting the varied applications and outcomes of adaptive reuse in different urban contexts. This approach assesses the broader implications of these projects on city-wide development, infrastructure, and policy, ensuring alignment with sustainable urban development goals. Furthermore, the study engages local communities, planners, and policymakers, ensuring that adaptive reuse strategies are contextually relevant and socially equitable. The temporal aspect is also considered, examining the longevity and adaptability of these projects over time in response to changing urban needs. Additionally, the study critically assesses current urban development paradigms, especially considering rapid environmental and societal changes, advocating for more flexible and responsive urban planning strategies. This comprehensive approach aims to advance the understanding and application of adaptive reuse in creating sustainable and resilient urban environments.

3. Urbanism and Post-Industrial Transformation

The transition from industrial to post-industrial societies has profoundly impacted worldwide urban landscapes and social dynamics. In the study of landscape transformations in post-industrial cities, scholars have identified several key factors that shape the evolving post-industrial cityscapes. For instance, Pytel et al. (2021) provided a comprehensive analysis of post-modern

urban areas by considering the localization trends in post-industrial economic activity and the development of new city management strategies, based on land use patterns, urban morphology, and density. In addition, the researcher emphasized the importance of new city management strategies in shaping post-industrial cityscapes. These strategies often prioritize sustainability, livability, and inclusivity, leading to the implementation of policies that promote public transportation, green spaces, affordable housing, and the revitalization of underused or abandoned areas (Mehan 2020; Pytel et al. 2021).

The decline of traditional manufacturing and heavy industries has led to a rise in knowledge-based economies, service sectors, and technological innovation (Mehan et al., 2023). In addition, the progressive transformation of the prevailing land use model has shifted towards the creation of 'selective territorial concentrations' (clustering) of new urban economic activities (Smith et al., 2018). This change reflects a strategic approach to urban development, where cities foster synergies and collaboration among businesses, institutions, and communities within specific sectors or industries (Berens, 2020; Mavratzas, 2008; Hudson, 1994). Clustering can enhance urban innovation, productivity, and competitiveness by promoting knowledge sharing, resource pooling, and establishing specialized infrastructure and services. This new model aims to drive sustainable economic growth while preserving and enhancing the unique qualities of urban spaces (Palermo & Ponzini, 2018).

This shift has transformed how cities are structured and influenced various aspects of urbanism, including land use, built environment, socio-economic patterns, and cultural practices. Holgersen and Hult (2021)'s research on Malmö's transformation from an industrial city to a post-industrial hub mirrors the shift seen in many European cities, driven by globalization, economic changes, and technological advances (Holgersen & Hult, 2021). This transition from a Fordist-Keynesian to a post-Fordist/neoliberal foundation has prompted a focus on tourism, culture, knowledge-based industries, and efforts to attract wealthy taxpayers (Meneses & Prats, 2018). While this has allowed cities like Malmö to diversify and become more resilient, it has also led to rising inequality, social polarization, and gentrification. Thus, cities need to develop inclusive strategies that ensure the benefits of this transformation are shared equitably among all residents (Holgersen & Hult 2021). One of the most visible impacts of post-industrial transformation is the physical change in urban landscapes. As industries decline or relocate, vast land

areas previously occupied by factories, warehouses, and related infrastructure become vacant or need more utilization (Douet, 2018). This creates urban redevelopment and regeneration opportunities as cities seek to repurpose these spaces for new uses. Post-industrial urban landscapes have often shifted towards mixed-use development, incorporating residential, commercial, and recreational spaces (Storm, 2019; Stead, 2016). This usually includes creating new public spaces, such as parks, waterfront promenades, and cultural institutions, which reconnect communities with their urban environment and foster a sense of place (Haupt et al., 2022; Overmann et al., 2016).

4. Adaptive Reuse and Sustainable Development Goals (SDGs)

Adaptive reuse, as a strategy, focuses on repurposing existing buildings and infrastructure for new uses instead of constructing new buildings (Conejos, Langston, & Smith, 2011). This approach has been recognized for its potential to significantly contribute to achieving Sustainable Development Goals (SDGs) by fostering sustainable development, economic growth, and environmental protection (Chusid, 2013). It is important to highlight that adaptive reuse has the potential to be a powerful tool in achieving the SDGs, advancing sustainable development, economic growth, and environmental protection. Some keyways adaptive reuse can support the SDGs include:

SDG (Sustainable Development Goals) 11: Sustainable cities and communities: Adaptive reuse can facilitate the development of sustainable, livable cities by preserving historic buildings and landmarks, mitigating the environmental impact of construction, and promoting the efficient use of existing infrastructure (Bullen & Love, 2010).
SDG 8: Decent work and economic growth: By creating new job opportunities in the construction, restoration, and operation of repurposed buildings, adaptive reuse can stimulate economic growth (Douglas, 2006).
SDG 9: Industry, innovation, and infrastructure: Adaptive reuse can contribute to sustainable infrastructure development by encouraging the efficient use of existing resources and minimizing the need for new construction (Langston, Wong, & Hui, 2008).
SDG 12: Responsible consumption and production: Supporting responsible consumption and production, adaptive reuse can reduce waste and encourage the reuse of existing resources (Yung & Chan, 2012).

SDG 13: Climate action: Adaptive reuse can help combat climate change by lowering the carbon footprint of new construction, preserving existing green spaces, and endorsing energy-efficient building practices (Mısırlısoy & Günçe, 2016).

5. Heritage Values and Meanings in the Post-Industrial Context

This section will discuss the role of values and meanings in adaptive reuse strategies, highlighting the importance of considering local contexts and cultural significance in shaping post-industrial urbanscapes (Adams & Larkham, 2016; Bianchi & Parkinson, 1993).

Heritage values and meanings in the post-industrial context relate to the significance and interpretation of former industrial sites, buildings, and artefacts, often viewed as symbols of a bygone era. The transformation from industrial to post-industrial societies has led to the decline of many traditional industries and the closure of numerous factories and industrial facilities. This shift has created a need to reinterpret and repurpose these spaces while preserving their historical and cultural significance (Castells 2010; Montella, 2009).

In the post-industrial context, heritage values and meanings can manifest in various forms such as historical significance, architectural value, cultural memory, and social and community values (Foster & Curtis, 2020; Valdpaus, 2018; Smith et al, 2018). Many former industrial sites hold immense historical value, representing the period of industrialization and its impact on society, economy, and urban development, while their unique architectural features can be creatively utilized in adaptive reuse projects. These sites also serve as symbols of cultural memory for communities once heavily dependent on these industries, and by preserving and repurposing them, communities maintain a connection to their past while adapting to new economic realities (Mehan et al., 2022). Many scholars have been argued that post-industrial sites have the potential to become vibrant public spaces that foster social interaction and community engagement through cultural, recreational, and educational facilities, strengthening communities and promoting social cohesion (Kozlowski et al., 2020; Khasraghi & Mehan 2023; Roberts & Sykes, 2019).

6. Radical Transitions and the Changing Structure of Post-Industrial Urbanscapes

The structure of post-industrial cities has undergone radical transformations due to industrial revolutions, energy transitions, and rapid technological innovations. These abrupt changes have altered how buildings and cities function over time. In this section, we will examine the implications of these shifts on urban spaces and their social, political, and cultural contexts (Mehan, 2022; 2015). We will focus on the challenges and opportunities arising from these radical transitions. Radical transitions signify significant shifts in societal, economic, and technological paradigms that profoundly impact urban landscapes. The transition from industrial to post-industrial societies has led to substantial changes in the structure of urban environments. Post-industrial urbanscapes are characterized by the decline of traditional manufacturing and the rise of knowledge-based industries such as technology, finance, and creative sectors (Kabisch et al., 2017; Bonino & Pieri, 2015).

Deindustrialization has left abandoned industrial facilities, known as brownfield sites, in urban areas. These sites require remediation due to environmental contamination and present opportunities for redevelopment, such as adaptive reuse, green spaces, or mixed-use development. Post-industrial cities often experience gentrification as former industrial areas become attractive to investors and middle- to upper-class residents. This can lead to the displacement of lower-income communities and increased social polarization as neighborhoods become increasingly stratified by income and social status (Graham & Marvin, 2001; Jacobs, 1961). Post-industrial cities have seen the emergence of innovation districts, where knowledge-based industries, research institutions, and creative enterprises cluster together. These districts are characterized by mixed-use development, vibrant public spaces, and a focus on sustainability and walkability. The decline of traditional industries has prompted many cities to focus on urban regeneration and revitalization efforts to improve residents' quality of life and attract new businesses. This can include redeveloping brownfield sites, investing in public infrastructure, and creating cultural and recreational amenities (Zukin, 1995; Harvey, 1989).

In this sense, Post-industrial urbanscapes often prioritize sustainability and resilience, incorporating green infrastructure, energy-efficient technologies, and climate-adaptive design in new developments (Misirlisoy & Gunce, 2016). This shift recognizes the need for cities to mitigate and adapt

to climate change's impacts while promoting a more sustainable urban environment. Radical transitions have led to significant changes in the structure of post-industrial urbanscapes, presenting challenges and opportunities for urban planners, policymakers, and communities. Embracing these changes while addressing social polarization and environmental degradation is crucial for creating inclusive, sustainable, and resilient urban environments in the post-industrial era.

7. Resilient Post-Industrial Cities: Navigating Energy Transitions and Climate Challenges

The territory's energy and social construction are closely intertwined with the radical transitions and changes in post-industrial urbanscapes. At the same time, the territory's social construction involves society's collective efforts to shape and adapt urban environments to new realities. Both these concepts play a crucial role in addressing the challenge of climate change and transforming metropolitan areas (Bulkeley & Castán Broto, 2013; Graham et al., 2000).

To achieve sustainable development, post-industrial cities need to adopt several strategies (Robiglio, 2017). Decarbonization and renewable energy are essential to reducing greenhouse gas emissions and mitigating the impacts of climate change. Energy-efficient urban design can help manage and distribute energy more efficiently. Adaptive and resilient infrastructure can protect against extreme weather events, and urban green spaces can reduce urban heat island effects (Luederitz et al, 2016; Hospers, 2002). However, social equity and environmental justice must be addressed to create inclusive and sustainable urban environments (Navrud & Ready, 2009). This involves ensuring all communities have access to resources and opportunities to adapt to climate change. Participatory planning and decision-making processes are crucial to building a shared understanding of the challenges and opportunities of the energy transition and creating a collective vision for a sustainable and resilient urban future (Landorf, 2018; Romero-Lankao & Dodman, 2011).

It is essential to highlight that the territory's energy transition and social construction are integral to transforming post-industrial urbanscapes in the face of climate change (Wu et al., 2022). By incorporating sustainable energy sources, energy-efficient design, adaptive infrastructure, social equity, and participatory planning, cities can rise to the challenge of climate change and

create more inclusive, resilient, and sustainable urban environments for future generations (Swyngedouw, 2010; Hakuta & Ben-Joseph, 2017; Stead, 2016).

8. Case Studies: Adaptive Reuse of Industrial Heritage in a Transnational Perspective

With a comparative approach and through a transnational perspective, projects in this studio identify and study urban-rural buildings, infrastructures, sites, and contexts that can be categorized as industrial heritage. Projects may consider the sustainable development goals of the United Nations, known as SDGs, as an overarching framework but still may go beyond these goals to engage with local communities and serve context-specific demands. This section will present selected case studies from different locations in North America, Latin America, Canada, Australia, and Asia, showcasing innovative adaptive reuse frameworks and design strategies that revitalize post-industrial urbanscapes.

At the beginning of the studio, students researched abandoned structures and explored industrial heritage. They were asked to pick one industrial heritage structure and explore the design, construction, usage, and eventual collapse or desertion of the building. From these selections and research, students were clustered thematically in the same industrial heritage groups according to their respective structure's history, consisting of the automotive (auto and railway), technology, natural resources (oil and water), and textile heritage groups. The formation of these groups allowed students to collaborate on their research, designs, and presentations. In each group, they shared mappings, historical significance, and heritage specific elements between their peers culminating in a greater understanding and appreciation of the selected heritage focus. Presenting together, these groups shared class wide and received feedback from classmates sorted into a different heritage group, generating a broad understanding of industrial heritage and adaptive reuse. The deliverables at the conclusion of this stage consisted of a poster from each student that examined the site and surrounding region, cultural and historical factors related to the structure, and images of the adaptive reuse building in its current, unrenovated state. The peer learning and collaborative aspects of the studio allowed for similar explorations into distinct and disparate site conditions, allowing each student to learn and develop their designs without being isolated by the varied industrial heritage, considerations, and project specific needs.

Figure 0: Peer Learning and Correlation Between Heritage Groups,
Figure 0a: Lapham Woolen Mill – Millbury, Massachusetts (Wall 2022),
Figure 0b: Kiddie Kloss Factory – Lansford, Pennsylvania (DeGrande 2022),
Figure 0c: Suyeong Factory – Busan, South Korea (Chung 2022).

The class wide exploration and collaborative design research culminated in a second set of groups that each focused on specific needs and improvements that can be made to communities located in or near to a postindustrial urbanscape. Each group set out to fill a niche within their respective community and provide infrastructure through adaptive reuse that would increase the quality of living, the built environment, and community cohesion. These groups, referred to as ARD (Adaptive Reuse Design) groupings, spanned adaptive reuse proposals pertaining to outreach, community, shelter, recreation, knowledge, and education. Each group contained 2-3 students and were instructed to research, collaborate, and ultimately present their designs together to highlight the potential of their adaptive reuse focus across several cities, cultures, and design restrictions. The ARD group began to show adaptive reuse on a macro-scale as the students learned and developed in varying considerations while sharing an overall purpose, respecting the larger idea of communities, industrial heritage, and the sustainable development goals. To a more limited extent, the individual case studies integrated their reconceptualization of industrial heritage and adaptive reuse and sought out to design for the micro-scale, respecting the community members, cultural significance and history, and necessities unique to the selected area.

The first group formed dealt with outreach to the respective communities, addressing a direct problem and attending to the people. These designs are

highly site specific and rely on existing features in the structures that are proposed to be used in new and more beneficial ways.

The designs include the adaptive reuse of the Richmond Power Plant to a hydroponic greenhouse that will combat food insecurity in the Port Richmond area of Philadelphia, Pennsylvania. This greenhouse aims to reduce pollution in the area, create a community hub for occupants to enjoy nature and learn about hydroponics and industrial heritage and to provide accessible and nutritious produce to all residents (See Figure 1a). As another design of the outreach group, this adaptive reuse will renovate the F1963 wire factory in the Suyeong-Dong district of Busan, Korea. The wire factory is proposed to be developed as a community center with vital support systems, including a mental health clinic, physical health clinic, and childcare services to improve the quality of life for residents in a highly suicide and mental health crisis prone location (See Figure 1b). The final design proposes a solution to rehabilitate the infrastructure and surrounding areas of the American Diversion Gated Dam in El Paso, Texas, rejuvenating the site and benefitting the nearby New Smellertown with potable water, flood management, and a potential community gathering area (See Figure 1c).

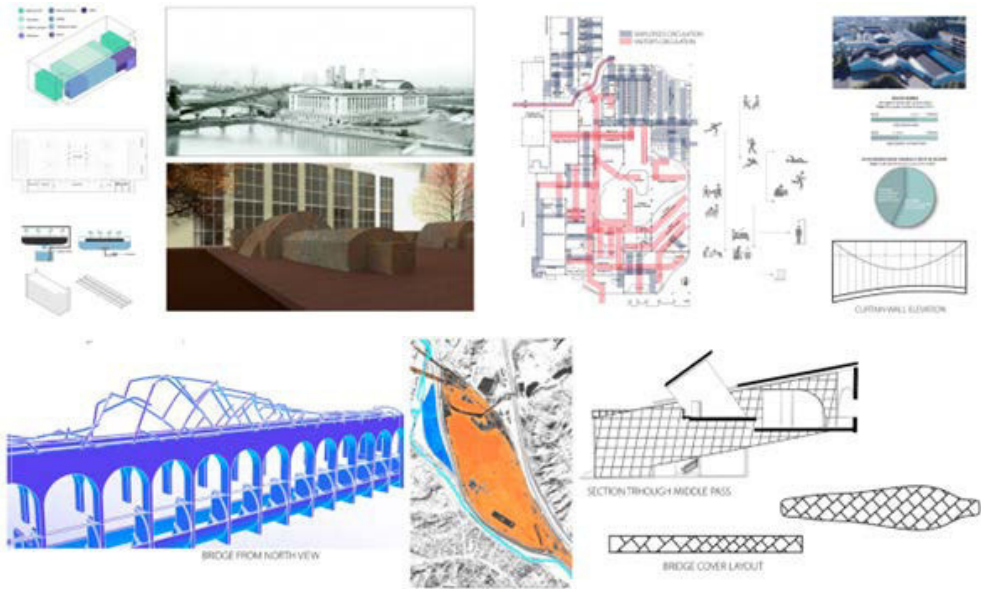

Figure 1: Outreach ARD Group,
1a. Richmond Power Plant – Philadelphia, Pennsylvania (Stuckemeyer 2022),
1b: Suyeong Factory – Busan, South Korea (Chung 2022),
1c: New Smelltertown – El Paso Texas (Arturo-Villegas 2022)

The second group was clustered together as community-based, focusing on implementing support systems and attracting local people to inhabit the space for the area's betterment. This group differs from the outreach ARD group through the wider attention to the community, focusing on infrastructure that benefits the identity and cohesion of the people rather than on a specific lacking factor of the area.

Designs from the community ARD group include the renovation of Maestranza San Bernardo, a historic train station located in San Bernardo, Chile. The adaptive reuse of this structure proposed a celebratory space to uphold cultural values and create a space for community members to bond with their respective identities and people This was inspired by the requests of Chilean residents who felt they were losing opportunities to embrace their culture (See Figure 2a). The next design addresses the community through transforming the Ford Geelong factory, a large-scale relic of Ford's automotive industry, in Geelong, Australia into a multipurpose adaptable design. This proposal forms a structure that can be used for any range of community needs, from simple gatherings to crisis where the building could, for example, provide space for vaccination and testing sites or other short term medical necessities (See Figure 2b). For the final project in this group, the adaptive reuse was focused on overhauling the Linseed Oil factory in Toronto, Canada, which features a large, unused site surrounded by an emerging neighborhood with many young families. Efforts had already been made by residents of the area through the construction of a park and outdoor gathering space, so the design became focused on creating a community center with a gymnasium, pool, and lounge that can be occupied throughout the cold season (See Figure 2c).

Figure 2: Community ARD Group,
2a. Ex Maestranza - San Bernardo (Medina 2022),
2b: Ford Motor Company – Geelong, Australia (Johnson 2022),
2c: Linseed Oil Factory – Toronto, Canada (Gomez 2022)

The following groups, groups three and four, contained projects with similar effects on the community, providing practical necessities such as housing or the creation of entertainment and leisure opportunities. Overall, these two groups, divided into the shelter ARD group and the recreation ARD group, were designed with the intent to generate reliable and compelling spaces that people would inhabit in their everyday lives. These groups are unique across the class as the adaptive reuse inspiration was much more generalized, necessitating designs that mandated the consideration of long-term occupancy and frequent usage across a wide range of community members.

The first design from the shelter ARD group proposes the adaptive reuse of Lapham Woolen mill, a historic building that is the largest and most preserved structure in this region that was erected during the industrial revolution, located in Millbury, Massachusetts. The town lacks accessible housing to bring in a new talent pool and a newer generation of workers, and as proposed by the Millbury planning committee, the historic mills across the region will be adaptively reused for mixed-used housing (See Figure 3a). With a similar goal, the second design of this group intends to address rising num-

bers of homeless youths and students in Mesa, Arizona by repurposing the F.P Nielson Grain Elevator. As a relic from the industrial heritage of cotton, the grain elevator boasts enough space to accommodate a 10-story building and is close to public transportation of the industrial, residential, and commercial areas of Mesa. The design proposes varied housing options, from single occupancies to family-scale occupancies, and addresses environmental concerns in the area with an occupiable green façade to mitigate heat gain and filter fine dust storms (See Figure 3b). Regarding the recreation ARD group, the first design proposes utilizing the TXU North Power Plant in Fort Worth, Texas to create a restaurant and bar for nearby residents. The power plant is located closely to Tarrant County Community College and downtown Fort Worth and strives to create a sustainable and appealing location for these differing groups of occupants. The design heavily utilizes the nearby river and redirects the water flow to include a watermill that will generate renewable energy for the restaurant and additionally, remind occupants of the industrial power plant heritage that allowed for this renovation to occur (See Figure 4a). The second design in the group focuses on creating a multi-use recreation space for residents in McKinney, Texas through the adaptive reuse of the historic McKinney Cotton Mill. The proposal takes advantage of the large square footage and history of the mill being used for weddings and events and offers additional amenities such as a wedding reception area, rooftop patio, restaurant, and entertainment such as a bowling alley and an arcade. Careful attention to materiality was a key design consideration and the final product intends to complement the original structure while bringing modern forms and activities in to fit the current demographic of McKinney (See Figure 4b).

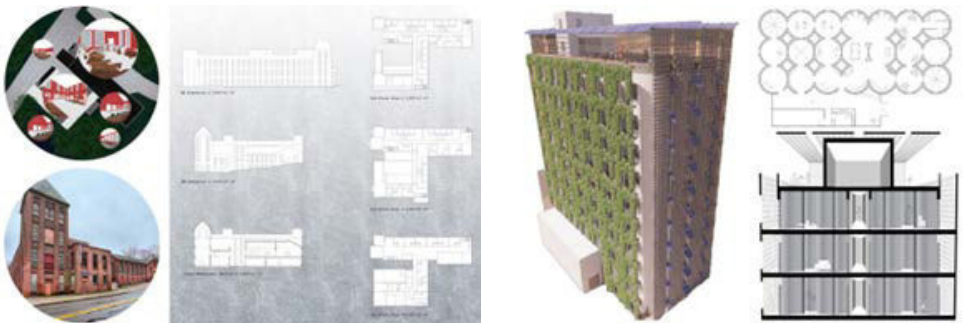

Figure 3: Shelter ARD Group,
3a. Lapham Woolen Mill – Millbury, Massachusetts (Wall 2022),
3b: F.P Nielson and Sons Grain Elevator – Mesa, Arizona (Mccune 2022)

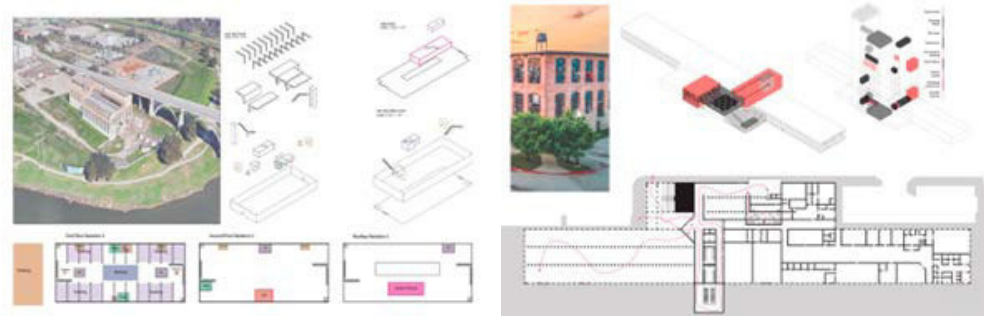

Figure 4: Recreation ARD Group,
4a. TXU North Power Plant – Fort Worth, Texas (Lopez 2022),
4b. McKinney Cotton Mill – McKinney, Texas (Hanson 2022)

The fifth ARD group, knowledge, was concerned with addressing the community through information sharing and rethinking known topics, providing education, and prompting the community to learn. Unlike many designs in this class, the knowledge group did not intend to solve a problem or supplement the community, but instead focused on providing unique opportunities and experiences in the form of museums.

The first adaptive reuse proposal in the fifth ARD group sought to transform Fort Tilden in Queens, New York into a military history museum that allows visitors to explore the historic site. The fort sprawls across the coast of New York and has been dedicated as a National Recreation Area for citizens to embrace the military history, but as it is partially abandoned, covered in graffiti, and overgrown, the adaptive reuse proposal aims to rehabilitate these neglected spaces. The new program includes outdoor areas to appreciate the scenic coastal views, gathering spaces and collections of the military artifacts left behind, and access to the structures that once held artillery and ammunition. Delicate changes and renovations are a key consideration in this design to bolster the existing infrastructure and restore the area to a point that reflects the history of American militarism and allow visitors to increase their knowledge in a safe and accessible space (See Figure 5a). The following design takes a different approach, generating a new type of museum and a unique way to understand varying movement types and learning styles, overall proposing knowledge that is not solely based on history. This project explores the adaptive reuse of the Ford Piquette Factory, a notable example of automotive heritage, located in Detroit, Michigan. The existing factory features a multi-story structure with large vehicle bays lining the bottom floor and apertures in the levels above, granting the opportunity to design

a structure that utilizes sub-levels and irregular heights across the multitude of proposed spaces. As occupants move throughout the building, they will be able to increase their awareness of learning styles such as auditory, visual, and tactile, while learning about movement styles in real time, either taking a meandering, non-linear path or opting to travel directly throughout the design (See Figure 5b).

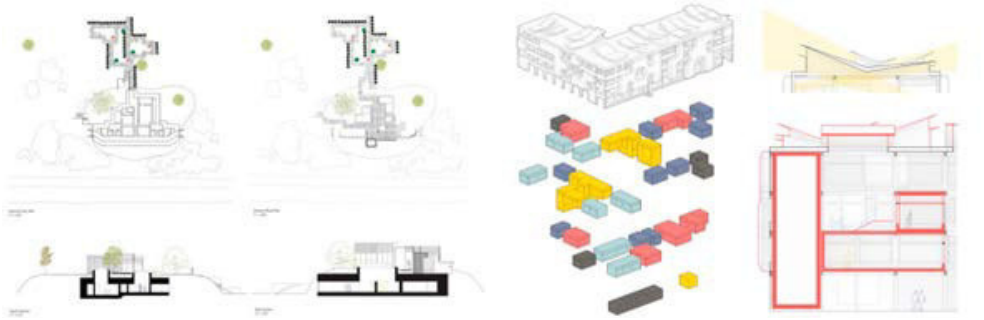

Figure 5: Knowledge ARD Group,
5a: Fort Tilden – Queens, New York (Avila 2022),
5b: Ford Piquette Factory – Detroit, Michigan (Palady 2022)

In contrast to the fifth ARD group, the sixth group titled education, sought to provide specialized infrastructure that will create accessible education and research opportunities that are uniquely suited to the community or location. The designs in this group are deeply connected to the benefits of accessible education and research that could begin to bolster the quality of life for their respective communities. The education ARD group ranges from micro-scale impact design that responds to a specific type and need of education to a macro-scale impact design that intends to generate research and studies that would benefit worldwide.

The first design focuses on the tradesmen and local industry of Orange, Texas, proposing to adaptively reuse Emma H Wallace High and create an education center that provides specialized training for recent high school graduates to enter the petrochemical industry with all necessary training and skills to secure a job. This reuse will generate a vocational school that partners with local industry recruitment specialists, offering an alternative to traditional universities and encouraging residents of the area to consider a trade that will later bolster the community in return. Necessary equipment and workshops are included in the design to centralize the training needed for potential tradesmen and the design can be adapted later if a different industry grows in Orange and requires a new form of vocational training (See Figure

6a). The next proposal focuses on the MacKay Marine Station, a former oil rig that has been repurposed as a mobile aquatic structure, utilizing the oil rig and its capability to be adhered to the sea floor temporarily to form the environment needed for mussel reefs and seagrass beds. This structure is in Cromarty Firth, Scotland but can be moved freely throughout the ocean. The adaptive reuse proposal aims to facilitate a second layer of benefit, creating a sustainable research station on top of the oil rig. As the rig moves locations and promotes marine life formation, the research station will analyze and document the behavior of marine life worldwide. Features such as water filtration, a self-sustaining garden and area for livestock, and adequate housing/recreation spaces are provided to allow this proposal to be as independent as possible and grant the opportunity for the oil rig to stay long enough to form the mussel reefs and study the formation without excessive transport of supplies or boat travel for the researchers (See Figure 6b). The last design proposes the renovation of the abandoned textile mill, the Kiddie Kloss Factory, in Lansford, Pennsylvania. The surrounding community faces high rates of poverty, excessive travel time for accessible employment and childcare, and a lack of space for businesses to expand. The adaptive reuse of the historic textile mill will change the structure into a sustainable structure that provides workshops for office or study settings, a community center that aims to compile and distribute resources for the community, exhibition spaces that respect the heritage of Lansford, and childcare resources. As a design that must respond to changing factors and needs of the community, the adaptive reuse focuses on being multi-usage and adaptable, intending to grow with the community while maintaining a link back to the historical importance of the region (See Figure 6c).

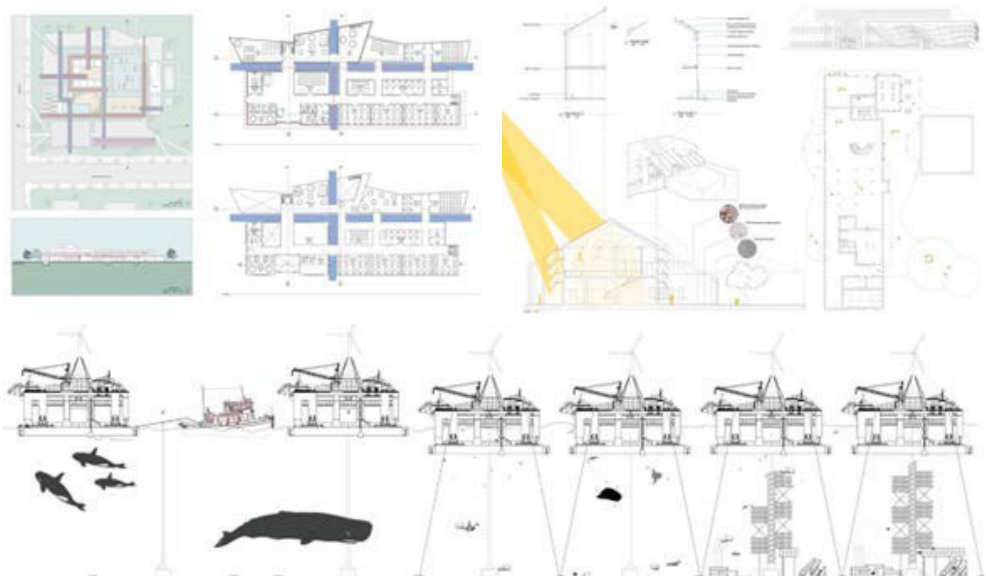

Figure 6: Education ARD Group,
6a: Emma H Wallace High – Orange, Texas (Casey 2022),
6b: MacKay Marine Station – Cromarty Firth, Scotland (Rice 2022),
6c: Kiddie Kloss Factory – Lansford, Pennsylvania (DeGrande 2022)

9. Concluding Notes and Further Discussions

The legacy of various industries, such as oil, textile, and automotive, continues to reshape industry, society, culture, and politics. This article argues for the need to critically engage with the conservation and adaptive reuse of industrial heritage in the context of radical transitions, emphasizing the importance of sustainable local development goals and the integration of social, political, and cultural dimensions in shaping post-industrial urbanscapes. Through various case studies, tis chapter delves into the complexities and challenges of transforming post-industrial cities through the lens of industrial heritage and adaptive reuse. The case studies presented within the chapter highlight the diverse strategies employed by students in the "Adaptive Reuse of Industrial Heritage" studio at Texas Tech University. These projects address various social-political and spatial-cultural challenges in cities that have experienced the impact of industrial revolutions, energy transitions, and disruptive technological innovations.

While the studio projects emphasize the importance of reimagining and revitalizing industrial heritage sites through adaptive reuse, focusing on the needs of local communities, and incorporating sustainable development goals,

they are deeply rooted in the local context and culture, illustrating how the legacy of oil, textile, and automotive industries continue to shape the urbanscape and influence how buildings and cities function over time. By employing a critical, historical, spatial, and analytical problem-based approach, the chapter sheds light on current policies and strategies that promote sustainable local development through the conservation and adaptive reuse of industrial heritage sites. The case studies are powerful examples of how urban environments can transition from their industrial past towards a more sustainable and inclusive future.

Through preserving the legacy of various industries, such as oil, textile, and automotive, these adaptive reuse projects create new urban identities and images, fostering a sense of community and cultural continuity. The collaborative and transnational approach taken by the students in developing these designs highlights the importance of engaging local communities and incorporating their needs and aspirations in the decision-making process. This chapter underscores the significance of adaptive reuse strategies in transforming post-industrial urbanscapes into sustainable and inclusive spaces capable of addressing the complex challenges of radical transitions in industry, society, culture, and politics. As a valuable resource for architects, urban planners, policymakers, municipalities, citizens, and communities, this chapter provides insights and inspiration for the conservation and revitalization of industrial heritage in the context of sustainable development goals and the rapidly changing urban landscape.

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Starting with a systemic understanding of cultural heritage, climate-change related urban transformation processes are analyzed through a multi-disciplinary lens and methods that blend the arts, humanities, and sciences. Governance-specific topics range from relevant cultural markers and local policies to stimulate resilience, to a typology of heritage-related governance and the vulnerability of historic urban landscapes. A variety of contributions from the Americas, Asia, and Europe describe and analyze challenges and potential solutions for climate-change related urban transformation and the role of cultural heritage. Contributions focusing on innovation, adaptation, and reuse introduce the concept of urban acupuncture, adaptive reuse of industrial heritage, and how a historical spatial-functional network system can be related to a smart city approach. The potential role of cultural traditions for resilience is analyzed, as is the integration of sustainable energy production tools in a historic urban landscape. Examples of heritage-based urban resilience from around the world are introduced, as well as the path of medium-technology to address climate adaptation and prevention in historic buildings. The contributions emphasize the need for an updated narrative that cultural heritage can also contribute to climate adaptation and mitigation.

Matthias Ripp, a senior heritage manager with a background of historical geography, is coordinating the "Old Town of Regensburg with Stadtamhof" site. He is active in numerous networks such as Heritage Europe and ICOMOS. He coordinated the EU HerO (Heritage as Opportunity) project and chairs the UNESCO world heritage working group on historic city centres of the German Association of Cities. Since November 2011 he has also been regional coordinator for the North West European and North-American region of the Organisation of World Heritage Heritage Cities (OWHC), is teaching at different Universities and works as a trainer, facilitator and consultant.

Christer Gustafsson, Ph.D. is Full Professor in Conservation at Uppsala University, Sweden. Currently, he is engaged as a member of the UNESCO Culture 2030 Indicators Expert Facility, an international expert group working with indicators for the United Nations' Sustainability Goals (Agenda 2045), Secretary-General for ICOMOS International Scientific Committee on Economics of Conservation as well as Chairman for EIT Culture & Creativity strategic topic group for Innovative, entrepreneurial and circular adaptive re-use of cultural heritage.