



# 3. STATO DELLE RICERCHE

## Brownfield Research : A Comprehensive Review of Library-Based Data Collection and Descriptive Analysis

Sezione II - Stato delle ricerche

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*Brownfields, often neglected in less developed countries, can provide redevelopment opportunities and urban transformation. These areas have high economic and social potential and can be recycled to reduce environmental pollution and save resources. The article examines library-based data collection and descriptive analysis within brownfield research, finding that abandoned lands can be used to revitalize urban zones and improve urban spaces. Although this research originates from the Western world, it is more linked to research data from the Eastern world, especially Iran.*

*Keywords: Land use, Brownfield, less developed countries, Eastern world*

### Introduction

The introduction delves into the pivotal role of land in accommodating human activities, notably in providing housing and urban services. Brownfields, often neglected in less developed countries, are highlighted as valuable spaces for development at various scales. Despite presenting challenges such as social, economic, and environmental issues, these areas also offer opportunities for urban transformation. The inevitability of change in urban development is acknowledged, with both positive and negative effects. Abandoned urban spaces resulting from city expansion or technological advancements, like old factories and military areas, are identified. The importance of recycling these spaces to reduce environmental pollution and optimize resources is emphasized. (Rafiei et al, 2015), (Gadomska ,2018), (Lalbahsh, 2012), (BBC, 2020), and (Whitney,2019). This article's goal is to review the literature on brownfields, particularly in less developed nations, especially Iran.

### Methodology

In curating this comprehensive review of brownfield research, a deliberate and methodical approach was

taken to select articles that contribute significantly to the understanding and advancement of brownfield-related issues. The chosen studies hail from diverse geographical locations, including Tehran, Zanzan, Ilam, Bojnord (Iran) , and Gauteng Province (South Africa), capturing a spectrum of urban contexts and challenges. The selection criteria emphasized a variety of research methodologies, ranging from descriptive-analytical and applied studies to qualitative and quantitative analyses, ensuring a rich representation of the diverse approaches employed in brownfield research.

The chosen studies comprehensively address various dimensions influencing brownfield redevelopment, including economic, socio-cultural, legal, political, and environmental factors.

### Review of Literature

Lalehpour (2019) conducted a study on the Tehran metropolis. The research is descriptive-analytical, and the general method that governs the research is the secondary analysis method, which has been done using library and documentary sources related to the research topic. The results of this survey showed that the policies and laws of the urban land sector did not

aim to deal with speculation in this sector; rather, they strengthened the flow of land speculation in the urban land and housing markets. The inefficiency of the tax system in this sector, ineffective regulations of land separation and demarcation of the city in comprehensive plans, the inefficiency of laws in limiting the private ownership of lands, the lack of determination and effort of the local administrations of Tehran to prepare the lands, and the weak performance of the government and municipality in recycling land in the worn-out urban fabric have resulted in inefficient policies in the land and housing sector and the continuation and prosperity of speculation in the urban land and housing sector.

Haydari et al. (2018) collected the necessary information in the dilapidated fabric of Zanjan city from library and field resources and investigated the methods of land recycling with the approach of meeting the needs of urban housing. The general results of the compiled model of land recycling in the worn-out textures of the city showed valuable results in relation to the amount of recycled land (2054 pieces with an area of 822895.5 square meters, equivalent to approximately 82 hectares). From a quantitative perspective and based on the documentation of the population forecast in the approved urban development plan in the visioning of the research (2011–2021), the number of residential units needed in this vision, in addition to the existing units, was estimated to be 34,682, which can be met by using 3,816 residential units extracted from the context, which includes about 11% of the city's residential needs. Therefore, in addition to solving the need for the lack of land use in the urban texture, brownfields can be effective in creating coherence between adjacent textures, preventing physical expansion, and promoting sustainable urban development in Zanjan city.

Rafiei et al. (2016) conducted research on the process of dealing with recycled land. The research was of an applied type and described and analyzed the content and related literature of urban planning in this field with a qualitative method based on documentary and library studies. It aims to redevelop brownfields and seeks to identify and deal with these lands. The results of the research show that the integrated approach in the process of redevelopment—the collection of primary information, the evaluation, and detailed verification of the site—is one of the components that influence the cleaning and restoration of brownfields, which in turn facilitates the process of redevelopment.

In their research, Rezaei et al. (2016) measured the effective factors in the abandonment of lands in

Ilam City to achieve urban sustainability. The main purpose of their research was to identify and measure the effective factors and forces involved in the emergence of abandoned and unused lands. The research method is descriptive-analytical, and the type of research is applied. They employed survey and library methods to collect data. For data analysis, they applied SPSS software and tests such as Pearson's correlation coefficient, single-sample T-test, and multiple regression. Factors and forces effective in land abandonment have been measured in five dimensions, including economic, socio-cultural, legal, political, and environmental factors and forces. The results showed that there is a significant relationship between all the investigated indicators and the intensity of urban land abandonment. According to these indicators, economic factors have played the greatest role in the abandonment of the inner city lands under study. In general, factors such as migrations caused by the imposed war and migrations of villagers to cities, land and housing policies, incorrect predictions of urban plans, the land stock market, and the prominent role of land grabbers in this matter have affected the formation of a scattered urban pattern and the abandonment of lands in Ilam.

Khakpour et al. (2016) identified brownfields and methods of their development in Bojnord, Iran. One major challenge of land use planning in cities is the lack of land to develop and meet the new needs of the urban landscape, and in such conditions, it is not easy to change the function and use of land. Therefore, in recent decades, according to the land limitations for the development of cities and also the problems resulting from urban sprawl, redevelopment as a proposed approach with an emphasis on internal development can be the answer to the problems facing contemporary urban development. On the other hand, brownfield is a term referring to lands with a risk of pollution to the surrounding environment. These lands were originally used for commercial and industrial purposes and then became parts of urban areas as a result of the growth and expansion of cities. Due to the above-mentioned actions and reactions, over time, they have turned into abandoned and polluted elements that the city does not need, and they have become incompatible with the environment and the society around them. Considering the existence of inefficient spaces in Bojnord city, Khakpour et al. investigated the goals and benefits of brownfield redevelopment and determined the process of how to deal with these types of lands. Then, based on the results obtained, they suggested solutions for the optimal redevelopment of these lands.

Chowdhury et al. (2020), in an article, developed a land use framework to analyze the potential of urban brownfields in the urban circular economy. The circular economy (CE) is expected to accelerate the use of bio-based resources. Cities play an important role in such an economy, not only as primary consumers but also because vegetation provides a myriad of ecosystem services essential to the well-being of urban dwellers. Urban lands are heavily loaded with past and present activities, and urbanization is growing. Retrofitting obsolete and potentially polluted brownfields provides an opportunity to interact with environmental uses within the city. Meanwhile, plants are an important part of gentle restoration options (GROs), a more sustainable alternative for managing pollution risks and restoring soil health. This paper presents a tentative selection of urban green space (UGS) related to brownfields and a set of ecosystem services provided by the selected UGSs. In addition, it provides a framework covering 14 ecologically selected land uses in brownfields, including GRO interventions over time. The framework provides three practical tools: conceptualization of connections between GROs and future applications of UGS, a scatter diagram for realizing 14 UGS opportunities in brownfields, and a decision matrix for analyzing requirements for realizing UGS in brownfields.

Venter et al. (2020) conducted a study on new green brownfield development for sustainable development. They believe that rapid urbanization, industrialization, and globalization have created a legacy of abandoned and empty reservoirs in the urban landscape of Gauteng Province, South Africa, which are considered an environmental problem rather than a development opportunity for effective sustainable development. Their paper was done for a systematic analysis of greenfield and brownfield development characteristics evaluated based on sustainable development objective indicators to determine which category of development contributes to sustainable development. They applied a qualitative research method, using a combination of interviews, case studies, and literature reviews. Based on content analysis and coding, thematic analysis results confirmed that the long-term sustainability benefits of brownfield developments outweigh the short-term financial benefits of greenfield developments. Recommendations, including establishing partnerships and financing models, identifying and defining development strategies for brownfield sites, and enforcing laws, can help realize sustainable, resilient, safe, and inclusive human settlements in abandoned mine sites.

The preceding literature study emphasized the criti-

cal role that land use plays in defining our environment, urban landscapes, and resource sustainability by delving into the complexity of land use and its dynamic changes. The complicated interplay of human actions with the natural world emphasizes the importance of constant monitoring, careful planning, and a thorough understanding of fundamental ideas. The glossary below elucidates basic concepts essential to understanding the discourse on land use and its alterations to improve clarity and provide a reference for readers. These concepts serve as guiding principles, providing insights into the various aspects of land use, urban planning, and the issues given by phenomena such as brownfields.

#### Land use:

Land use involves transforming natural environments into built environments like housing and semi-natural spaces such as agricultural lands and forests (Albrechts et al., 2017). It encompasses various sectors like agriculture, natural resources, and industry, with human activities significantly impacting these changes. (Yari et al., 2020). Urban land use is crucial to urban planning, aiming to organize spatial arrangements for diverse and complex city uses. Understanding how to allocate and distribute land between uses is essential for sustainable urban development (Mohammadi-Doost et al., 2018; Ebrahimzadeh et al., 2017).

#### Land use changes:

One of the environmental hazards and ecological crises that the world is facing today is the land use change phenomenon (Mousavi et al., 2016). Land use changes affect a wide range of environmental characteristics and natural resources, such as water quality, land and air resources, the processes and functions of ecosystems, and climate systems. Therefore, timely and accurate detection of these types of changes is the basis for a better understanding of the relationships and interactions between humans and natural phenomena and, as a result, provides better management and more appropriate use of natural resources (Shenani Howizeh & Zarei, as cited in Sundarakumar et al., Lu et al., 2016) (Teimouri & Asadi Nalivan, 2021).

#### Brownfields:

Brownfields are a concern for government, business, and environmental interests. In general, despite the widespread use of the term brownfields, there is usually no clear definition of this concept (Nosrati, 2016). Some definitions only include industrial lands

or lands that are known to be polluted (Rahnama et al., 2015). The EPA classifies brownfields as vacant, abandoned industrial, and commercial lands whose development or redevelopment has been associated with environmental pollution or actual pollution. Brownfields are defined as areas where the potential presence of hazardous, contaminated, or polluting materials may impede the expansion or redevelopment of the land (Mostofi et al., 2021). Today, the redevelopment of lands that have been used for industrial and commercial purposes in the past and have turned into abandoned lands due to changes in human needs is considered one of the concerns of urban planners in Iran (Taghvai et al., 2016). These lands, which, due to their previous land use, sometimes have various pollutants and are the source of social, economic, and environmental problems, are called brownfields. Samples of brownfields include previously built industrial facilities, factories, gas stations, warehouses, and locations of small businesses. (Saeidi Mofrad, 2021). The UK government defines brownfields as previously developed land (PDL). PDL, as the basis for statistical information collected for the National Land Use Database (NLUP), was launched in 1998 to identify significant redevelopment opportunities for the development of such lands (Green, 2018). There is also another definition of brownfield: "Lands that have previously been developed and were or are still occupied by a fixed structure (except for buildings in forests and agricultural lands) and lands such as parks, recreational horticultural areas, etc. (Simeonova & Van der Valk, 2016).

local communities to manage and protect natural resources, WP2 Literature review and definition of a framework of analysis, 2.a Critical review of the literature on bioregional theories and tools with specific focus on community engagement in the protection and sustainable management of territorial and natural resources, con particolare riferimento al tema delle teorie bioregionali urbane capaci di costituire un framework efficacemente utilizzabile anche per casi di studio situati nelle Aree Interne (v. anche nota 1)

3. Nel testo che segue vengono confrontati alcuni ulteriori risultati preliminari delle attività in corso di svolgimento nell'ambito dei PRIN citati alle note 1 e 2, relativi in particolare ai temi della conoscenza locale (PRIN 2022) e dell'impegno della comunità nella tutela e gestione sostenibile delle risorse ambientali (PRIN PNRR 2022), con l'impostazione dell'Agenda 2030 ONU, soprattutto in relazione alla necessità, emergente dai detti risultati, di focalizzare l'attenzione sui contesti e sulle comunità locali anche per

conseguire al meglio gli obiettivi fissati dall'Agenda.

4. Si veda ad esempio il caso virtuoso del Consorzio degli Uomini di Massenzatica, che ha portato anche all'assegnazione del Premio Nazionale del Paesaggio 2019 e ad una menzione al Premio del Consiglio Europeo del Paesaggio 2018-19 [Ottaviano, De Bonis, 2021].

## Conclusion

The growth of city population and urbanization has led urban managers and theorists to seek the right solutions for urban development. In the two decades of the 1980s and 1990s, the development of abandoned lands was proposed as part of the endogenous development policy. This policy deals with the redevelopment of areas within cities that are polluted, decaying, abandoned and at the same time, have potential such as facilities and urban equipment. A city can be considered a living organism that is growing and evolving, and in this process cells and tissues are gradually worn out, destroyed and replaced again. The accelerated development of big cities and the excessive growth of suburbanization in recent decades have caused heavy industries, which were once outside the urban context due to their unfavorable environmental qualities, to be surrounded by new contexts today. This issue has led to their closure or transfer.

As a result, empty spaces appear in cities, which achieves a new definition of the urban landscape. The vast abandoned lands resulting from this movement in cities, which are also known as brownfields, although they are the source of various urban and environmental problems, nowadays are considered as golden opportunities in the direction of revitalizing urban areas and developing the quality of urban spaces. Realizing these capabilities requires to recognize wasted landscapes resulting from the growth of the city and a part of the cultural landscape of urban dwellers. The adaptive recycling of such wasted landscapes, as a large part of the contemporary city landscape, is one of the most fundamental challenges facing designers in this century. Also, examining the way of allocating land to urban uses in the existing planning models indicates that these models are ineffective. With the rapid growth and horizontal expansion of cities, many lands and worn-out areas have been left behind from the flow of construction and development due to unprincipled and accelerated development. They occupy a considerable part (between 15 and 25 percent) of the dense context of cities, which are of great value.

Currently, a considerable amount of land allocated to industries and warehouses is inactive or abandoned. Such lands have many issues and problems, including economic stagnation and land value reduction, environmental pollution (accumulation of garbage and construction debris), visual pollution, disruption in urban functions such as service delivery and access, reduced permeability in parts of the region, negative impact on environmental security, reducing vitality. To solve the problem some suggestions may be effective including redevelopment of abandoned lands, employing abandoned lands for the economic and social development of the region, the imposition of taxes on abandoned lands and their transactions, the use of abandoned spaces to provide part of the lack of services in the region, prioritizing the organization of abandoned lands that have better access to Arterial route networks in the region and outside the region, establishing the desired quality and integrating the fabric and creating coherence in the spatial organization and skeleton of the region, and finally, strategic policies and implementation mechanisms of these strategies.

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## RIVISTA DEL DOTTORATO IN ARCHITETTURA, ARTI E PIANIFICAZIONE DELL'UNIVERSITÀ DEGLI STUDI DI PALERMO – DIPARTIMENTO DI ARCHITETTURA

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APPROCCI PLACE-BASED ALLA CO-PIANIFICAZIONE DEL  
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L'AGENDA 2030 E L'INTEGRAZIONE MANCATA DELLE  
PROSPETTIVE DAL BASSO  
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