Identification and Monitoring of Degraded Real Estate in the Context of Urban Environmental Analysis and Development Planning in the City of Riga

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Abstract. Nowadays real estate plays an important role in the life of a person: it is one of the important elements of the quality of life (dwelling, workplace), as well as of public spaces, especially the outdoor space, i.e., the elements that make up the image of the city and the aesthetic enjoyment of the city. The topical issue under consideration is directly related to the physically deteriorated real estate that falls into the category of degraded or even dangerous buildings and structures. The article aims at investigating the problems of identifying, assessing and monitoring the degraded real estate in the context of urban development. The topicality of degraded objects is also observed in the main national and municipal development planning documents. The quality of real estate is assessed by different institutions according to the specificity and necessity of their activity, for example, planning and monitoring of territory development, application of real estate tax, as well as determination of the value of real estate. However, according to the research conducted within the article, information on real estate is not always up to date, available or linked between different holders of information sources. Different institutions evaluate the same thing at different levels of detail, but there is currently no fast, efficient and accurate exchange of information. This can be explained by disorganised administrative and legal issues, as well as the inefficiency of mutual communication.

1. Introduction
Real estate is one of the types of property that provides benefits to its owner and often directly affects the environment, processes and people. Not only is the safety and quality of the property important, but also the scenic and aesthetic enjoyment it provides to the passers-by, tourists or its users, which in turn promotes economic development. The importance of high-quality, architecturally successful and energy-efficient real estate is particularly emphasised, even with the granting of various awards, while problematic or degraded property is financially and/or administratively restricted with the aim of restoring it. Great responsibility for property quality, design and availability lies directly on the owner of the real estate because, according to the national legislation, responsibility is not only for its internal content and quality, but also for surrounding people.

Degradation includes both environmental degradation associated with loss of biodiversity, soil degradation, ozone depletion, reduction in water quality [1], [11], lower energy efficiency, higher
maintenance costs [5], and the territory with known or anticipated pollution, abandoned, unused or under-utilised property where past activities have caused environmental pollution but have the potential for restoration or other economically viable use.

In the urban environment, the degraded state of the property (structure, territory) is more used in the context of its socio-economic activity or use; however, separate attention is also paid to the soil. Soil chemical degradation [2] or pollution is one of the types of soil degradation that can occur in water bodies (surface, underground, as well as in sludge). In the urban environment, it is possible to distinguish physical forms of soil degradation, such as its covering with artificial coating with limited permeability (asphalt, cement), compression and erosion [2].

The European network of experts defined brownfields as sites affected by past use of the site and adjacent areas, abandoned or unused, contaminated or considered to be contaminated, mainly located in a developed urban environment, as well as sites that can be returned to useful use as a result of interference [12].

The aim of the article is to investigate the problems of identifying, assessing and monitoring the degraded real estate in the city of Riga.

To achieve the aim, the following tasks are defined:
1) to study scientific conclusions on the identification of real estate degradation;
2) to investigate real estate identification and monitoring activities;
3) to study statistics of degraded property;
4) to identify the possibilities of classification of degraded structures in the city of Riga.

Limitations of the research are as follows:
1) the research covers the period of 2011–2015;
2) the research covers the identification methods of real estate degradation and methods of degradation category determination in Riga.

Within the framework of the research, the authors have used the following methods: a descriptive method, summarising the information and taking into account the scientific literature review, the statistical and analytical methods.

2. Property Identification and Monitoring

At present, there are no common criteria and methodology for identifying and assessing brownfields in Latvia.

The identification and monitoring of degraded objects and brownfields in Riga are carried out in a fragmentary way, such as built-up territories are regularly surveyed, while regular surveys of unbuilt territories do not currently exist, and surveys also depend on the ownership of property (Figure 1).

![Figure 1](image-url)

*Figure. 1. The administrative and organisational structure for the identification and monitoring of degraded objects and brownfields in Riga [12].*
In Latvia, the concept of brownfield/degraded object is used differently. The definition of soil degradation is explained as a result of changes occurring or taking place under the influence of natural processes and human activities, due to which the possibility to use the soil for economic, environmental and cultural functions is reduced. In contrast, brownfield is defined as an area with destroyed or damaged land surface or abandoned structures, mining sites, economic or military territory [14]. Degraded real estate has formed and continues to form due to various international and local socio-economic factors. Here, problems of financial and/or legal nature are often observed.

In Riga, one can observe a significant number of real estate properties at different quality levels, including degraded/non-degraded objects. The vastness of the city, the large number of real estate properties and the changing environment indicate a large amount of information that should be processed, surveyed, evaluated, administered, monitored, etc. However, there is still no single information system that contains information on each building to the extent necessary to make quality decisions, such as the purchase of real estate.

The degradation level of structure elements refers to the degradation of the performance of structures in the context of the decrease in performance of building envelope elements and energy supply systems. Declining performance is affected by wear and tear, inappropriate management, inadequate maintenance [5], as well as the degradation of mechanical properties of building structural materials [13]. Maintenance rather than wear and tear is given a greater role or influence on the occurrence of degradation. As a result, the energy efficiency of the building is reduced and the costs of the building lifecycle increase [5]. This essential condition already indicates the importance of the owner’s administration or maintenance, which is often even a daily matter. Consequently, the area of quality real estate maintenance and management should be particularly highlighted and supported as a long-term policy. In the long run, this would affect the quality assurance of the building fund, its impact on cost reduction and sustainable management.

In the context of urban planning in the municipality of the city of Riga, surveys are carried out to identify the total quality or degradation of objects and territories. In 2004, within the framework of the development of Riga Spatial Plan for 2006–2018, criteria for the identification of degraded territories were developed (based on the experience of the European Union in the management of brownfields, incl. the Contaminated Land Rehabilitation Network for Environmental Technologies in Europe – CLARINET and available materials within the European expert network Concerted Action on Brownfield and Economic Regeneration Network – CABERNET), land and building resources were identified that were previously used economically, but were no longer actively managed or abandoned or contaminated during the research. In Riga, 185 environmentally degrading objects (buildings) and 142 brownfields were identified [3]. In Riga, there are currently over 600 degraded buildings and 200 brownfields [4], which have a negative impact on the city’s ecosystem, public safety and economy.

Brownfields also include data from the Latvian Environment, Geology and Meteorology Centre on polluted and potentially polluted areas. At present, there are polluted areas of 104.1 ha and potentially polluted areas of 283.8 ha in Riga, which make up the largest concentration of polluted and potentially polluted areas in Latvia [10].

The Soviet industrial heritage also includes contaminated water objects [15]. Likewise, modern entrepreneurship has a negative impact on the quality of the environment, for example, despite the port contribution to the economy of the state and Riga, residents in the vicinity of the port regularly suffer from odours, noise, vibration and landscape degradation. Therefore, in the Sustainable Development Strategy of Riga, neighbourhoods of Riga port (Mangalsala, Vecmigravis, Milgravis, Sarkandaugava, Bolderaja and Daugavgriva) are identified as priority areas for improving the quality of the public outdoor environment [6].

The problem of degraded objects is highlighted in the development planning documents of the municipality of Riga: the Sustainable Development Strategy of Riga until 2030 and Development
Program of Riga for 2014–2020 [7]. Political incentives foresee the priority of revitalising degraded objects rather than building new ones, as well as providing support for business development in brownfields [6]. Referring to the above-mentioned planning documents, the European Union funding is attracted for the revitalisation of certain objects/territories.

3. Results and Discussion
Urban environment surveys and information are highly valued as a tool for long-term policy definition, such as spatial planning, support from European Union programs, and as a valuable monitoring indicator. However, this is a general type of study or a general visual assessment, and it does not assess different elements of each structure and their physical assessment. Figure 2 shows a scheme for identifying and monitoring a degraded object in the context of urban analysis and development planning in the municipality of the city of Riga.

**Figure 2.** Identification and monitoring of a degraded object in the context of urban analysis and development planning.

This type of degraded object survey and monitoring takes place on average every seven years, related to the drawing up of territorial development planning documents. It is appreciated that territories are also evaluated in these surveys because at other stages of the quality determination of real estate, only fragmentary attention is devoted to territories. In Riga, brownfields have been divided into natural, residential, business and mixed-use areas. Part of the land is degraded while being at the state of reservation, such as red line corridors reserved for future street infrastructure development, but it is currently not being properly utilised, resulting in degradation and/or contamination.

Riga City Council’s Committee on Buildings Degrading the Environment determines whether the buildings (structures) qualify as environmentally degrading, collapsed or posing threat to human health and safety [8]. The Committee classifies buildings or structures that are degraded, collapsed or pose a threat to human health and safety not only for the purpose of administering a real estate tax, but also consider applications of building owners claiming to postpone the classification of a structure, if it is manifested that a structure will be restored, and evaluates the change in classification assigned to the structure according to its actual visual and technical state, as well as considers other related issues. Committee’s meetings are convened as necessary but at least once a month [16].

It is the responsibility of the owner or the actual possessor of the real estate to maintain the facade of the buildings and other external structures in a technical condition and appearance that does not degrade the environment or ruin the surrounding landscape. Buildings that do not comply
with the requirements of urban and landscape conservation are classified according to their impact on human safety in categories A, B or C.

Category A structure/ruin is **completely or partially destroyed, and it is a structure in a dangerous condition posing threat to human safety**. Category B structure/ruin is **a structure in a potentially dangerous technical condition posing threat to human safety**. Category C structure/ruin is **an environmentally degrading structure** [9].

According to the statistical information, in Riga there are mainly Category B structures, which account for 51% of the total degraded structures, followed by Category A structures (34%), and Category C structures (15%). From the point of view of property ownership, structures that are environmentally degrading, destroyed or pose threat to human security are mainly privately owned (87%), state owned (7%), municipality owned (3%) and of unknown ownership (3%) [17].

The register of environmentally degrading buildings includes environmentally degrading objects and they are subject to an increased real estate tax rate of 3%. The total number of objects in Riga reached 617 on 4 April 2019. The register also includes objects to be monitored, i.e., objects that are maintained in accordance with the requirements of regulatory enactments and currently their number has reached 161, as well as objects with environmentally degrading features that are planned to be examined by the Committee on Buildings Degrading the Environment, and their number is currently 5103 [17]. Figure 3 illustrates the main steps of the classification of environmentally degrading buildings in the context of real estate tax administration in the municipality of the city of Riga.

![Figure 3](image-url)  
**Figure 3.** Classification of environmentally degrading buildings in the context of real estate tax administration.

In the case of this survey, surveys are carried out by several persons who can theoretically interpret objects in different ways. Although a large number of the Committee representatives provide a comprehensive view of building evaluation, it should be borne in mind that in this case only structures are assessed, so the analysis of brownfields remains outside the assessment.

The physical deterioration of a building is much more detailed, which is often the basis for various decisions, but this information is not always relevant to the current situation without updating it.

The indicator of physical deterioration of a building affects the cadastral value of the object, which in turn affects the amount of the real estate tax and the value of the property. Information on building deterioration or physical condition is included in the State Information System of Real Estate Cadastre under the section “Basic Data of Structures.”
As an example, the city of Riga is considered, which is dominated by residential buildings put into operation in the periods of 1900–1914, 1925–1940 and 1960–1975; their number is 3769, 3542 and 5772, respectively. According to the assessment of physical deterioration, most buildings fall into categories of physical deterioration ranging from 21 % to 60 % (see Figure 4).

![Graph showing number of buildings by year of commissioning and physical deterioration](image)

**Figure 4.** Buildings by the year of commissioning and physical deterioration, % [18, calculations made by the authors].

A high proportion of buildings in poor technical condition with deterioration above 50 % indicates poor quality of living environment. Approximately 27 % of residential buildings in Riga have a depreciation rate above 50 % and these are mainly buildings put into operation in the periods of 1875–1899, 1900–1914 and 1925–1940.

Within the Building Deterioration Detection Service, buildings are surveyed locally, determining the ratio (percentwise) of physical deterioration of the main structural elements (foundation, walls, intermediate floors and roof). After the survey, information is updated in the State Information System of Real Estate Cadastre (at the same time, the cadastral value of the building and assessment of real estate are updated). The determination of building deterioration is shown schematically in Figure 5.

![Diagram showing determination of building deterioration](image)

**Figure 5.** Determination of building deterioration.
Determining building deterioration is a very important process in the entire real estate context, which should be given special attention as it affects both value and cost in the short and long term. Therefore, it would be important to carry out such assessments on a regular basis and possibly on request by the state or municipal authorities to have information on the condition of the entire building stock. In addition, as the technical opinions of buildings demonstrate, the information here also depends on the knowledge of the performer and the work done.

Supervision of the operation of structures is ensured by Riga City Construction Board, which makes decisions on the technical examination of the structure or built-in construction products, gives an instruction to eliminate the identified hazards, if the danger of the structure has been detected, — prohibits its operation until the prevention of danger.

Despite different approaches, state and municipal institutions are constantly looking for and applying solutions to force and encourage owners to restore real estate in the city themselves, especially the degraded property. According to the statistics, in recent years the activity of restoring the degraded property has become more active in Riga. If 16 such objects were restored in 2011, then in 2017 their number already reached 205 [19].

According to the regulatory framework, each owner is responsible for keeping their property in good condition. Legislation prescribes a number of conditions to maintain real estate quality and physical preservation throughout their lifetime. They include cleaning conditions, energy efficiency requirements, microclimate, service availability, structure and equipment inspection and maintenance, financial organisation and other management issues.

Reviewing scientific opinions and political documents of the city, the authors set out the criteria that should be taken into account when determining the level of degradation of objects (see Table 1). To perform a comparative analysis at an urban level, for example, when deciding on priority objects to be revitalized, impact weights should be developed and incorporated in the proposed criteria. Moreover, additional information should be added, such as ownership, encumbrances, the cultural and historical significance of the object, the range of persons affected, as well as the potential environmental and socio-economic benefits gained after restoring the object as opposed to the loss if the object is not restored. It is important to evaluate not only the short-term and long-term income losses, but also the maintenance costs and increased real estate tax.

### Table 1. Criteria for Detection of Real Estate Degradation [developed by the authors].

| No. | Criterion | Notes |
|-----|-----------|-------|
| 1.  | Environmental pollution caused by the object | CO2 emissions, thermal areas, soil and water pollution, waste. The larger the affected area size (and/or depth), the greater the weight to be assigned. |
| 2.  | Deterioration | Physical and moral assessment of buildings and their elements, utilities, engineering structures. |
| 3.  | Visual appearance | Visual appearance of facades and other elements of buildings, as well as architectural integrity in a common building space. |
| 4.  | Safety | Compliance with relevant operational requirements. |
| 5.  | Intensity of technical maintenance | Regular and qualitative assessment of the necessity of restoration work, frequency and quality of the works to be performed. |
| 6.  | Functionality | Intensity of real estate use and functionality. |
| 7.  | Financial sustainability | The operation of an object on the basis of sustainable solutions and/or materials. Assessed in the context of Indicator 1 (such as fossil fuels, heat loss) and Indicator 6, such as partial or incomplete use of property (empty/abandoned property that is gradually degrading). |

In the case of degraded property, dismantling, reconstruction or renovation are identified as voluntary restoration measures. They are also influenced by building regulations of a respective
municipality, in the case of Riga, these are the regulations for the use and construction of the territory of Riga, which set the requirements for the use of land plots and structures in the territory of the municipality. In Riga, it is recommended to demolish an environmentally degrading building, as it degrades the environment and to construct a new building in place of the degrading buildings in accordance with the regulations for the use and construction of the territory of Riga for new buildings [9].

**Conclusion**

Inappropriately administering or abandoning a real estate object, it loses its value, attractiveness both morally and physically, and starts degrading over time.

In municipality of the city of Riga, real estate appraisal takes place at several levels, such as survey in the context of urban development and policy making, survey, analysis and evaluation of degraded buildings for application of a real estate tax rate, technical survey findings upon owner’s or manager’s request, various surveys on forced restoration, determination of building deterioration in the context of cadastral information, as well as surveys in the nature performing real estate valuation. There are several evaluations of each building that are not included in a single information system, but are used to make specific decisions.

When the owner or property manager detects deviations from the norm or identifies various deficiencies when deciding on the restoration of the property and starting the restoration, usually the costs are also lower in the long run, and the property is not classified as a degraded one by the supervising authorities, thus the real estate tax rate is not increased and the property is not prevented from being exploited.

In cases where the real estate does not conform to the quality stipulated in the regulatory enactments and its owners do not take the appropriate measures for maintaining the building in good technical condition, several administratively motivating mechanisms are imposed, for example, penalties, increased real estate tax rate, or ultimately Riga City Council’s decision is taken on the forced restoration of the object.

Despite the rapid dynamics of real estate restoration, there is still a need for complex solutions to implement the ongoing process of property restoration, as well as to prevent the emergence of new degraded objects. At present, there is no clear definition of a set of preventing measures in the context of empty buildings in order to prevent degradation of the property.

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