



EVALUATION OF BROWNFIELDS IN LATVIA DEGRADĒTO TERITORIJU IZVĒRTĒJUMS LATVIJĀ

**Gotfrīds Noviks, Edmunds Teirumnieks, Natālija Lemešenoka, Ivars Matisovs,
Ērika Teirumnieka, Ziedonis Miklašēvičs**

Rezeknes Augstskola, Faculty of Engineering, Latgale Sustainable Development Research
Institute, Department of Nature and Engineering sciences
Atbrivosanas aleja 76, LV 4601, Latvia

Phone/fax: +371 64625167, e-mail: novik@ru.lv, edmunds@ru.lv, natalija@ru.lv,
Ivars.Matisovs@ru.lv, Erika.Teirumnieka@ru.lv, Z.Miklasevics@lvm.lv

Abstract. *Brownfields (contaminated or degraded territories) significantly pollutes environment, form derelict landscapes and affects people's security and health. Formation of these sites depends on many factors such as bad industrial practise and economy, inadequate legislation, wastewater and waste management etc.*

Inventory and evaluation of these sites in Latvia is carried out according to Regulations issued by the Latvia Cabinet of Ministers.

The sites are characterised with parameters which differs from accepted in the other European countries. For example, primary classification indicator in Latvia is a degree of ground and soil pollution in these fields and as a secondary factor – presence of destroyed and abandoned buildings.

The paper presents the results of investigation the situation on brownfields in Latvia, especially in Rezekne city, analyses the reasons of their formation and develops recommendations for intensification revitalization process of brownfields.

Keywords: *brownfields, contaminated territories, ground and soil pollution*

Introduction

Brownfields are urban areas which form as a result of many uncontrollable human actions especially during the economy restructuring periods. Brownfields are areas of land and the property therein, within established urban areas, which have ceased their original use, or have become seriously underused. Such areas often bear considerable environmental damage, dilapidated production buildings (see Fig. 1) and disused plants. For a variety of reasons, brownfields constitute a larger portion of urban land in postsoviet countries [1]. Brownfields have an extremely detrimental economic influence on their physical and biological surroundings. The complexities and costs, related to the renovation and re-use/regeneration of these territories, discourage private capital from active economic intervention.



Fig. 1. Former peat factory in Struzani

Brownfields usually require public finance to help remove the barriers to redevelopment, and thus initiate the reuse/regeneration process.

The brownfields problem has emerged, since the 1970's, to a prominent place on the political agenda of developed countries and is now strongly linked to the more general agenda of sustainable urban development [2].

In Latvia instead term "brownfields" is used term "degraded territories" and it means intensive contaminated territories at first.

According to Latvian legislation brownfields in this interpretation are:

- Dumps of the industrial waste;
- Dumps of household waste;
- The gas stations and oil storage bases;
- Storages of hazardous chemicals and pesticides;
- Forage complexes, piggeries, poultry and cattle farms;
- Former Soviet Union army bases.

In Latvia there is not mining industry objects, therefore the scale of degraded territories is significantly smaller than it is in countries where mining industry is well developed. It means that so called contiguous brownfields in Latvia are associated with the production of building materials, including building construction, and partially or fully excavated but not reclaimed quarries (sand, gravel, limestone, clay, dolomite).

The formation and existence of brownfields is the one of the consequences of human activities that leaves the negative impact not only on environment, but also have the direct influence to humans. The formation of these territories rapidly developed in the 20th century and still continues. The main reason for that is the unjustified economical development that demands not only use but often overuse nature resources in order to achieve maximum profits instantly [3]. It is noticeable in all countries, especially in countries experienced changes of a political system. After collapse of Soviet system during 1990-ties in Latvia number of industrial enterprises were closed that resulted in vast formation of polluted/degraded territories.

Materials and methods

The object of the research was brownfields in Latvia.

Investigation included characteristics of brownfields in historical and nowadays aspects.

The methods involved analyse of large scale documents, cartographic materials and databasis regarding to background and development of brownfields, state official rules and regulations and foreign experience in managing degraded territories.

There were used site surveys and visual evaluation of brownfields in Rezekne city also.

The selection of methods ensuring adequate, transparent and comparable information on the genesis of brownfields, the existing situation, problems and forecast changes in the European context, the experience of learning the Latvian case studies provide opportunities of brownfields in research to integrate different approaches and to find appropriate specifics of Latvia brownfields renewal proposals.

Results and discussion

20 years ago problem of the brownfields in Latvia was not supposed for priority and there were not enough financial resources for the revitalization. During this time was created contaminated and potentially contaminated areas register. However, included information is incomplete in many cases. Revitalization was executed only partly.

In Latvia are not large localities in which industry prevails, for example, metal working, therefore it does not form large brownfield territories. In Latvia, also in Riga, already are not complete unutilized abandoned territories.

The causes of brownfields existence are very different. In the Eastern Europe states main reasons of the brownfields existence is population's decrease, economy recession, and dropping land

market costs. In the same queue in Latvia the main reasons of brownfields subsistence are populations decrease and vacant territories.

Latvian Environmental Agency registered 3527 damaged territories; among them 238 were classified as contaminated sites, 2620 - as potentially contaminated sites. It is necessary to continue clarification of contaminated areas [4].

Distribution of the brownfields in Latvia districts is shown in fig. 2. The largest number of the brownfields is storages of oil products and dumps. Prevailing brownfields are situated in Latvia districts, but brownfields are in 6 largest Latvia cities also - Riga, Jurmala, Liepaja, Daugavpils, Rezekne and Jelgava.

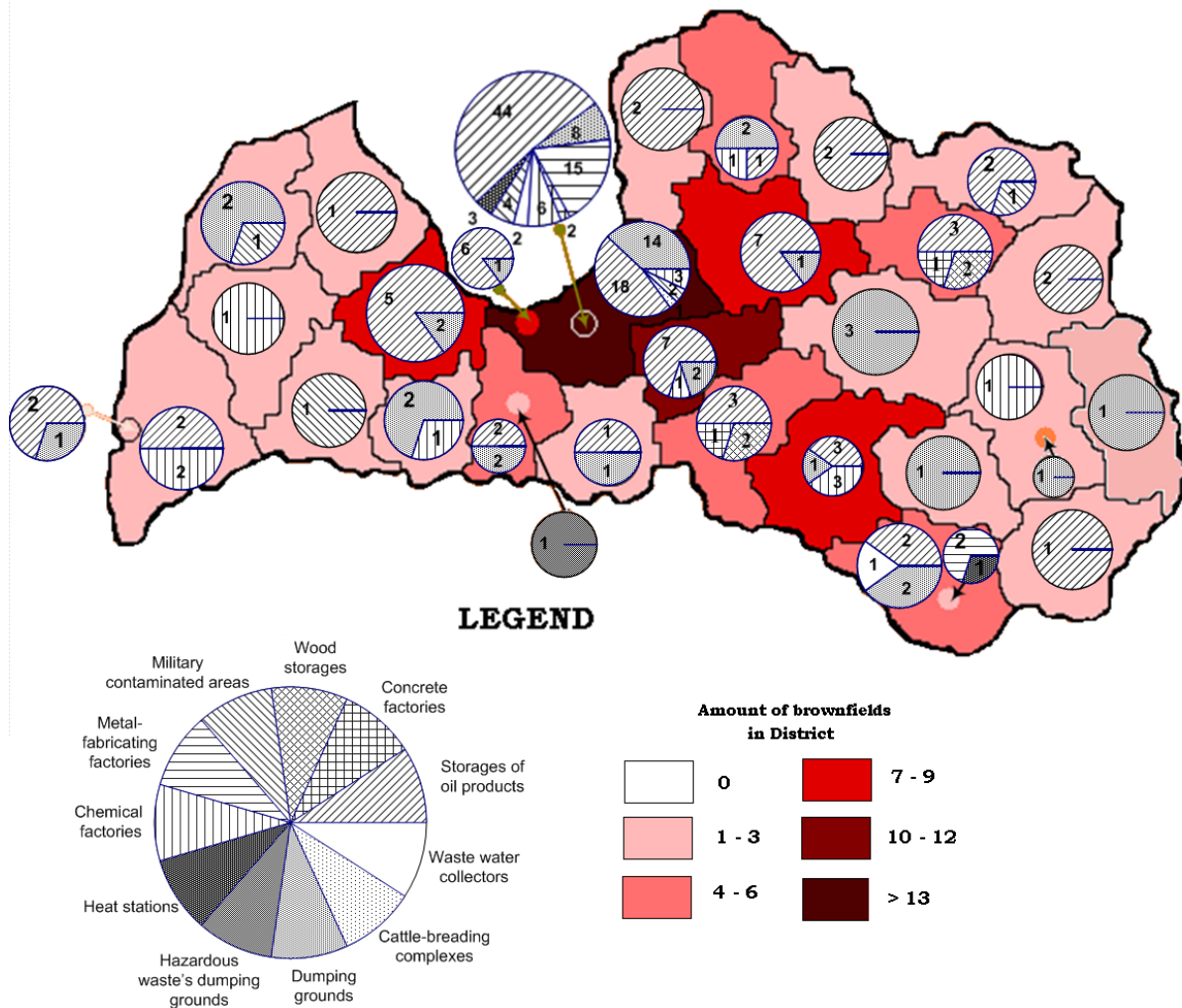


Fig. 2. Brownfields in Latvia districts

The most of brownfields in Latvia are in the inhabited area - the Riga region and especially Riga (see fig. 3). There is the large number of contaminated ground areas and degraded landscape.

The most problematic there are brownfields with a high contamination. In many cases the producer of contaminations at the moment is not accessible. Producers of wastes ordinary are enterprises and structures, which in nowadays do not exist and are not also direct proprietor too.

The places, which are evident as most polluted in Latvia territory, are [5]:

- The Incukalns sulphuric acid petroleum ponds. Contaminants: oils, asphaltens, sulphate acids and sulphuric acid. Place is former sand quarry. Polluted area is approximately 130 ha. The filtration of the contaminants will reach Gauja river approximately in 25-30 years. From this reason it is necessary hasty to abolish a contamination source and to diminish a contamination level in all polluted area.

- The dump of the liquid hazardous wastes in Olaine. The dump contains 2500 m³ liquid and 4000 m³ solid waste. The main polluting substances are piridin, buthanol, izopropilalcohol, chlorides and ammonium.

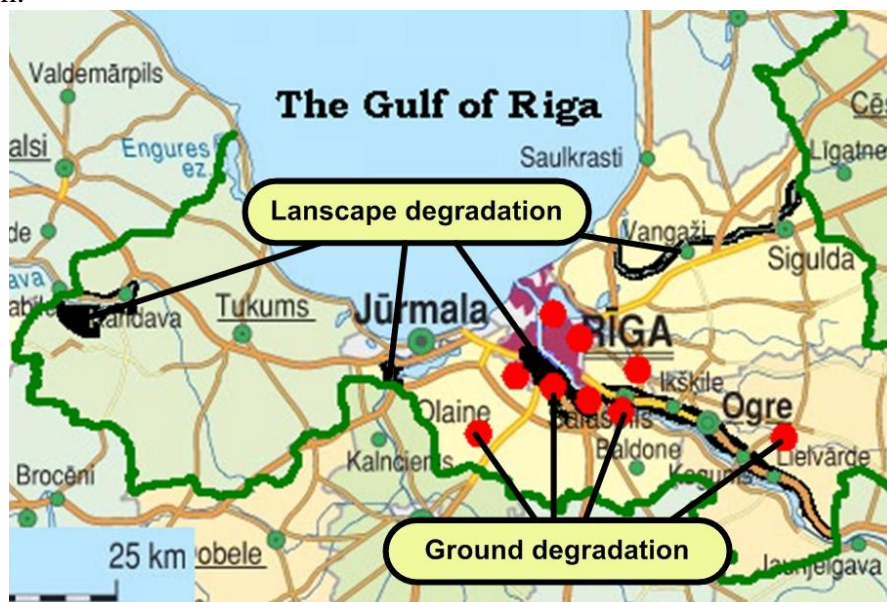


Fig. 3. Brownfields of Riga region

- The Karosta in Liepāja. Already in 1992 the HELCOM acknowledged the Karosta in Liepāja as one of the most polluted place in the Baltic Sea region and included it in the Baltic Sea Act program in 2000. The Karosta in Liepāja 50 years was a military area. In this time the Soviet Union military forces have created and abandoned serious ecological problems. A canal ground is covered by 0.1 to 2 meters thick layer of polluted sludge with heavy metals, hydrocarbons, oil products and other chemical substances. Concentration of the pollutants in a channel is 10 - 100 times larger than in Riga and Ventspils ports. Canal length from a port gate to the barrier is 3200 m, it joins a sea with the former part of the military territory and sea military harbour. The canal area is 780000 m². The volume of the polluted soil is approximately 600000 m³. The canal ecosystem, especially river fauna and flora, is nearly obliterated.

- The liquid hazardous wastes dump „Space” in Jelgava. The liquid and toxic wastes were deposited to this place from a savage of leather factory, factories of agriculture technical equipment and other. Now these wastes together with silts are situated in 4 ponds. Territory is polluted with chlorides, sulphates, organic acids and ammonium. In the 1987 ponds of sands were broken and large amount of the liquid waste deluged forest and the vast territory was polluted.

- Former air-port territory Rumbula (fig. 4). There was refueling base of the military aviation from 1954 to 1978. The leak of aviation fuel in the environment was approximately 1000 tons. The aerodrome is situated 20 km from the Daugava river outfall in Baltic Sea. The total polluted area is 100 800 m². In the soil the concentration of oil products are within the limits from 1000 mg/kg (reserve of the military aviation fuel depositary) to 23 000 mg/kg (fuel of the military aviation allocation point).

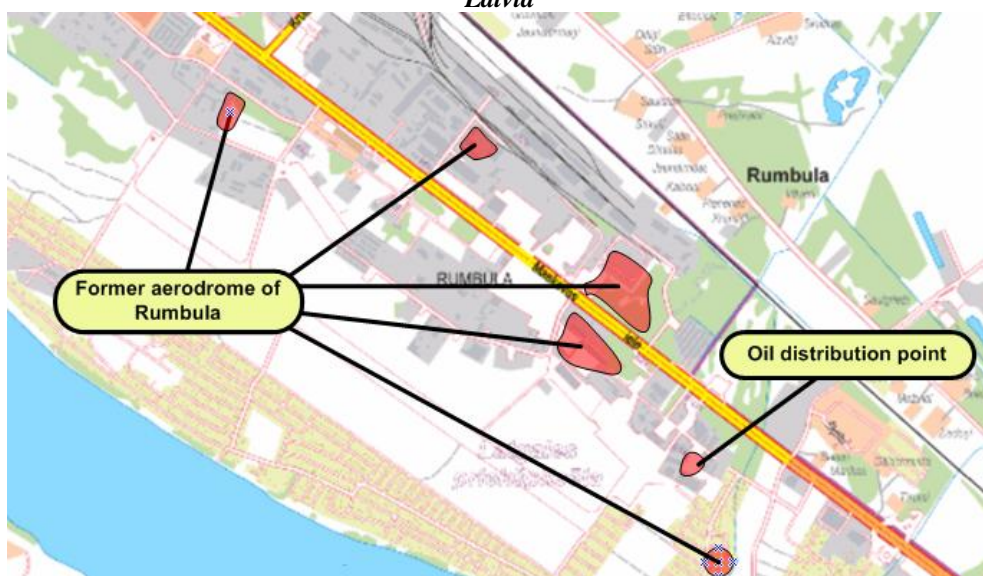


Fig. 4. Former air-port territory Rumbula

In 1997 the computer model of the polluted territory to investigate hydrogeology processes was created and in collaboration with the Denmark EPA project in 1998 were executed researches of the most effective technologies for territory purification.

- The Jaunmilgravis and Sarkandaugava contaminated territories. They are conglomerate of the enterprises, from which the most contaminated are an oil terminal territory and enterprise of oil territory. Contamination with oil products started in 1970s and now the level of oil products is 1.37 m. Oil products consist mainly from derv with a small petrol admixture, in a few places with a kerosene admixture.

In the Republic of Latvia particular status (not polluted, potentially polluted or polluted) is acquired to territory according to the Regulation of the Cabinet of Ministers No. 483 "On Ascertaining and Registration of Polluted and Potentially Polluted Sites" [6]. A territory is assessed by answering questions and summarizing score (see fig. 5). Given below is the example of evaluation of railway station Rezekne II (there is not polluted territories in Rezekne region, but 25 territories are recognized as potentially polluted such as heating boiler houses, hardware production plants, oil terminals, transport territories, wastewater collection and processing sites, distribution centres of solid, liquid and gas fuel, wood-processing plants as well as concrete production plants.

Rezekne brownfields may be divided into 4 specific groups (fig. 6): the deserted built-up areas (8) industrial areas (7), military-contaminated areas (3) historical buildings in catastrophic conditions (2). Arrangement of the brownfield states in Rezekne is uneven - most of them (by area) are located in the north area behind the railway. Many sites are located in the historic center of Latgale Street, and around the recreational object – the Kovshu Lake. As a specific type of brownfields can be mentioned the railway, what effects the landscape degradation and divides the city into 2 sectors [7].

Majority of Rezekne brownfields are not included into potentially contaminated territory register - it means that for revitalization projects there is weak legal motivation to plan activities – and so rehabilitation process may be continuous and complicated.

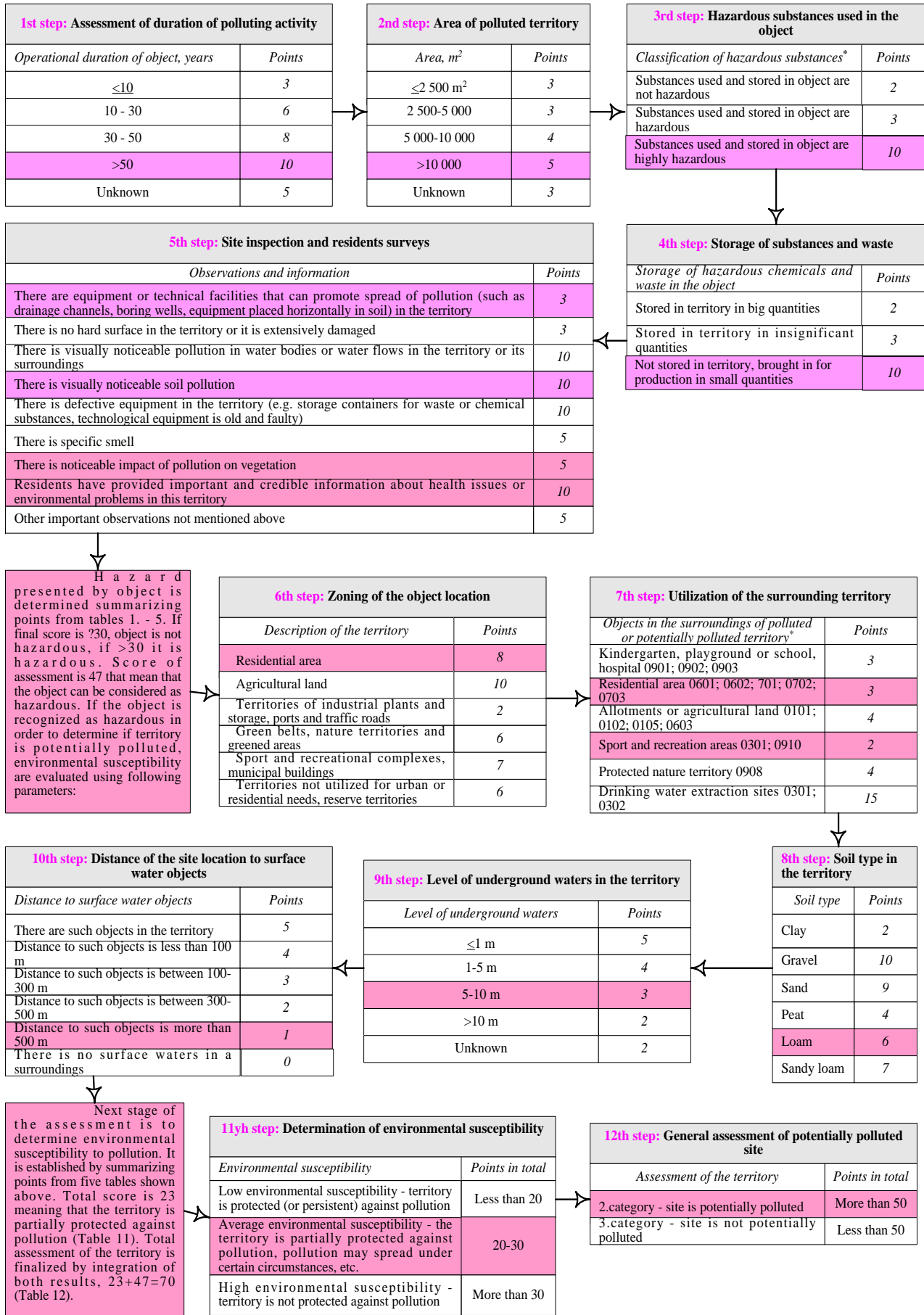


Fig. 5. Example of evaluation of railway station “Rezekne II”

Revitalization process of brownfields needs to be considered in the context of the following factors:

- Cities economic development, the rate of change - under favourable conditions a number of brownfields are restored with the private sector resources;
- Tourist industries development - increasing number of tourists demands to ensure appropriate infrastructure and an attractive urban environment;
- Society segregation in population groups, degraded living environment as a physical manifestation of social problems;
- Districts area development (strict building control in greenfields areas to strengthen the interest of brownfields);
- European Union policy and revitalization potential support for sustainable urban development and brownfield revitalization.

To assure brownfields revitalization, it is needed [8]:

1. To fulfill detailed measure the situation, which involves:
 - Gathering information about existing brownfields (geological and hydrological circumstances, topography, the site's existing and planned usage, building intensity and other physical, economic and social indicators that characterize these areas);
 - Feasibilities of new brownfields forming and determination the causes of their existence;
 - Possible scenarios and models of brownfields evolution.
2. To create publicly accessible database of brownfields. The database may be used to check the situation and strategies for implementing the results of the assessment.

Priority determination of brownfields revitalization [3]:

The municipality must define a priority of brownfields restoration in accordance with the city development, limiting the area of extensive usage. As a potential priorities are: the functional diversification of industrial areas, the new potential town centres development, challenges in a new territory planning.

Companies, land holders and cities politicians' information and awareness forming of brownfields: Brownfields revitalization is a complicated and expensive process. Local municipal priorities and actions need to have public acceptance. The process need to be transparent for public discussion. The strategy is to provide a proposal for connecting the public program of brownfields regeneration.

Acknowledgment

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