Rising from ruins: from derelict spaces to sustainable landscapes – the Portuguese case

Luis Loures, Frederico Meireles, Laura Costa and Ana Loures

Abstract—The legacy of derelict, obsolete, and often abandoned post-industrial structures and sites we face today in our landscapes is, arguably the result of human current and former uses of land. One way or another, the present situation, enabled by technological innovation and structural economic change, is founded in human (ab)use of limited and valuable resource, and on his increasing ability to affect large landscapes. Though it is widely recognized that the reclamation of post-industrial landscapes constitutes an important strategy towards city development, it is normally acknowledged that redevelopment projects are generally associated to multidimensional objectives based somehow on a twist of sociocultural, economic and environmental issues. By assessing a set of 18 redevelopment proposals/projects where it is possible to identify the relevance of each of them to the different sustainability dimensions and therefore to urban development, this paper aims to point out the relevance of these projects to achieve sustainable urban environments considering the aforementioned levels. The analyses of the case studies presented in this article enabled us to conclude that even if post-industrial landscapes are commonly experienced negatively, as fragmented and incoherent because it is difficult to conceive a legible whole, the redevelopment of post-industrial facilities may enable a sense of spatial enlargement, with high degree of complexity and with diverse ecological and social benefits, contributing to local redevelopment, reason why they should be viewed as a resource and its recovery as an opportunity.

Keywords—Urban development, Post-industrial landscapes, Redevelopment process.

I. INTRODUCTION

The need for greater environmental protection coupled with the appearance of several postindustrial derelict areas and the increasing public awareness to the necessity to reclaim degraded landscapes provide great challenges not only for landscape architects and reclamation professionals but also for planners, natural resource managers and policy makers. Though this problem encompasses numerous categories of manufacturing infrastructure all over the world, this paper will focus only on urban postindustrial sites, where reclamation - redevelopement processes play an important role in city redevelopment throughout the creation of multifunctional sites able to fulfill peoples needs at different levels, while contributing to urban sustainability. Additionally, though it is widely recognized that the reclamation of postindustrial landscapes constitutes an important strategy towards city’s development, it is normally acknowledged that redevelopment projects are generally associated to multidimensional objectives based somehow on a twist of sociocultural, economic and environmental issues. The legacy of derelict, idled, obsolete, and often abandoned post-industrial structures and sites we face today in our landscapes is, arguably the result of human current and former uses of land. One way or another, the present situation, enabled by technological innovation and structural economic change, is founded in human (ab)use of this limited and valuable resource, and in his increasing ability to affect large landscapes. “As the world moved from agriculture to industry, a mechanist view of the universe began to supplant the idea of an organic nature. A desire for “progress” and faith in technology implied that the earth was a place to extract resources and its “complementary” idea: that the earth could absorb anything humankind asked of it” [1].

Though, changes in society’s values began in the 1960s enabled a different view, according to which the former production and consumption patterns were no longer acceptable. As these landscapes become economically disadvantaged, environmentally degraded and socially distressed, several planners, designers and urban developers started to react to decline, both by looking for answers to the social and economic problems caused by the growing wastelands [2] and by developing new methods to transform them, considering that the issues facing postindustrial land transformation today are multidimensional, including sociocultural, environmental and economic aspects.

In fact, as it was mentioned before, it is increasingly acknowledged that previously developed land (e.g. postindustrial landscapes) constitute an undervalued asset towards urban redevelopment. As mentioned by Loures [3] this idea is supported by the six key challenges for producing a sustainable built environment presented by the European Council for Construction Research, Development and Innovation [4]: urban sprawl; redeveloping industrial sites; regenerating brownfield sites; sustainable construction; green space, and regenerating distressed neighborhoods.
Somehow, all these principles may be directly or indirectly connected with postindustrial land transformation processes. However, even if it is argued by several authors that investing in the redevelopment of existing sites may be preferable to developing new areas [5, 6, 7, 8, 9, 10, 11, 12], and that several redevelopment/land transformation programs (as it is the case of PRAUD (Program for the Reclamation of Derelict Urban Areas) and POLIS (Program for Urban Requalification and Environmental Valorization of Cities) in Portugal; SUPER - Sustainable Urban Planning and Economic Redevelopment and CABERNET (Concerted Action on Brownfield and Economic Regeneration Network) in Europe; and CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act), commonly known as Superfund [13] from EPA, and AHP - Affordable Housing Program - Brownfields Initiative in North America) provide decision-making tools that help optimize the profits and costs of redeveloped sites reducing political conflicts, economic barriers and environmental problems, it is still hard to assess such options scientifically, and to demonstrate that one is better than another, at least at design, conception and programmatic levels [3].

Nevertheless, all over the world, several regions and countries have begun to embrace the notion that postindustrial landscapes offer unique opportunities to the creation of multifunctional landscapes, viewing their value to society in a broad sense. Recognizing that more than ecological and environmental reclamation opportunities these sites embodied alternative social, cultural and economic values [14]. In fact, development of creative cultural and recreational amenities and the improvement of the image of the city through landscape transformations is increasingly acknowledge [3, 15]. These new trends are evident not only in specialized literature [16], [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], but also in several international design competitions promoted to transform large scaled postindustrial sites all over the world. Downsview Park, located at a derelict military air base in Toronto and Fresh Kills reclamation project, the world’s largest landfill on Staten Island, New York, represent not only these tendencies but also landscape reclamation practices applied to postindustrial sites in North America [18].

In Europe, Parc de la Villette design competition held in 1982 - according to Turner [27] “the twentieth century’s most important park design competition” – created a momentum for the beginning and dissemination of large scale land transformation projects; proving this is the IBA (International Building Exhibition) in which various Architects, Landscape Architects, Urban Planners, and Environmental Engineers got together with numerous other specialists and worked for ten years in the Ruhr Valley – Germany, exploring innovative possibilities, programs, functions and uses for postindustrial landscape transformation projects [28], [29]. Those competitions showed that perceptions concerning what might constitutes land transformation and redevelopment has changed towards environmentally cognizant sensibilities and contributions from a broad array of specialists [30] because more than greening, it is necessary to create condition that enable economic development and attract people to those spaces [3].

II. METHODOLOGICAL FRAMEWORK

Recognizing that any attempt to understand/define “good urban design” must embody the principles of sustainable development, the present research is based in a methodological approach (fig.1) that considers building design, landscape design and urban design as part of the same process, which constitutes the only way to deliver a more integrated, more skilled and more effective analysis of a specific design process [3]. In this regard the developed analysis is based in the verification of the presence of specific aspects in the design strategy used on the analyzed projects, considering the integration of specific criteria, put forward by Loures et al. [31] as is the case of: (i) protect and conserve quality landscapes, while enhancing natural and historic/heritage resources; (ii) develop a clear redevelopment vision and strategy; (iii) enable resilience, considering the ability to be long lasting and adaptable to new uses; and (iv) show the ability to promote biodiversity, to create good places for people, and to aid economic development.

Fig. 2 – Methodological approach.
In this regard, in order to understand and evaluate the complex relationship between postindustrial landscape redevelopment and urban sustainability (considering the three sustainability pillars), a set of redevelopment projects that represented specific examples of multifunctional redevelopment as catalyst for urban regeneration and economic development was selected, and their impact on sociocultural, economic and environmental aspects assessed. For each project a specific evaluation and description form was created (fig. 2) in which it was possible to highlight the most relevant facts of every single redevelopment proposal and the main impacts it had to the different sustainability dimensions.

III. CASE STUDIES ANALYSIS AND RESULTS

Considering the afore-presented methodology the selection of study areas constitutes an essential component of the research, representing an important aspect to the accomplishment of the present study. In this regard, the selection of “best-practice” case studies (as well as the definition of a practical case study area) considered a set of predefined parameters. Regarding the selection of “best practice” case studies, the process is anchored in the collection and analysis of as much postindustrial land transformation projects as was possible within the boundaries set by schedule and economic constraints.

In this sense, throughout the investigation as many postindustrial land transformation case studies as possible were identified. After identifying the project, it was necessary first to address the availability of data and to verify the possibility to access, collect and use that data. If the necessary information is available, and the case study considered relevant for the research, considering the characteristics of the project and the objectives of the research, the project was addressed.

In order to keep the review manageable, analysis was limited in several ways. First, the research focused only postindustrial land transformation projects in which pre-design goals/objectives, were clearly established. Second, the selected projects should obey to a set of selection principles that included:

- transferability and/or contextual relevance to the study area (postindustrial land transformation) considering not only the specific principles and frameworks of the design strategy used in the redevelopment process, but also size, social diversity, cultural relevance and impact of the project;
- the direct analysis of the case study, so that the inferential ideas and conclusions presented during description and analysis, regarding not only the design strategy adopted, but also the presented solutions, the construction options, the program, and specially the planning and design principles used, could be precise and effectively confirmed;

For this purpose, 18 case studies were selected for analysis, using objective criteria according to the pre-established methodological framework. These case studies were divided into three groups, considering their significance for urban sustainability at sociocultural, environmental and economic levels. Besides the aforementioned criteria the ability to protect and protect and/or highlight industrial heritage was also assessed, since it is considered an important cultural objective of postindustrial redevelopment, which is inherently sustainable, considering it encourages the positive re-use of redundant buildings that are part of our industrial and commercial heritage. Conservation was, in fact, considered a very important aspect for postindustrial redevelopment, considering the information put forward by several international studies that highlight postindustrial redevelopment capability to raise local environment quality, preserve local distinctiveness, attract visitors and new business, and maintain genius loci.
Considering this information, for each case study several aspects were investigated and analysed, including location; design team; project typology and use; size; brief description of the project background/history; significance and uniqueness of the project; goals; program and design strategy; lessons learned and project limitations. After the analysis of each of the selected case studies, following the aforementioned protocol the influence of the redevelopment proposal in each of the sustainable development pillars/dimension was heuristically assessed, using an approach similar to the one proposed by Lang (1994) in order to identify normative theories in urban planning [33].

Taking into consideration the various sources of data and information regarding the eighteen analyzed case studies and the impact they had on each of the urban sustainability pillars (environmental, social and economic) – table 1 (some of them had a specific impact on more than one pillar), their significance and benefits to urban development at different levels were identified and briefly described.

| Table 1 – Analyzed case studies – and their impact on urban sustainability |

<table>
<thead>
<tr>
<th>Name</th>
<th>Design Team</th>
<th>Former Use</th>
<th>Location</th>
<th>Sociocultural</th>
<th>Economic</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Área Mineira de Aljustrel</td>
<td></td>
<td>Mining</td>
<td>Aljustrel, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Auditiório Municipal</td>
<td>António Meireles and Vibeiras</td>
<td>Canning Factory</td>
<td>Olhão, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Boca do Rio Resort</td>
<td>Architect Fernando Raposo</td>
<td>Canning Factory</td>
<td>Lagoa, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Braga Municipal Stadium</td>
<td>Souto Moura Arq. Lda + Daniel Monteiro</td>
<td>Quarry</td>
<td>Braga, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Casa dos Cubos</td>
<td>Embaixada Arquitectura</td>
<td>Storage Warehouse</td>
<td>Tomar, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Convento das Bernardas</td>
<td>Souto Moura Arquitectos Lda</td>
<td>Canning Factory</td>
<td>Tavira, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Jardim de Santa Luzia</td>
<td>Topiários</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Marina Loftis &amp; Apartments - A Fábrica Arquitectos</td>
<td></td>
<td>Brick Factory</td>
<td>Lagos, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Museu de Portimão</td>
<td>José Cid &amp; Isabel Aires, Lda</td>
<td>Canning Factory</td>
<td>Portimão, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Parque Tejo-Trancão</td>
<td>PROAP + Hargreaves Associates</td>
<td>Industrial Waterfront</td>
<td>Lisbon, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Parque Oriente</td>
<td>Tirone Nunes Arquitectura, Lda</td>
<td>Industrial Block</td>
<td>Lisbon, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Parque Urbano de Santa Iria da Azóia</td>
<td>Biodesign</td>
<td>Landfill</td>
<td>Santa Iria da Azóia, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Pavilhão do Arade</td>
<td>Miguel Arruda Arquitectos Assosados</td>
<td>Canning Factory</td>
<td>Lagoa, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Quimparque</td>
<td>RISCO + Juan Busquets BAU</td>
<td>Industrial District</td>
<td>Barreiro, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Requalificação da Zona Industrial do Bom João</td>
<td>Parque Expo</td>
<td>Industrial Waterfront</td>
<td>Faro, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Requalificação Urbana da Lisnave</td>
<td>Richard Rogers</td>
<td>Industrial Waterfront</td>
<td>Almada, Portugal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
IV. DISCUSSION AND CONCLUSIONS

The analysis of the presented case studies showed that the redevelopment of postindustrial areas might promote sustainability, reducing negative environmental impacts, and fomenting economic prosperity, social inclusion, multifunctionality and a better quality of life. In fact, even derelict and degraded industrial areas can be created with a new spirit and can be made worth living by keeping visible the spirit of existing site, by applying design strategies that contribute to economic prosperity, social cohesion and environmental quality. As shown in Table 2 the analysis of the selected case studies made clear that there are several benefits arising from post-industrial redevelopment. Moreover, if one assesses simultaneously Table 1 and Table 2 it is possible to identify several projects that present multiple benefits, i.e. benefits at different sustainability pillars.

Table 2 - Postindustrial redevelopment benefits to urban sustainability

<table>
<thead>
<tr>
<th>Sociocultural</th>
<th>Economic</th>
<th>Environmental and aesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase sense of belong</td>
<td>Utilize existing infrastructure</td>
<td>Remove contaminants from the environment</td>
</tr>
<tr>
<td>Increase pride in community</td>
<td>Reduce urban sprawl – reuse</td>
<td>Create and protect wildlife habitat</td>
</tr>
<tr>
<td>Increase in park-land and open space</td>
<td>Reduce infrastructure cost</td>
<td>Increase flora and fauna diversity</td>
</tr>
<tr>
<td>Increase quality of life</td>
<td>Increase property values</td>
<td>Increase human</td>
</tr>
<tr>
<td>Encouraging recreation and connectivity</td>
<td>Encourages inner city</td>
<td>Create green open space and recreational opportunities</td>
</tr>
<tr>
<td>Protect and highlight industrial heritage</td>
<td>Job creation and increased income and investment</td>
<td>Reduce greenfield consumption</td>
</tr>
<tr>
<td>Neighborhood revitalization</td>
<td>Increase value of cultural assets</td>
<td>Improved aesthetic quality of urban fabric</td>
</tr>
</tbody>
</table>

Additionally, the analyzed case studies showed that it would be useful to set up a common language among redevelopment interventions in different post-industrial landscapes/sites, so that besides increasing visual/aesthetic quality the projects represent an effective public benefit, highlighting the sociocultural and historic relevance of these landscapes for urban sustainability.

This is increasingly relevant because, even if, only a few industrial buildings are of true importance to national and regional heritage, its conservation and reutilization represents an important environmental, economic and socio-cultural advantage, towards the establishment of true sustainable development. In this regard though it is recognized that the presented postindustrial redevelopment project contributed to increase not only landscape quality but also life’s quality of local inhabitants, it is arguable that the design solutions developed for this landscape, failed in the application of some best-practice techniques of postindustrial redevelopment, as is the case of:

-Introducing public participation in the redevelopment process, ensuring that the community can play a role in shaping the redevelopment proposals;
-Ensuring that development responds both to site and context, reinforcing the sense of place and local distinctiveness;
-Reusing previously developed sites or unused buildings, ensuring more compact development that enhances accessibility, affordability, and conviviality;
-Promoting the continuity of multifunctional spaces associated with industrial buildings and street frontages; and
-Ensuring that proposed redevelopment approaches create places that have variety and choice through a mixture of different uses, functions and activities.

However, the analyses of the case studies presented in this article enabled us to conclude that even if postindustrial landscapes are commonly experienced negatively, as fragmented and incoherent because it is difficult to conceive a legible whole, the redevelopment of postindustrial facilities may enable a sense of spatial enlargement, with high degree of complexity and with diverse ecological and social benefits, contributing to local redevelopment.

Resulting very often from public private partnership (PPP), postindustrial redevelopment projects are generally promoted under the argument that the reutilization of former postindustrial landscapes and/or buildings contribute to improve the quality of life not only at local level but also in the surrounding landscapes, while fostering the maintenance an important part of people’s collective memory.

However, as mentioned by Loures et al. [31], even if redeveloping an underused site is generally beneficial, people’s needs and desires need to be take into consideration in order to assure that the new development may be a resilient and sustainable one.

In this regard in order to create a successful and sustainable reclamation design it is important to recognize and interpret the historic and cultural significance of the landscape and to understand how landscape ecology and design can invent alternative forms of relationships between people, place, and cosmos so that landscape architectural projects become more about invention and programs than the merely corrective measures of restoration [32].
Acknowledgements:
The authors would like to acknowledge financial support given to Luis Loures whose contribution to this paper is financed by National Funds provided by FCT-Foundation for Science and Technology through project UID/SOC/04020/2013.

REFERENCES


Luis Loures is a Landscape Architect and Agronomic Engineer, Professor both at the Polytechnic Institute of Portalegre and at the University of Trás-os-Montes e Alto Douro, who holds a Ph.D in Urban Planning, focusing the relevance of landscape architecture design projects not only in urban planning procedures but also in the maintenance of industrial heritage. Since he graduated he has published several per reviewed papers at the national and international levels and he has been a guest researcher and lecturer both at Michigan State University (USA), and at University of Toronto (Canada) where he has developed part of his Ph.D. research with the support from the Portuguese Foundation for Science and Technology (Ph.D grant). On recent years he has teach in several courses in different Universities, both at Ph.D and Master levels including the University of Trás-os-Montes e Alto Douro – Portugal, Letterkenny Institute of Technology – Ireland, the University of Algarve – Portugal, The University of Santiago de Compostela, Ryerson University – Canada, Nurtening University and University of Extremadura, mainly regarding the fields of landscape architecture, urban and environmental planning, sustainable development, and the sociocultural and economic reconversion of depressed areas in shrinking cities.

Frederico Rodrigues was born in Vila Real, in the north of Portugal. He holds a five-year diploma in landscape architecture by the University of Trás-os-Montes and Alto Douro (UTAD). In 2015 he has concluded his PhD in Landscape Architecture at the Faculty of Sciences of the University of Porto, focusing the post-occupancy evaluation of the contemporary urban parks in Portugal. He has been teaching at UTAD since 2001, where he is now a Professor in Landscape Architecture and also been involved in professional practice, cooperating with offices and in the University studio. His publications have been focusing the evaluation of green spaces and the alternative recreation and restoration in the urban setting. He is a researcher of the CITAB Research Centre and his main fields of research are urban green park evaluation and critique; urban allotment gardens design and evaluation; open space, health and inclusion. Doctor Rodrigues has been a member of the Executive Committee of European Council of Landscape Architecture Schools (ECLAS) since 2009, and was awarded in 2015 for his Outstanding Service in the organization and running of ECLAS.

Laura Costa is a landscape architect with a PhD in Landscape Architecture from the Faculty of Science of University of Porto under the theme: “The vegetation in the implementation of projects of landscape architecture”. She is an assistant professor in the Forestry and Landscape Architecture Department at University of Trás-os-Montes e Alto Douro, and currently develops teaching and research in landscape architecture field: landscape design and planting in urban and rural environments.

Ana Loures is a landscape architect with a Master in Landscape Architecture from the Faculty of Science and Technology of University of Algarve focusing landscape evaluation methods in rural/urban environments.