



## Research Article

### Brownfields: Land Degradation to Land Opportunities

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**Abstract:** Economic development has been the major focus of every nation across the globe. The cycle of three major pillars of holistic planning: physical, social and economic together contribute towards building overall structure for sustainable growth and development. Similarly the inherent property of resources paves the way for market force to utilize their potential in order to drive the life in a city. Land has been one source that gives us the maximum resources varying from food, minerals, habitat etc. It's the responsibility of humankind not only to commercially exploit this resource but also to acknowledge its potential to serve us in all parameters. The industrialization in cities and suburbs have contributed immensely to exploitation of this rich resource and leaving behind environmentally contaminated properties. All these orphan lands are considered as hazardous due to their former use like industrial or mining whereas most of the time they have enough potential to be re-used. The paper aims to analyze the different

best practices of Brownfield development across the globe and analyze their applicability in Indian cities so as to rationalize the use of land resource from degradation to opportunity and guide the city planning approach to its right path.

**Keywords:** Economic development, Industrialization, Re-use, Environmental contamination, orphan lands and Brownfield.

#### INTRODUCTION

The term "brownfield site" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. These lands absorb the waste of city's needs and get abandoned for that. These abandoned or under-utilized properties that sit idle and unutilized due to environmental contamination and associated

liability concerns are popularly known as Brownfields. These abandoned lands are need of the city and people to facilitate platforms for urban development.



**Figure 1: Weightage of BR merits**

The planning approach of acquiring more and more Greenfields need curbing and simultaneously shifting focus to utilization of brownfield for urban land practices. This transformation in planning approach needs attention not only from experts but all the stakeholders involved in land development such as Policy makers, state governments, planners & experts, builders and developers and industrialists too.

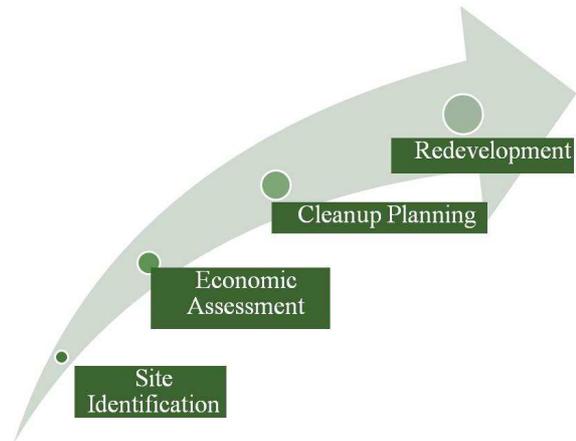
**Types of Brownfields**

The term Brownfield refers to all commercial works undertaken and leaving the site orphan after its exploitation. There are types of brownfields with respect to their uses: Industrial Brownfields, Mining Brownfields, Coastal Brownfields and Others

The type of Brownfield in a region depends upon the local resources availability.

**Process of Brownfield Redevelopment**

The Brownfield redevelopment goes through a series of steps:



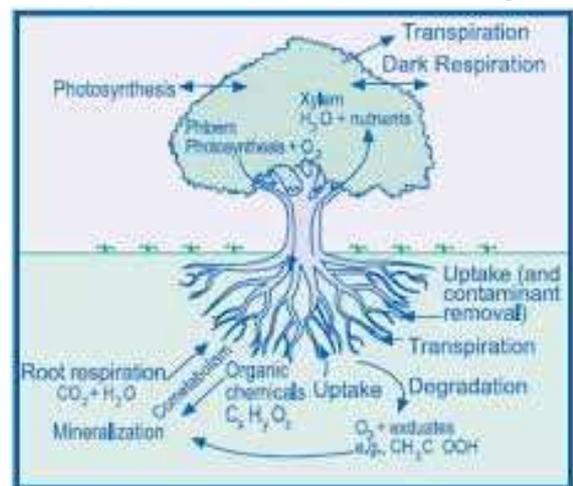
**Figure 2. 4 Steps of Brownfield Redevelopment**

**Decontamination Remedies**

There are several remedies in practice for decontamination of land: Thermal remediation, Bioremediation, In situ oxidation and Soil vapor extraction.

Phytoremediation: Use of plants to reduce contamination of soil, sediments, surface water or groundwater. It is used for heavy metal contamination.

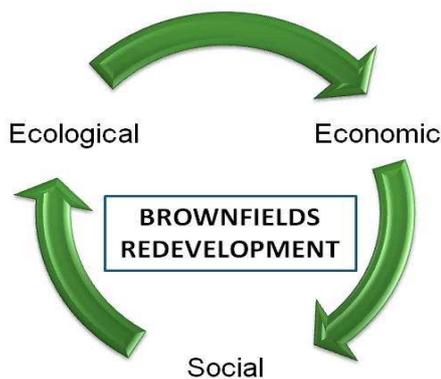
These strategies are used in conjunction with each other or with other remedial strategies.



**Figure 3. Model of Phytoremediation**

## A ROAD TO SUSTAINABILITY

Brownfields redevelopment is a boon for present and future planning as it comes with revitalization of abandoned souls and bring life to it. The redevelopment may be more and unaffordable but the numerous benefits it comes with not only accrue the private developers but also to the community as a whole. Various studies have examined the positive outputs of brownfield but only fewer focuses upon the sustainable redevelopment approach to brownfields. Some of these are: Ecological, Economic and Social.



**Figure 4. Merits of Brownfield Redevelopment**

**Ecological:** Land resource is scarce and limited for use whereas the needs and demands are high and unending. Therefore the three R's of sustainability: Reduce, Reuse and Recycle are of prime most importance for optimization of this expensive and limited resource. The re-use of abandoned land by decontaminating it and bring new life simultaneously reduce the demand of more land and hence fulfills the need. The remediation of Brownfield also improves the quality of underground water

resource and increases its possibility to be reused.

Thus, it is more environmentally sustainable to cleanup and reuse Brownfield than to build on an unused Greenfields.

**Economic:** The Brownfield have generally been centrally located and is accessible by transportation modes and infrastructure already in place and maybe few buildings that can be rehabilitated and reused. Redeveloping them acts as counter action to sprawling urban and suburban development that swallowing more farmland out of production and reduces habitat and open space.

These urban blights properties significantly lose their own commercial value along with abutting properties but cleaning them up considerably lifts the property rates. This property values enhancement varies as per site depending upon the infrastructure along with location advantage and market force. This increase in property values also increase the tax revenues of Urban local bodies and encourage them to contribute more toward redevelopment of these blighted areas. A study of Bronx in New York City, the consortium found that the property values lead to a 6.6% increase upto 1.9 miles from the site due to Brownfield redevelopment.

**Social:** Redevelopment of Brownfields has public health benefits too.

Reduction in land contamination.

Improvement in ground water quality.

Reuse of these sites to potential use like housing or commercial development contribute to public in large way.

Phytoremediation process enhances the green open areas thus reduce the urban heat island effect. The overall merits of Brownfields redevelopment and the cost of inaction is summarized in the table below:

**Table 1: Benefits with its inaction cost**

S.No	Benefits	Cost of in action
1.	Revitalize neighborhoods	Blighted neighborhoods
2.	Stimulate the local economy	Lack of development
3.	Catalyze development	Underutilized infrastructure
4.	Boost employment	Fire and safety hazards
5.	Increase property values	Lower property values
6.	Higher tax revenues	Unpaid taxes
7.	Build new housing & infrastructure	Landowner liability
8.	Reduce urban sprawl	Urban sprawl
9.	Manage environmental	Environmental damage
10.	Improve public health	Health risks

**SCOPE-LIMITATION  
 Greenfields vs Brownfields**

**Analysis:**

Everything comes with a package of ifs and buts. To compare between Greenfields & Brownfields its necessary to see the advantages and disadvantages associated with both on all parameters such a cost,

usability, social utility etc. These parameters not only tell the advantages related to Brownfields redevelopment but also a parallel perspective towards Greenfields development which helps in understanding the comparison between the two. Some of these are discussed in the table below:

**Table 2: Greenfields vs Brownfields: Comparison**

Parameters	Greenfields	Brownfields
<b>Development</b>	Undeveloped	Developed
<b>Landuse type</b>	Farmland, Woodland, wetland	Industrial, commercial, warehouse
<b>Characteristics</b>	Green, clean	Contaminated (reusable)
<b>Location</b>	Urban fringe	Inner city
<b>Treatment b4 development</b>	Not required	Required
<b>Risk factor</b>	Less	High
<b>Compliance to sustainability</b>	Less	High
<b>Clearances duration</b>	High	Less

**URBAN PLANNING PERSPECTIVE**

Brownfield Redevelopment is the road to uncover the development potential of our urban communities. Brownfields can be reused instead of more Greenfield.Land acquisitions burden will be reduced.

It can be a mean for metros to grow smarter-recycling our Nation’s land. Curtailing urban sprawl.

Mobility to outskirts and urban fringe can be avoided. Cleaning up or environmental problem associated with Brownfields.

### **BEST PRACTICES- Case Studies**

Brownfield redevelopment only tends to take place in cities with high demand for land and for rapid development where land resource is limited. For example, BR takes place in cities like Toronto, Chicago, Philadelphia, Detroit, Pittsburgh where most of the available land is in form of Brownfields due to their industrial background. Other similar examples of BR in Europe include London the centre place of Industrial revolution which has high population but little available land for development projects in the inner city. The above mentioned cities belong to developed countries have seen rapid industrialization in 20<sup>th</sup> century and have started focusing on their remedies since 1960s.

The Asian countries like China and India have been witnessing the same situation now with more Brownfields coming of age when mining or industries operation get stopped after exploiting the resources extraction of resources. These Brownfields are not degraded properties but opportunities to reuse them for alternate uses and step towards sustainable land utilization.

### **Menomonee valley, Milwaukee, USA**

The Menomonee Valley, a 1,200-acre site in the heart of Milwaukee, suffered from unemployment and pollution after the industries left following World War II.

**Process:** The City of Milwaukee started planning for redevelopment in the late 1990s, with public outreach and stakeholder participation. A public-private partnership named Menomonee Valley Partners (MVP) that convenes businesses, neighborhood groups and public and non-profit partners in efforts to revitalize the Valley.

**Result:** In 2011, One million sq.ft of facilities had been built on this site by 12 companies located in the valley. MVP also makes sure that local residents steer jobs through local nonprofit organizations for their family sustainability.



**Figure 5: Menomonee Valley Industrial Center and Stormwater Park**

Benefits include an increased tax base and added employment in the central city, as well as indirect benefits associated with dollars multiplying in the local economy and steady increases in surrounding property values.

### **Redevelopment of Mumbai Mills**

The mills of [Goregaon](#) were once integral to Mumbai's economy, particularly during the British colonial period, when Mumbai (then known as Bombay) was often referred to as the "Manchester of the East". However with newer industries in Mumbai and across

Globe the cotton production started coming down after World War I and the numbers declined rapidly forcing government to relax its norms for redevelopment of mill lands.



**Figure 6: Ruins of Shakti Cotton Mills, Mumbai**

**Process:** In 1980s under serious crunch of land resource for development in Mumbai the government relaxed its norms that once restricted the redevelopment of mill lands, and as a result, numerous high-profile builders quickly took possession of these land parcels. Between 1990 and 2010, the majority of these mill lands were acquired and redeveloped.

**Result**



**Figure 7: Phoenix Mills to Phoenix Mall, Mumbai**

Some of the best redevelopment projects on Mumbai Cotton Mills are listed below.

**Table 3: Redevelopment of Mumbai Mills**

Former Mill	Location	New Project
Mukesh	Colaba	Bollywood City
Morarjee	Parel	Ashok Towers
Phoenix	Lower Parel	Phoenix Mall
Ruby	Dadar	Corporate Park
Swadeshi	Kurla	Swadeshi Garden
Ambika	Worli	Namaste Tower
Apollo	Mahalakshmi	Lodha
Bombay dyeing	Worli	Hard Rock Cafe
Century	Worli	Century Bazaar
Bharat	Lower Parel	Indiabulls Bleu

Source: [www.wikipedia.com](http://www.wikipedia.com)

**Melbourne Docklands, Australia**

Till 1970s, the area was Melbourne’s Keyport but the area was not utilized till start of 1990s. The Dockland redevelopment is Australia’s largest Urban Renewal project with \$12 billion and covering 200 hectares of land and 7km of new waterfront. It was estimated to provide housing for 17,000 people, workplaces for 40,000 and a tourist destination for approximately 20 million people per year.

### Process:

In 1991, the Docklands Authority was established to facilitate private sector development in the area and release to the market. In 1996 in seven separate precincts with first project of Docklands stadium started in 1997.



Figure 7: Melbourne Docklands stadium

### Result



Figure 8: Promenades of Melbourne Docklands now

The area has been fully functional and long term development with urban design features of waterfront development as new open space for the citizens has been successful and various Real estate ventures.

### Potential in Indian Scenario

The Brownfields redevelopment has been a boon for future planning practice of Urban renewal as well as new industrial ventures. It not helps the economy of the city but also the social and ecologically beneficial. India is going through the development process as 3<sup>rd</sup> world edging towards developed nation. The resources rich Indian cities like Bokaro, Surat, Jamshedpur, Bhali, Ahmedabad, Nagpur Secuderabad, Faridabad going through rapid industrialization process shrinking the Greenfields and will soon be needing proper framework and guidelines for Brownfields development.

The framework will help the current industrial cities as well as pre planned guide for future cities.

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