



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 5, May 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

Brownfield Regeneration through Sustainable Urban Development

Krishna C S

Assistant Professor, TKM School of Architecture, Kollam, Kerala, India

ABSTRACT: Lands are considered as a very important asset in cities cores; they are usually still occupied by very poor buildings and infrastructure. One main reason of having such deteriorated sites inside cities is caused by the change occurring in cities over time. These changes, whether in economic base or demographic shifts and social transformations, lead to emergence of different needs and produced many vacant or under-utilized. These assets are known as Brownfields. The study includes typologies and common characters of brownfield, its impacts, the benefits and barriers of brownfield, Sustainable urban development and dimensions, Sustainable brownfield regeneration concept and sustainable aspects on brownfield regeneration. The study ends with conclusions and recommendations related to brownfields regeneration by integrating sustainable parameters by analysing worldwide best practices and experiences.

KEYWORDS: brownfield, sustainable brownfield regeneration, sustainable urban development, urban regeneration

I. INTRODUCTION

Brownfields are frequently vacant or under-utilized properties that would have been used as industrial buildings or at other uses that are now declining. They often exist in desirable waterfront lands, city centers, and old industrial zones or densely populated urban areas which are a waste of land resources. Brownfield sites have great potential and can be redeveloped for a wide variety of uses. Brownfields are often converted into residential spaces, commercial spaces even converted into outdoor recreational spaces. Because of many industrial activities inside cities cores; moreover some of the activities of city centers have been transferred to other places, or even don't exist anymore because of technological development, which lead to a lot of vacant sites-Brownfields. These can be developed through redevelopment strategies. Brownfield development can be implemented effectively with a proper understanding as well consideration of factors such as economic concerns in real estate, consequential environmental behaviour, issues and concerns on public health, land use regulations. Lessons from consequences of conventional climate change also mandated the requirement of environmental protection.

II. BROWNFIELD

Brownfield has adversely impacted urban landscapes, the regeneration of these lands have been discussed in various platforms. But still the term brownfield does not have a recognized definition. The most common definition is by the Environmental Protection Agency (U.S. EPA) "Brownfields are abandoned, idled, or under-utilized industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination"

Other definition is by committee called CLARINET (Contaminated Land Rehabilitation Network for Environmental Technologies): "brownfields are sites that have been affected by the former uses of the site and surrounding land, are derelict and underused, may have real or perceived contamination problems, are mainly developed in urban areas, and require intervention to bring them back to beneficial use"

The term "brownfields" represents land and properties that have been artificially modified, but are not currently used to their optimized potential. Agricultural land is not generally considered as brownfields.⁵ In other words, brownfields can be conceptualized as „unemployed“ non agricultural land resources

In 2007, Dixon described brownfield as "any land, which has been previously developed, including derelict and vacant land, which may or may not be contaminated. From all the above definitions, the term brownfields applies more to previously used land or to parts of industrial or commercial facilities that are to be redeveloped.

A. Typologies of Brownfield

Brownfields may vary from very small spots in mixed urban areas to large military complexes, industrial sites, public spaces, airports, and coastal areas. Although industrial complexes are dominant, areas destined for other occupancies, in which the primary activity is no longer operated, can also be regarded as brownfield sites.

B. Brownfield zones in historic context

The architectural heritage and historical context are a particularly sensitive issue in terms of brownfield regeneration. Brownfield sites are sometimes a part of historical heritage and are protected as cultural-historical monuments but, due to lowering of their structural/architectural qualities, they are increasingly viewed as threatening to the context and the surrounding. In such situations, it is very important to make adequate assessment of strategic approach to be adopted in reconstruction of these areas, and in definition of their future role in the historic context. A systematic holistic approach is the basis for developing cities of the future, on the existing platform of present-day cities. Historic context has a special place in this process.

C. The existence of Brownfields.

Brownfield land exists before it was formally defined. Many reports have stated that deindustrialization and suburbanization are the two main causes of brownfields. Brownfields exist usually in sites of the industrial sector. Worldwide especially in industrial countries began shrinking in the mid-20th century. As many industrial areas were sent out old cities, they often left behind abandoned and contaminated properties. The mid-20th century, also observed the start of population loss in older central cities, as residents moved into new homes on the urban border or relocated to newer population centers outside old cities.

D. Brownfield regeneration Barriers

Brownfield regeneration has many barriers starting from the site conditions which mainly concentrate on contamination and cleanup process followed by the access to the site. Then presence of low quality infrastructure which cannot be easily incorporated in the site or design. Another trouble is in getting the public and private financial support. Once to generate the site we need to know well about the site history and environmental aspect of the property.

E. Benefits of Reuse of Brownfield

The clean-up and reuse of brownfields provides many environmental, economic, and social direct and indirect benefits. These benefits make worth to vestment in brownfields. Some of these benefits are direct as follows:

1. Location benefits

Brownfield area considered as an advantage itself, in light of the fact that brownfields are frequently situated in key spots close waterfronts, railways and transportation courses, and downtown area territories. Besides reduction of urban sprawl which decrease the side effects of transportation due to reduction in commuter travel

2. Infrastructure benefits

Brownfields are sites that have already been developed which means that they are connected with infrastructure. It is more efficient to upgrade the existing infrastructure than extending new one into new zones.

3. Economic benefits

Brownfields remediate and redevelopment can be a base for economic development and increase the available jobs and taxes base of the government. Increased competitiveness for cities and commercial benefits for private parties. It also increases property assessment values and the resulting tax base, leading to increased revenue for governments.

4. Social benefits

Revitalization of urban cores, resolve many of socio economic problems associated with living in neighboring brownfield sites, access to affordable housing. Removes or renovates derelict buildings, decreasing the risk of injury, vandalism and arson also helps in renewal of urban cores, elimination of socio-economic stigmas associated with living in the proximity of brownfield sites, and improved quality of life in neighbourhoods.

5. Environmental benefits

Encouraging and supporting the reuse of brownfields can help protecting public health by cleaning –up the contaminated sites and avoid their negative impacts.

F. Urban Regeneration

Urban regeneration process is expected to promote smart growth, generate sufficient revenue and return from underutilized and abandoned property, create new job and business opportunity, community empowerment, address people's real needs, increase environment quality, and providing quality of life for all.

G. Sustainable Brownfield Regeneration

"Sustainable Brownfield Regeneration is the Management of brownfields recovery to beneficial use in a responsive way to people; considering present and future needs, environmentally sensitive, economically viable, institutionally robust and socially acceptable, within the particular regional context". The hidden key element of this concept is the balance. The balance between the stakeholders' needs, present and future generation, and different sustainability dimensions regarding sensitive response to stakeholders and the context. A regenerated brownfield site can be sustainable; yet, it has negative environmental impacts. Positive effects in one or more aspects of sustainability may outweigh the negative ones and the negative impacts on the site could be balanced on the urban/regional scale. This concept is particularly applicable to brownfields. The most significant brownfield challenges are linked to firstly understanding the complexity of regeneration process and then applying this knowledge to find sustainable solutions for the sites that link to regional strategies, but also taking account of the wider dynamics of the overall urban area.

1. Key Elements of Sustainable Brownfields Regeneration

Set of elements have been identified that represent specific criteria or processes for Brownfields regeneration. In social parameter key elements like History, Affordable housing, Community Profiling, and Comprehensive Planning may occur. Under economic sector key elements such as Housing and Job, Regional Development Model, Site Marketing and Redevelopment can be identified. On the basis of environment parameter Pedestrian Orientation, Open Space System, Site Identification and Characterization Risk Management and Restoration can be considered while planning.

III. CASE STUDIES

Best practices and worldwide experience of brownfields regeneration planning interventions with sustainable urban development have selected

A. Baker District redevelopment in Guelph, Ontario.

The Baker District Redevelopment will be a thriving community hub that is physically, socially, and environmentally connected to Guelph's urban fabric.

The Baker District Redevelopment project is being developed using the One Planet Living framework. One Planet Living (OPL) is a planning and sustainability framework which aims to improve environmental and social impacts related to the way we design, build and thrive in our communities.

Created an integrated development that includes a diverse mix of users to activate the residential population and surrounding community. Provided with affordable housing that enable a wide spectrum of residents to live in within downtown and take advantage of the area. Main design was to adapt the elements of the public and private realm to create a coherent and functional redevelopment. The public realm consists of pedestrian porosity and development of public open spaces that are flexible. They have incorporated community spaces, pedestrian circulations and streetscape improvements.

Local Streets like Baker Street are intended to provide access to development and facilitate circulation by all modes. They will generally accommodate two travel lanes and have sidewalks on both sides. As a part of creating a diverse and lively downtown for the City of Guelph, the Baker District Redevelopment includes a provision for an affordable housing component. This is in keeping with the blended mix of uses encompassed in the project.

B. The New York High Line, USA

The High Line is a 1.45-mile-long (2.33 km) elevated linear park, greenway and rail trail created on a former New York Central Railroad spur on the west side of Manhattan in New York City. The abandoned spur has been redesigned as a "living system". A nonprofit organization called Friends of the High Line was formed in 1999 by Joshua David and Robert Hammond, advocating its preservation and reuse as public open space, an elevated park or greenway.



Fig 1. New York High Line, USA

The High Line has become a defining feature in its neighborhood and a powerful catalyst for investment. It's recognized as a significant contributor in the revitalization of Manhattan's West Side. The City rezoned the area around the High Line to encourage development while protecting the neighborhood character. The combination of the rezoning and the success of the park have helped to create one of the fastest growing and most vibrant neighborhoods in New York City.

C. Hammarby Sjostad, Sweden

Hammarby Sjostad is a district in Stockholm, Sweden adjacent to the downtown, which is a brownfield site that is being developed as a sustainable neighborhood. Hammarby Sjöstad operates according to its own 'ecocycle', which outlines environmental solutions for waste, energy, water and sewage. The aim is to have half the total environmental impact compared to similar districts. The hammarby model is an eco-cycle system that integrates energy, solid waste, water and wastewater for homes, offices and other activities in the area. The cycle also includes storm water, rainwater and melt water. Domestic refuse is separated into different chutes and the various fractions are then transported by vacuum to containers at a central collecting station. Renewable fuels, re-use of waste heat, biogas and household energy efficiency. The adjacent hammarby thermal plant extracts heat from the treated wastewater and also contributes byproduct energy to the district cooling network.

IV. ANALYSIS

The case studies include various planning interventions based on sustainable parameters. Every city has looked into the brownfield potentials and have developed maximum utilising the property for beneficial use. They have used integrated strategic planning for achieving efficient brownfield regeneration. The uniqueness of each site has made them to move from one process to another considering each project and site conditions. With proper planning and innovative initiatives brownfield site can be transformed to development catalyst.

The sustainable brownfield regeneration is conversion of the land into an attractive environment. There are many tasks involved, which include the management of contaminated site followed by the renovation of infrastructure and also promotion of project with local government and people. It can provide the users a quality space considering their requirements. Most of these sites are present at core spaces which can help in development of core space. It is a way of giving positive space by providing solutions to problems. Community involvement in decision making process and planning considering particular regional context.

According to different aspects the project has to consider several things. Starting from the Economic conditions for regeneration. Sites that are highly economically viable and type of financing and the associated financial risks. Another thing is Partnerships in redevelopment process which includes Access to wider sources of funds and encouraging the private sector to develop on brownfield land. Considering environment aspect which incorporates site investigation and soils and material management plan for offsite disposal or on-site reuse of impacted soil.

V. RECOMMENDATIONS

A. Recommendations in environmental sector

Considering the soil conditions redevelopment potential of the site to promote adjacent land owners and uses Development to promote current economic conditions
Redevelopment of site such as to promote transportation and infrastructure and provide Government policy and requirement changes for risk management

Long-term remedial approaches for threat of contamination spread and Empower the public to act with respect to the risk communicated

Promote risk based corrective actions based on future uses To preserve natural amenities and to incorporate natural features and environmentally beneficial landscaping into their development proposals and conserve energy demands on the environment by providing trees and grass, and landscaping between the sidewalk and buildings to encourage walking. Establishment of a green corridor, using existing water-courses and greenspaces and efficient allocation of public infrastructure, preservation of open space resources, and reinvestment in central cities.

B. Recommendations in social sector

Tries to preserve the city character, and protecting its historic, scenic and natural beauty. Planning to harmonize the industrial elements from the past with the present environment.

To enable local government and citizens to anticipate with the changes occurring in society. The plan includes an analysis of past trends and development, existing conditions, as well as goals and objectives for the future and specific plans for individual projects. Encourage housing opportunities in a community. Designing considering low income groups and provide adequate services and employment to all members of a community.

C. Recommendations in economic sector

Promote program factors for management of development. Promotion of Brownfields as parks and open spaces and development of eco-Industrial parks also by considering environmental equity, equitable costs and equitable benefits for all. There should be a balance between the housing and job opportunities they are providing. Develop a balance between residential and commercial use and encourage employees of businesses and institutions to buy homes near their workplace.

For economic growth, environmental quality, and social equity. Economic restructuring and demographic transition now require communities to reach out to a regional level of decision-making. Development of the brownfield using the local potential for starting the business activities.

VI. CONCLUSION

The study was to know different approaches and planning interventions for brownfield sustainable regeneration. It included various issues in the field of brownfield regeneration internationally and on local level. Brownfields could be categorized according to the location of brownfield, previous use, and contamination. Brownfield sustainable regeneration is a balanced approach that consists of environmental, social and economic aspects. There are various approaches and projects experiences in application of brownfields sustainable regeneration concept. Based on international successes and the strategic improvement in Brownfields planning, such projects may be expected to become increasingly attractive. Regarding the implementation of brownfields regeneration projects, the sustainability issues are considered not just in planning phase, but in every possible phase. Practical implementation of brownfields regeneration requires consideration of a range of factors including: the economic drivers of real estate development, the land use regulation, and skills of urban planning. Many of countries having brownfields have been required to cooperation between the activities of planning and environment protection agencies, and frame specific legislation to facilitate such cooperation and shared control. Many planning interventions are designed to address the challenges facing brownfields regeneration using legal, financial tools, moreover regulations incentives to encourage brownfield regeneration. There is no one tool or method that is guaranteed for success, but a combination of tools based on different locations and situations.

REFERENCES

1. Ferber, U., Grimski, D., Millar, K., & Nathanail, P. (2006). Sustainable brownfield regeneration: CABERNET network report. University of Nottingham: L & Quality Management Group.
2. Ferber, U., & Grimski, D. (2003). Brownfields and Redevelopment of Urban Areas: Report Prepared by Working Group" Brownfield Redevelopment" (CLARINET)
3. RESCUE (2005) Best Practice Manual. LQM Press, Nottingham
4. Greenberg, M. R., & Hollander, J. (2002). The environmental protection agency's brownfields pilot program. American journal of public health



5. Alker, S., Joy, V., Roberts, P., & Smith, N. (2000). The definition of brownfield. Journal of Environmental Planning and Management
6. Hall, P., Gracey, H., Drewett, R., and Thomas, R., (1973) The Containment of Urban England vol I : Urban and Metropolitan Growth Processes George Allen & Unwin.
7. Bardos, P., Bone, B., Boyle, R., Ellis, D., Evans, F., Harries, N. D., & Smith, J. W. (2011). Applying sustainable development principles to contaminated land management using the SuRF-UK framework.
8. Brundtland Report, World Commission on Environment and Development, 1987. Edwards, D. (2005). Best practice guidance for sustainable brownfield regeneration. Rescue.
9. Perovic, S., & Kurtović Folić, N.)5015(. Brownfield regeneration–imperative for sustainable urban development. Građevinar
10. Myers, D., & Wyatt, P. (2004). Rethinking urban capacity: identifying and appraising vacant buildings. Building Research & Information



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details