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Reviving the dilapidated stretches of Urban Railway Corridors: A case of sustainable development

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Abstract

Railway corridors have been the main channels of circulation and integral part of a city through which commuters' move in and out, experiencing the urban environment. Large amounts of valuable urban land occupied by this system of transportation are high potential areas for urban development which are lying either vacant or misused in most of the big cities of our country. Careful implementation of policies and efficient utilization of these grey stretches may add economic viability to the city environment and a significant source of revenue to the Railway department. Certain changes in regulatory framework may also be necessary to look specifically at the linear stretches of land next to the railway tracks for strategic sustainable development. This research paper delves into the root cause of the problem and comes up with new urban design strategies for sustainable development along a similar stretch of railway corridor in the core urban area of an Indian megacity.

Keywords – sustainability; railway corridors; transport planning; drip irrigation; Urban design.

INTRODUCTION

There is an estimated 44,000 hectares of railway land lying unutilized amongst which 5% of the present unutilized land is already encroached upon by illegal housing (RLDA) [1]. and the rest is used in varied activities, a clear data of the bifurcation of activities on these lands is unavailable as the railways haven't maintained a proper record of the same.

This research aims at creating oxygen-generating, green arteries for the city along railway corridors. These areas will be designed to offer the people of Mumbai a dynamic and engaging public destination addressing elements of green transport, culture, health and leisure. Sustainability is at the centre of the proposal. Today the railway tracks and their rights of way are themselves filled with distinct activities. These areas represent both urban and rural cultures and ideologies which are manifested in several diverse ways.

A brief over view of the railway lands are as follows:

• Second largest owner of land, after defense, in India

• A total ownership of 4.61 lakh hectares of land

• This land is present on either side of railway tracks and along railway stations. Ideally this land was handed over to the Railways for further projects. **Under-utilization of these areas has led to misuse.** (RLDA) [1].

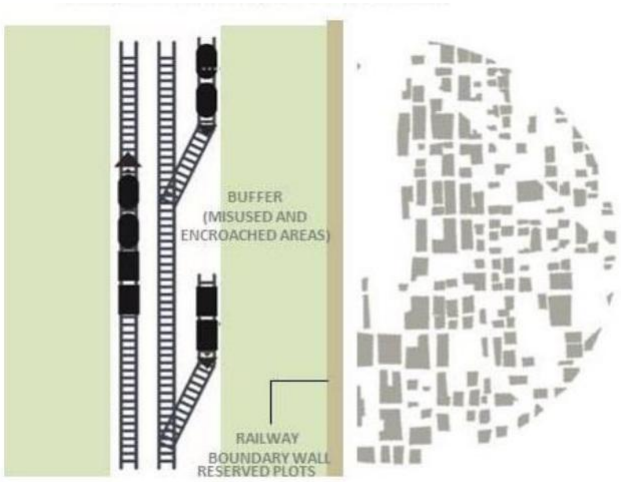

Fig 1: PLAN OF TYPICAL RAILWAY CORRIDORS

The site of intervention for the proposal is for a patch of land that is between the railway tracks and the reserved municipal plots (See Fig. 1.). A **30 m buffer** is defined by RLDA as a no construction zone. This is proposed as the area of intervention.

It is important to note that any development/ approach adopted for this exercise needs to be sustainable in the long run.

The following are the documented activities that take place on the corridors:

- Illegal encroachments
- Garbage and debris dumping
- Water logging
- Uncovered drains
- Public defecation
- Urban farming/agriculture

AIM OF THE STUDY

The overall objective of the study is to assess the potential of the current railway corridors in Mumbai for proposing conservation of natural elements and utilizing green energy systems.

OBJECTIVES:

1. To study and document the present scenario of encroachment and misuse of land along railway corridors of the city.
2. Study, analyse and provide a strategy for future planning and design of railway corridors so as to minimize the obsolescence in physical and visual environment.
3. To investigate the policy and planning barriers that needs to be overcome in order to implement the changes.

RESEARCH QUESTIONS:

- How are railway lands used/ misused presently? (Existing land use)
- What is sustainable urban development (SUD)?
  What are the goals of SUD with reference to railway corridors? (Specifically transport, energy sustainability and water management related)
- What are the present rules and regulations
- Drone images available on the internet of the target areas were studied and greatly contributed in efficient mapping of the stretch.

FIELD WORK:

- The research findings discussed in this proposal is majorly derived from first hand field observations. Several field visits included carrying out detailed photo documentation, complete video documentation of the stretch, interviews and surveys conducted of railway passengers.
- Interviews of key persons: Railway officers (Chief PRO of Western and Central railway, Mumbai) were also conducted in order to gain insights from within the railway system.

SITE VISIT:

- Visits to the site were conducted during the later stages in order to study the condition of railway lands around Bandra at a micro level. The research findings derived from the site has been recorded graphically by creating several analysis maps. The base GIS maps are derived from UDRI (Urban Design Research Institute) (UDRI GIS) [2].

Enforced under Railway Land Development Authority (RLDA) disturbing the regular development situation?

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METHODOLOGY

This research is based on a systematic and analytical method of studying the identified problem area. It depends on collecting qualitative and quantitative information in order to pinpoint the problem, analysing all inputs, and consequently developing guidelines to solve the problem. Strategies and proposals are developed in the recommendation segment. Research methodology adopted for this research proposal consists of the following types:

DESKTOP RESEARCH:

- An exhaustive study about the MSRS (Mumbai Suburban Railway System) was carried out in the initial stages of this dissertation in order to gather as much understanding as possible about railway engineering, railway and its planning principles, its financial profile and issues it faced.
- A thorough desktop research of the government body that deals with and is exclusively responsible for Mumbai's railway lands: Railway Land
  Development Authority (RLDA) was conducted. An understanding about its objectives, its regulations, past and future government schemes and current state of railway lands was derived from this research.

RESEARCH VARIABLES

- Catchment area
- Scale of project
- Socio- cultural background of vicinity
- Budget
- Governing authority

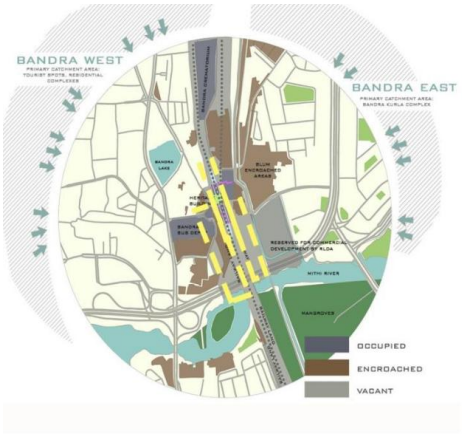

Fig2: BANDRA RAILWAY CORRIDOR STUDY

BANDRA RAILWAY CORRIDORS

The area under the corridor comes under 3 main categories:

- Occupied
- Encroached
- Vacant

CHALLENGES FACED DURING UNDERTAKING DEVELOPMENT OF RAILWAY LANDS

Physical development of railway land parcels come with its own set of challenges; that need a well-coordinated strategy to be executed.

There are two types of complexities found with respect to overall development of railway land parcels.

MACRO-COMPLEXITIES:

These are largely regulatory, legal and institutional challenges and need to be tackled at policy level. For instance, land use conversion in the congested areas, overlapping jurisdiction of various government agencies and approving authorities, maintenance, abiding by regulatory decisions that conserve the environment etc.

SITE-SPECIFIC COMPLEXITIES:

- ACCESSIBILITY

It was observed that several of the operational assets and auxiliary buildings are either land locked or have poor accessibility. Most of the operational assets are bound by tracks and can be approached only through access which is rendered inadequate because of various factors such as encroachments.

- ENCROACHMENTS

Various patterns of encroachments on Railway land parcels in the city were observed and recorded. Generally encroachments are on the periphery of the open plots and take place because of inadequate boundary and preventative measures.

- CONGESTION OUTSIDE THE SITE

Congestions are mostly observed in the vicinity of stations but this challenge is not exclusive to stations. If the site is located in a congested area getting land use change may be difficult as the proposed development at the site will put further pressure on already stressed infrastructure, utilities and traffic.

- SIZE AND SHAPE OF THE SITE

A smaller land parcel is more complex to construct compared to a larger land parcel. Also it is desirable that the shape of the land parcel is not longitudinal.

RECOMMENDATIONS

The market potential and regulatory framework may vary depending on the asset being proposed for sustainable development. At a city-level in Mumbai, policies for Transit-linked, Green Real Estate Development of potentially high-value parcels of land closer to railway tracks, or airspace development above operational assets is notably absent.

Following are the 3 topics chosen to develop and narrow down on for the purpose of this research paper:

1. Sustainable ways of developing Urban farming techniques in railway corridors.
2. Water management in urban areas
3. Strategy that generates electricity through movement of trains along the tracks

URBAN AGRICULTURE ALONG RAILWAY CORRIDORS

The Indian railway authority had begun leasing land to its maintenance personnel for small urban farms as this dissuades further encroachment on railway lands by squatter settlements and also helps in maintaining the lands. These linear patches are typically for vegetable gardens and small scale farming. The produce derived from it is locally sold at nearby markets in Mumbai. As these prime pieces of real estate are not supposed to be built on due to regulations issued by the RLDA (Railway Land Development Authority), the present proposal is a great idea on paper. It treats land as a resource and converts it into a revenue generating area and also preserves the image ability along with maintaining it. However, several issues creep up while implementing this idea. The cultivated railway lands require manure and water for irrigation. Unfortunately, this water requirement is often fulfilled using the waste water from the drains running along the railway tracks. This untreated water is undoubtedly harmful with unknown components and is used as a convenient way to water the vegetable patches with no costs involved. (Urban farming hazards) [3]. The residue of salts and chemicals in the water seep into the soil and consequently find their way into the food pyramid as these vegetables are consumed. A brilliant, harmless idea that helped repurpose land parcels turned out to be hazardous for public health and safety. There is an immediate need to develop a master plan that takes into consideration several facets of sustainable and safe development to benefit citizens, the economy and the environment in the long run. The development of these urban farmlands also acts as a natural acoustic buffer. (Fig 4.)

PROPOSAL: The design proposal encourages usage of the 30 m railway buffer to be used for organic farming. Presently, this is already practiced by the railways. They lease railway lands next to the tracks where construction is not permitted.

CONCERN: There have been several cases where the water from drains has been used to water these linear vegetable patches. This poses a health threat for the community.

SOLUTION: The usage of drip irrigation allows clean water to be supplied to the crops without wastage. It helps the people of the community to have access to organic, fresh vegetables without the fear of contaminated sources.

ELECTRICITY GENERATION THROUGH ROTATING TURBINES ALONG RAILWAY TRACKS FOR

Some urban areas have naturally occurring lakes, ponds, rivers and creeks. The site studied has a creek indentation into the land that has flowing water throughout the year. This water can be used as a resource for electricity generation and treated water can be directed towards the linear farmlands in pipelines for maintaining purity. The grey water collected from stations can also be filtered and used. The best method that can be adopted minimum loss due to evaporation, minimum contamination and maximum efficiency is drip irrigation. (see Fig 5.). This is a highly flexible method that can be used to control and irrigate exactly the amount needed without much evaporation loss. (Water management in Urban Areas) [4].

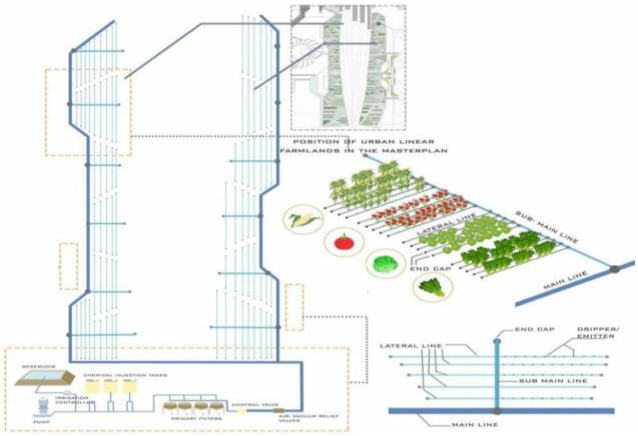

Fig 6: ROTATING TURBINES ALONG TRACKS

The thousands of local/ express trains that run day and night pick up speed while running through the corridors between stations. This motion can be taken advantage of for generation of clean energy seamlessly. The kinetic energy produced by the wind is converted to mechanical energy with the help of a DC generator. The average speed of a train is around 100km/hr. When a train is in motion, the pressure near the body surface of the train drops immensely. This causes a region of low pressure to manifest itself. This in turn lets the surrounding air run towards the air deficit in order to fill the void.(Abraham, March 2018) [5].

CONCLUSION

We can conclusively say that a sustainable approach is the only way forward after studying the detoriation of the built and unbuilt environment. The proposal for intervention and need for change needs to be put forward at a policy level (with changes in government rules and regulations) as well as a macro and micro design level for it to show results.

REFERENCES

[1] Retrieved November 22, 2019, from RLDA: https://rlda.indianrailways.gov.in/

[2] Retrieved from UDRI GIS: http://www.loginmumbai.org/map.html, GIS Analysis maps of Mumbai

[3] Retrieved fromurbanfaminghazards:https://www.hindustantimes.com/mumbai-news/don-t-use-sewage-to-cultivate-farms-along-mumbai-s-railway-tracks-bombay-hc/story-vNXG2US4KhDW33HtizgFoJ.html, Updated April 30, 2019

[4] Retrieved from Urban water management Ramboll website https://ramboll.com/services-and-sectors/planning-and-urban-design/urban-water-management

[5] Retrieved from Abraham, S. V. (March 2018). Power Generation from a Moving Locomotive by wind Turbines. *GRD Journals*, 7.