



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

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 12, December 2021

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 7.569

9940 572 462

6381 907 438

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# Risk of Industrial Disaster and its Management in Jaipur, Rajasthan

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**ABSTRACT:** Disasters disrupt progress and destroy years of painstaking development efforts, thereby pushing nations back by several decades. The impacts of disasters are particularly strong in case of developing nations in terms of recovery therefore, both predisaster efforts in terms of preparedness, capacity building, awareness along with an efficient response mechanism, recovery and reconstruction would lessen the loss of lives and property. Within the country, Rajasthan is one of the most drought prone states, due to its low average rainfall, coupled with erratic behaviour of Monsoons. The state has also witnessed some major industrial disasters in the recent past, like the floods in Barmer (2006), IOC Depot Fire, at Jaipur (2009), the stampede at Jodhpur (2008), the serial bomb blasts, Jaipur (2008), and the collapse of Chambal bridge at Kota (2009) to name a few. Further, some parts of the state fall under seismic zones III and IV. The State is witnessing a rapid increase of urbanization giving rise to concerns like slums and squatter settlements, pollution, unregulated expansion of urban areas, transportation problems, etc. Excessive urbanisation has contributed to the occurrence of major disasters, both natural and man-made. Even natural disasters have different ramifications when they occur in urban areas due to the high population density. The Industrial Disaster Management and Relief Department is a member of all the regulatory bodies in the State in order to ensure that measures required for safe planning are enforced. The existing Town and Country Planning Act, Industrial Master Plan and Land use Zoning Norms would be evaluated to make necessary amendments to ensure that implementation of these Acts and Rules do not increase our vulnerability. The present study is based on the study of the risk of industrial disaster and its management in Jaipur, Rajasthan

**KEYWORDS:** risk, industrial, disaster, management, Jaipur, Rajasthan, country

## I. INTRODUCTION

All state departments and agencies would designate nodal officers responsible for disaster management activities and for the effective formulation and implementation of DM plans.

All stakeholder agencies would also carry out regular mock drills and tabletop simulations for testing these plans. SEC (State Executive Committee) would ensure mainstreaming of industrial disaster risk reduction in the developmental agenda of all existing and new developmental programmes and projects, which shall incorporate disaster resilient specifications in design and construction in Jaipur. SEC would encourage all stakeholders to set up appropriate institutional mechanisms to ensure that departmental DM plans are not only implemented but also closely monitored vis-à-vis specific targets. Risk assessment and impact assessment (with focus on disaster risk reduction) shall be mandatory processes for all departments to formulate and evaluate their DM plans. [1]

SEC shall ensure undertaking regular inspections/ monitoring of structural works and implementation of the required restoration/strengthening measures prior to emergency in the hazard prone areas by the respective agencies/departments. Encourage preparation of community preparedness plans to address their own special features and outline the linkages of the various state support systems and the jurisdiction of each of these departments. The existing plans would be modified, where required, in order to streamline and optimise the response systems. These plans must indicate the officer responsible for carrying out specific tasks along with timelines for implementation. Documentation is an essential component of post- industrial disaster management for assessing the consequences of disasters, and identifying initiators and factors that affect mortality and morbidity with respect to time variables. National and state level development schemes play a crucial role in the socio-economic development of a community. These schemes target a huge population every year and are allocated large amounts of funds for their implementation. The SEC, through all national and state schemes, would strategically address and encourage all departments and agencies to reduce vulnerability and risks through structured framework and operational measures in Jaipur.[2]



**RIICO Industrial Area, Jaipur**

## **II. AIM OF INDUSTRIAL DISASTER MANAGEMENT IN JAIPUR**

- Promoting a culture of prevention and preparedness, so that DM receives the highest priority at all levels in Jaipur.
- Ensuring that community is the most important stakeholder in the DM process. - Encouraging mitigation measures based on state-of-the-art technology and environmental sustainability in Jaipur. [3]
- Mainstreaming DM concerns into the developmental planning process in Jaipur.
- Putting in place a streamlined and institutional techno-legal framework for the creation of an enabling regulatory environment and a compliance regime in Jaipur.
- Developing contemporary forecasting and early warning systems backed by responsive and fail-safe communications and Information Technology (IT) support in Jaipur. [4,5]
- Promoting a productive partnership with the media to create awareness and to contribute towards capacity development in Jaipur.
- Ensuring efficient response and relief with a caring approach towards the needs of the vulnerable sections of society in Jaipur.
- Undertaking reconstruction as an opportunity to build disaster resilient structures and habitats in Jaipur.
- Undertaking recovery to bring back the community to a better and safer level than the pre-disaster stage in Jaipur.

## **III. OBSERVATIONS**

The district police department, Home guards, Civil Defence personnel, Fire Service officials, SRTs, etc. would undergo periodic mock drills for different disasters, coordinated by the District Magistrate at the district level and by the Relief Commissioner at the State level. It is mandatory to have mock-drills at least twice in a year for fire and earthquake in Jaipur.[6,7]



**Sitapura industrial association, Jaipur**

Absence of adequate rainfall and prolonged extreme hot temperature generating dry seasons causing agriculture and income loss, deaths, health problems, water scarcity, food scarcity reducing/ diminishing the coping capacity of the local/ state Government to respond.

There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures, and disregard for wise environmental management. Vulnerability varies significantly within a community and over time. This definition identifies vulnerability as a characteristic of the element of interest (community, system or asset) which is independent of its exposure.[8]

The proposals for industries are based on the type of industries and their appropriate sitting within the region. Industries have been classified as “Red”, “Orange” and “Green” industries. At the regional level the same have been held true however, at the zonal levels, a more detailed approach towards the siting of industries is required with reference to the National level Project by CPCB on “Zoning Atlas”. Accordingly, the same is envisaged to be used as an extension of the Master Plan. Till then a schematic approach as mentioned in the Zonal plan need to be adopted. With regard to the region, the proposals for the industries are as follows:

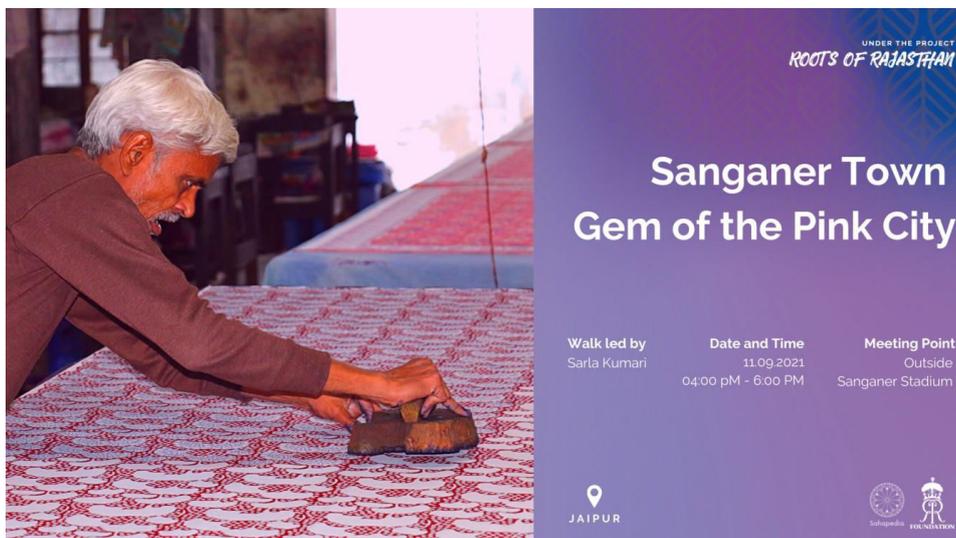
1. No Red category of industry is proposed to be allowed within the region.
2. Industries are not to be permitted at all within the Eco-sensitive areas G-1 (a buffer zone of the same has been created)
3. The agriculture zone shall have industries which complement low scale- agriculture related and household industries. However, industries which may in any way create water pollution shall not be permitted.
4. Other Orange, (within the industrial areas developed by RIICO) and Green industries would be permitted within the development zone whether within or outside the proposed UA. However, large manufacturing industries are permitted within the U-2, U-3 area and rural area however EIA in such cases is to be prerequisite.
5. Adequate proposals of industries attended in the U-1 areas
6. The RIICO need to work out further modalities in realizing them. Besides the above the general rules applicable for sitting of industries along with the necessary EIA and other pre requisites as stipulated by the State and the Central Government from time to time need to be met. [9,10]

In furtherance there of, the following principle directives also need to be met out for any new industrial proposals:



### Ratnavali real estate industrial park and projects in Jaipur

- Jaipur being a heritage city, its environment comprising of its rich built heritage needs to be protected at all costs. Hence no air polluting industry would be permitted within a radial distance of 10 kms from any heritage/structure of National/State or local significance.
- Jaipur Region having limited water resources, extensive water consuming industries are not to be promoted within the region. Accordingly water polluting industries are not to be permitted within a distance of 10 kms from a natural water channel/water body. In other areas wherein water polluting industries are permitted, adequate measures need to be undertaken for the discharge of its effluents after treatment.
- No air polluting industrial areas to be set up within a radial distance of 10 kms from airports and to be totally avoided within the air funnel.[11,12]
- Re-thinking is to be given to liberal conversion of Industries within 1 km. of existing industrial area.
- Polluting textile industry within the residential areas of Sanganer need to be shifted.



The economy of Jaipur depends largely on Tourism and the heritage resources of Jaipur (both built and natural) play a significant role in the promotion of tourism in the city. Since the inception of Jaipur, it has been an international tourist

destination and its unique planning has fascinated many researchers, academicians and urban planners. Tourism has increasingly put pressure for the conservation and sustenance of this historic city. Hence, it is crucial that the heritage resources/areas in the city be judiciously selected for promoting sustainable tourism. As per the gaps identified in the Land use Plan 2025, there is an increasing need of recreational zones to be developed in the city by 2025. To meet the required target, it is feasible to evaluate existing natural and cultural heritage areas in the city such as Ghat ki Guni and Jamwa Ramgarh that can be developed into recreational nodes for the city. Jaipur walled city and its surrounding towns such as Bagru and Sanganer are well know for local crafts and serve as important locations for expansion of small scale craft industries. Wherever possible, aspects such as crafts development should be integrated in the planning.[13,14]

#### IV. DISCUSSIONS

Sanganer has important craft industries (mainly textile printing and handmade paper) besides the ruined palaces, broken city walls, triple gateways and havelis. Large and small units of block and screen printers produce some of the finest hand-printed textiles in the country which are also exported across the world. A special heritage tourism development plan for this circuit can be developed linking Sanganer as the textile heritage town with nearby Chaksu having heritage haveli hotels. With its history, textiles and strategic location, Sanganer can function as an important tourist town that caters to the influx of Jaipur tourists. Local incentives for conservation and reuse of structures for tourist facilities should be promoted.[15]

Some plans would be proposed beyond zonal level. These plans are as follows:-

- (i.) Environmental Management Plan
- (ii.) Eco-tourism Plan including conservation aspects
- (iii.) Conservation and Tourism Development Plan for Madhogarh and
- (iv.) Surroundings Conservation and Tourism Development Plan for Kanota Castle
- (v.) Surroundings Heritage Tourism Development Plan Heritage Tourism Development Plan addressing built and natural heritage of Sanganer



**Ring road Project, Jaipur**

At present, the most common method used by Municipal Corporations for disposal is dumping of the collected waste at open dumpsites. The waste at these dumpsites consists of rich organic content, which produces landfill gas over time by anaerobic digestion. Landfill gas is rich in methane (40-50%) and carbon dioxide. Gases such as nitrogen, hydrogen and oxygen are also produced in the process in insignificant quantities. The collected gas from large landfills can be effectively utilized as a clean fuel for power generation and gas collected from smaller landfills can be supplied to appropriate industries located in the vicinity of the site for direct use of gas in boilers or other equipment. To estimate the feasibility of any landfill gas to energy project, a crucial step would be to conduct a feasibility study to estimate the

potential of methane emissions. This in turn would assist in planning and design for the management of the dumpsite after closure[16]

The Ring road development corridor has been taken up with a visionary approach to create infrastructure in advance to meet the growing needs of rapid urbanisation of the region. BRTS provision is incorporated as part of its 90 mt. ROW. The development Zone along the road corridor is envisaged. The length of the proposed corridor is 125 Km. The southern portion i.e. from Agra Road to Ajmer Road the acquisition of the land is complete however the northern portion of the Ring Road is proposed to be developed on top priority[17]

### V. RESULTS

The Standard density for a town like Jaipur is about 12,500 persons per sq.km. The area with density above this is walled city with highest density (avg. 6000 persons per sq.km) and planned areas of Malviya Nagar, Adarsh Nagar and unplanned areas of Barkat Nagar and Jhotwara. The rest of the city (within the developed area of the city) exhibits a population density between 4000- 12500. The peripheral area exhibits a low density of less than 4000 persons per sq.km.

U1 - Urbanisable Area U2 - Immediate influence area of U1 and satellite towns U3 - Influence area of NH, SH, Ring Road, Bye passes, Industrial corridors and other important corridors Ecological Zone - It includes all the bio-diverse and incompatible use G1 (Green Zone -1) - To conserve natural features G2 (Green Zone -2) - A buffer to G1[18]



#### Ring road map

(i.) Urban area (U1)

(ii.) Urban area (U2) U1 is based on Population projections, the existing city, urbanisable area of 2011, and the existing satellite towns. It honours the commitments/projects. The total projected U1 area is 945 sq km. but after the extraction of G1 and some part of ecological zone (94 sqkm; which falls under U1 boundary) it remains 852 sq.

km. because it can not be used for any type of land use in future. The projected U1 area of satellite towns is 102 sq. km. thus the total urban area (Jaipur region + satellite towns) is 954 sq. km. (852+102 sq.km). The urbanisable area proposed was increased by another 99Sq.Km. to accommodate commitments in the south west of Jaipur around Diggi Malpura Road and area between Ring road and proposed development area in the North -West. The immediate influence area of the U1 and the Satellite towns is the U2 area. This is generally created as buffer to U1/nearest physical boundary, accommodating commitments + special area projects- SEZ, and other developments. The U-2 area is divided into Low Intensity Zone (LIZ) and High Intensity Zone (HIZ) i.e.; the U2 area overlapping with G2 is considered as Low intensity Zone (116 sqkm) while the rest of the U2 area falls under High intensity Zone(391 sqkm). In the U2 LIZ area, Low impact development (LID) techniques shall be used for land development by Conservation of drainage, trees & vegetation. Development impacts in this area shall be minimized by low intensity development. Proposals supplement the land use plan of U1 area

(iii) Urban area-3 (U-3) Transportation/development area U3 is the Influence area of National Highways, State Highways, Ring Road, Bye passes, Industrial corridors and other important corridors. This is generally 1000 meter buffer on either side on NH and 500 meter on either side of the SH excluding road right of way. The U-3 area is divided in to Low intensity Zone and High Intensity Zone i.e.; the U3 area overlapping with G2 shall be considered as Low intensity Zone while the rest of the U3 area shall fall under High intensity Zone. The projected U3 area 2025 under HIZ is 96 sq km. and under LIZ is 39 sq km. In the U3 LIZ area, Low impact development (LID) techniques shall be used for land development by Conservation of drainage, trees & vegetation. Development impacts in this area to be minimized by encouraging low intensity development.[19,20]



**Nod phase for metro in Jaipur**

## VI. CONCLUSION

Ecological Area: This area includes the area which is suitable for agriculture and other eco sensitive purposes. Activities like eco-friendly housing, biotech parks Motel, resorts are permitted in this use zone. Here "Pulses villages", "Oil Palm", Vegetable clusters and Mega food parks may pe proposed. Other uses are to be discouraged in the G-2 and Ecological area. The competent committee may arrive at any other activity if in the interest of general public, with environmental impact assessment. However, such use adhere to the basic principle of low intensity development. [21,22] All the activities are to affront a minimum of a village road and the building line is placed at 30mt from the central line. Other Master Plan roads like NH/SH/Major roads applicability shall be as per norms. The green zone-3 is primarily the use shown as recreational with hierarchy in the land use plan. Separate lists of activities are identified in the development controls. The growth foci, focal villages and service villages falling in ecological zone are provided with 500 mt radius from the existing abadi to accomodate growing needs of the settlement. The use is designated as mixed use. The Development control and promotion regulations (DPRC) enumerate the use premises that to be accomodate in ecological zone. Area falling in the six villages of tehsil Bassi namely Ramsinghpura, Hingonia, Bhatasari, Bhurthal, Kanharwas and Sindoli having an area of 26.30 sq km have been earmarked as Ecological zone in MDP-2011 and it has decided to be selected as Ecological zone in this plan. In the same way land falling in the villages Malpura chowd, Malpur doongri further earmarked for ecological zone and it is retained accordingly.[23]

The land utilization for Jaipur region worked out to cater to the Urban development Protection of agricultural zone and eco-sensitive areas, Balanced distribution of investment opportunities

## VII. FUTURE SCOPE

Master Plan is a policy level plan and is not complete without the follow-up strategic level plans. The 'concerned organizations shall prepare within two years of the approval of MDP 2025 the following Plans:



### Amanishah Nala Dravyavati river project

- i. Zonal Development Plans
- ii. Water Supply Plan
- iii. Power Generation and Distribution Plan
- iv. Solid Waste Management Plan
- v. Drainage Plan
- vi. Environment Management Plan
- vii. Housing Development Plan (including Slum Rehabilitation /BSUP/ IHSDP)
- viii. Special Area/ Heritage Conservation Plan
- ix. Mobility/Transportation Plan at zonal level
- x. City Landscape Plan
- xi. Village Development Plans on PURA concept
- xii. Disaster Management Strategic Plan
- xiii. Financing Strategic Plan
- xiv. Land Information and Management Strategy

- xv. Catchment area plan for Jaipur Region
- xvi. Decongestion plan for walled city area
- xvii. Public convenience plan

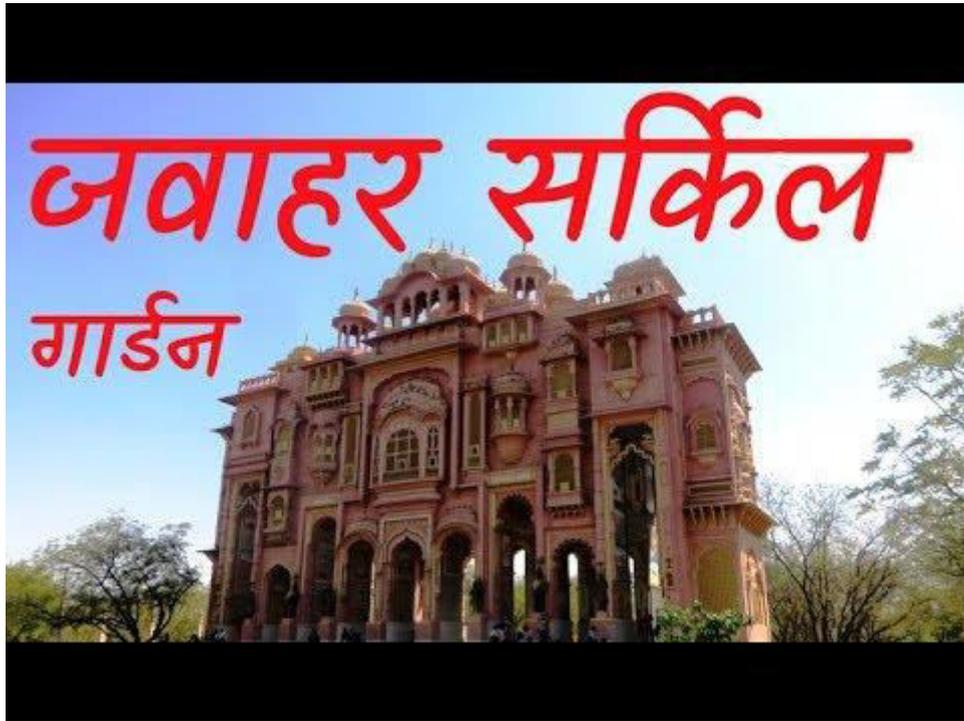
The new Jaipur area is earmarked with Green City and Heritage City, in this respect a detailed project is to be prepared. Amanishah Nallah is to do be developed as life line of the city. It starts from foot hills of Nahargarh and flows through Jaipur city in north to south direction and culminates in to Dhund River. The length of this nala is about 48 K.m. Many other nalas of the city i.e. Nahri Ka Naka nala, Ganda nala and Jawahar nala also merge with Amanisha nala.



### Jawahar Circle Project, Jaipur

The Hon'ble High Court has passed a decision about Prithvi Raj Nagar scheme on 29.10.10 In compliance of the Hon'ble High Court's decision, and in furtherance: (i) to designate Scheme Area as a special area in the plan (ii) to follow road network plan as was suggested by the committee constituted by the committee/State govt. for P.R.N. scheme as guidance and further changes with respect to road network while implementing the plan, due to construction at site if considered, to this effect, it shall be treated as part of MDP 2025 proposals.[24]

The area around Jawahar Circle shall be treated for Special project area and the land use may be governed as shown in the Master Plan. To this effect detailed project/area details shall be construed as part of Master Plan. All plots situated at junctions of 18 mtr. and above where rotaries/traffic islands are provided for regularisation of traffic and all plots situated on either side of flyovers/ROB are barred from Mixed Land use /Commercial use permission in future. Existing establishments may be continued and regularised as per policy of State Government. New permission shall not be granted, if traffic generation activities are sought to be established such as Restaurants, Showrooms, Big commercial establishments etc. Only convenient shops or mixed use can be considered as part of commercial activities on such places.



The isolated industrial uses which have come amidst the developed residential area shall be shifted in phased manner by drawing development plans in consultation with Industries Department and RIICO. These pockets shall be treated as special areas (even otherwise indicated in the map). The State Government shall take final view of the land uses on all such cases.

The Warehousing/ godowns handling the explosives and highly inflammable goods which exist within the city is to be shifted outside the urbanisable area to minimize the loss of life and property. All such uses existing (even otherwise mentioned in the Plan) are to be treated as special areas and further modalities to be worked out to decide about the land use of all such cases by the Authority.

Master plan is prepared on the scale of 1:25000. In case of any deviations in the alignment of the sector roads/ roads widths, in the plan, it is suggested that while interpreting the plan the sector plans prepared which are detailed in nature shall have final say in this respect. In case of any further clarification the cases shall be referred to Executive Committee and finalised.

The land use of the concessional allotments shall be for the use for which it was allotted, even otherwise mentioned in the Master Plan.[25]

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