



Effects of Urbanization on Pollution: A case study of Jamshedpur

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Abstract:

*The industrial township was created in 1907 to serve the Tata Steel works in the tribal villages of Sakchi. Previously it was called Sakchi but its name was changed by Lord Chelmsford. The old railway station was known as **Kalimati** railway station whose name is now changed to **Tatanagar junction**. Jamshedpur city has outgrown beyond such essential facilities as water supply, electricity, sewer system, drainage, transportation, sanitation services particularly outside the Tata owned area. It is the largest city in state of Jharkhand. From last few decades due to heavily industrialization, deforestation and migration this township is facing some severe problems. The aim of this research paper is to highlight the problems faced due to heavily industrialization, Urbanization, deforestation and migration. Secondary data were collected from JUSCO and other reliable resources.*

Keywords: *Urbanization, Lithosphere change, Geomorphic, population pollution, crowding*

1. Introduction

Jamshedpur, India's premiere steel city has a picturesque location on the confluence of the two rivers the Subarnarekha and its tributary the Kharkai, in an undulating micaschist plain surrounded by rugged hills and hillocks of the Jharkhand particularly the Chotanagpur plateau. The industrial township was created in 1907 to serve the Tata Steel works in the tribal villages of SAKCHI. In the north beyond the Subarnarekha lies a range of hills known as the Dalma range (926 m) dominating the whole landscape.

Jamshedpur city is the largest urban agglomeration in the state of Jharkhand. It has a long history and heritage. Lord Chelmsford named the city Jamshedpur in honor of its founder, Jamshedji Nausherwanji Tata it is located between Lat 22°40' to 22°5°NN and Long 86005' E to 86020' E. It occupies 2.03% of the total area of Jharkhand, having the total geographical area of 149.23 K.m², It comprises Jamshedpur notified area Adityapur Municipality, towns of Parsudih, Ghorabandha, Govindpur, Gadhra, Sarjamdah, Halubani, Kitadih and Bagbera, As per 2001 census, Jamshedpur had a population of 1,1 million constituting 53% of the male population and 47% female and having the average literacy rate of 82%.

Geomorphic environment is the sum total of Geology, relief, drainage climate, soil, vegetation and the denudation processes. Geomorphic setting of the locality forms the very Oasis for the township development and industrial development in the area. Geology of the area occupied by the present Jamshedpur is responsible for the installation of the steel plant, which in turn has led to the origin of the township. The undulating physical features in the form of ridges and valleys, the existence of the drainage system has determined the layout of the city.

The existence of slope of the city area is the results of the joint dynamism of the tectonic, structural morphological and Ethological conditions relief and of the climato-morphologic process acting on the surface, Slope types of the city area has been modified by the sprawl of the city & slag dumping of industries. The isotangent map or the first derivative map shows a real distribution of degree of slope and the isoline map shows the distribution of the down slope component of gravitational acceleration which determines the intensity of shear acting upon soil surface. The highest average slope is observed in the North-Western Dalma hills area of the city and the lowest along the main stream flow of Subarnarekha and Kharkhai River. The hills of the city area are deeply dissected. The great elevation of

the Dalma Hill (700 m) is a geomorphological problem. It is a barrier for the northwest and north-western growth and other infra-structural development of the city.

A longtime dumping of slag in the city area has also altered the hydrologic condition of the city area. Man is many more times more powerful, as an agent of denudation, than all the atmospheric denuding forces combined.

The city area is marked by the physical dominance of the Dalma range in northern side and the ranges of the South Singhbhum. The other geomorphic levels or erosional levels stand out in the different superimposed, projected and composite profile.

2. From last few years this township is facing some problems due to urbanization, industrialization, migration and deforestation some of them are as follows.

2.1 Crowding and Non Industrial Pollution in Urban area of Jamshedpur

Jamshedpur city has outgrown beyond such essential facilities as water supply, electricity, sewer system, drainage, transportation, sanitation services particularly outside the Tata owned area. Due to crowding and lack of infrastructure expansion in the town disruption of electric supply is frequent due to overload and load shading for hours daily leading to the use of diesel motor generators, vibration and smoke in many hotels, shops and houses, streets are choked with traffic and particularly the motorized vehicles releasing black smoke and pungent, smells from cooking in the road side restaurants and adjacent houses, popular movie songs or some religious, prayers competing with the noise and horns of vehicular traffic moving slowly through the crowded streets. Besides the large or small market places where private business, shops, small industries and residential apartments co-exist side-by-side, even the middle and upper class residential areas are not free from many of these problems.

2.2 Cultural aspect of pollution

The most non industrial pollution problems are certainly due to overcrowding, lack of resources and poverty of the people in the developing countries. "The culture plays an important role in health and many diseases." Jamshedpur being an industrial city, millions of people have migrated from rural to urban areas with a surge of urban industrial development. The same culture and outlook towards sanitation are being superimposed on the urban areas with the continuous wave of rural urban migration. These rural migrants not only choke the already limited housing and sanitation facilities but manage without such facilities by using any open space including the streets in the urban area. Such situation is commonly found in Jamshepur city is the different outgrowth of the city area.

2.3 Industrial pollution

Jamshedpur is known for the industrial hub right from the 19th century. The locality like Sakchi and Bistupur where the industry started has undergone several change in respect of topography, drainage system, skyline and sky colour. The starting of the steel plant has brought a series of imbalances, disasters in eco-system and degradation of the environment that result in series of changes in the morphology of the region. The process of changes, the forest has been scarified to provide accommodation for such a large scale industry and its growing landscape. The undulating rugged land was bulldozed and made artificial pen plain to allow the installation of heavy machine.

Man is always in pursuit of his comfort welfare and prosperity through the aid of the technology by exploiting the natural resources. The exploitation has created several ecological imbalance and health hazards and deterioration in the quality of our environment. Industrial projects bring the new shape to the locality and spray innumerable chemical pollutants over it in the air and discharge the affluent that contaminate the drainage the system flowing nearby as well as the immediate atmospheric layer above. The whole physical set up yields into develop new cultural landscape after being distorted by the use of heavy machinery. The surrounding wears the immediate deserted look without fauna and flora by the mass technological and cultural rapping over earlier natural environment. The industrial township

expands with the growing population in the geometrical progression and consequently resulting in removal of natural landscape to make room for them. Thus the unhygienic condition and shabby living of the fast sprawling slum.

2.4 Lithosphere change

The most visible change has been marked in the lithosphere with the opening of the mines and quarries in and around Jamshedpur city as well as agglomeration of various types of industry. The dumping of the slag from the steel plant has created an artificial wide flat elevated land that resembles a miniature piedmont plateau having the abrupt rise from the green field and waste site. It has speeded over a very large area encroaching towards Kharkai river. The rear side has a gradual rise for dumping of the unnecessary waste of the plant. The sludge of the cement plant shares in making this heap. The whole dumping yard site looks like a dark and grey colour apron that spreads over a gentle rising land. A huge remnant of hillock has been developed near the industry, A huge quantity of slag has been dumped along the Kharkai and Subarnarekha river bank. The whole lowland area along the Subarnarekha river like Sonari, Bara, Mohadna, which were pool of stagnant water particularly during the monsoon period. All these lowland areas have been filled up by the slag of various industries. A remarkable change in the landscape

2.5 Dusty Skyline

The different types of emission from the chimneys and towers of the different units of the steel plant bring the invisible atmosphere into the wall district visible layer hanging over the steel plant with periodical multi coloured painting. The yellow colour emissions from the fertilizer plant, the black colour emissions from the coke oven, the brown colour emission from the blast furnace and sintering plant and grey colour emission from the thermal plant and other mill side of the plant add the mosaic layering to the atmosphere. In addition to this the heavy dusts of coal, iron and other materials make the bottom layer of the troposphere much heavier and thicker. These materials suffice hygroscopic nuclear to form the clouds and bring unusual scattered sporadic and uneven rain in the region, thus, upto 3 Km distance from the core the percentage of heavier dusts decreases to about 25 percent. But the upper layer with the emissions of lighter gases spreads and covers larger areas. The suspended particles fall upto 5km distance from the plant, The higher layer pollution covers larger area in the sky at decreasing rate from the core.

Air pollution has reached a critical level in Jamshedpur town. It has been found that emissions weighing 1305 tons including highly injurious elements are released into the atmosphere of Jamshedpur city area. The air pollution compromises suspended particulates. Suspended particulates are the predominant air pollution. About 370 tones of dust are daily deposited in the city. The industries contributes 46.30% of emissions following by transportation which accounts for 27.20% of emissions, thermal power plants, 14.70% and domestic emissions 11,80%. Several small industries have been sprung up in the city and they do not follow the pollution rules, Even the large industrial units are also found to be lacking in this regard.

2.6 Population Pollution

In addition to the regular workers of the steel plants, there are a larger number of casual workers working in the various units and sections of the plant. Beside, a large number of the people are earning their livelihood by extending their services to the society in various respects. With the meager income they are unable to hire good houses to stay. So they are forced to stay in the Jhuggies, shanty and squatter settlements with the poorest amenities. The overcrowding, congestion and insanitation have brought the simultaneous morphological change with the population pollutants.

3. Chemical analysis of the skyline over Jamshedpur City

The natural atmospheric condition over Jamshedpur City has undergone various changes just after the physical setting was distorted for installation of the giant steel plant. After the commissioners of the

several units of the plant the billowing smokes and dusts used to change the clear blue sky into dirty dusty sky. The skyline has become metallic coloured due to the emission of the various coloured smokes and suspended particles hanging over Jamshedpur City. As per the distribution of ISO pollutant zones like SPM, Nox and SOx in micro gram sat few monitoring stations at various distances from the centre of the plant. The SPM, NOx and SOx are not found distributed in equal proportionate to distance from the centre taken from study. It is because of the quantity of emissions of these pollutants in microns that differ from one unit to another.

4. Solid waste generation and pollution

The garbage or refuse i.e. the solid wastes are major problems in most of the Indian Cities. Every day over 2000 metric tones of garbage generated in Jamshedpur City, although the JUSCO has arranged house to house collection system of garbage but this facilities are not available in all the outgrowth of the Jamshedpur city, so the garbage is deposited in the Street Vat and pickup stations, From these vats the garbage is transported by trucks to the dumping ground. Sometimes due to the lack disposal services the garbage spill over from vats and blocks the portion of the road. There are two types of solid waste generation in Jamshedpur city.

5. Industrial Solid Waste None Industrial Solid Waste

Jamshedpur is basically an industrial city where several industries have been developed in an around the vicinity of the city. TELCO and TISCO itself produces lakh tones of industrial waste every year. Slag generated by the Iron Melting and production is the major problem. Ultimately huge quantity of slag is being dumped in the nearby area or along the river course, So, the natural layout of the surface of the city ultimately disturbed. The course of the Karkai and the Subarnarekha main is shrinking from the eastern side. More bank erosion has been started towards the north i.e. towards Mango and Paradih. Likewise, Adityapur industrial area is also trial waste. It has become a serious problem to the city planners and managers to manage the solid waste of various types generated by the industrial units.

6. Non Industrial source of garbage

Solid wastes are of several types on the basis of their nature and origin. Household wastes kitchen house cleaning papers, packing bottles crockery wastes, furnishing material, garden trimmings etc are termed as domestic wastes. Solid wastes generated at business premises, shops, offices markets, departmental stores (paper packing materials, spoiled discarded goods), organic, inorganic and chemically reactive and hazardous wastes, polythenes (non biodegradable) are of commercial wastes. The waste generated by schools, colleges, hospitals, large hotels and restaurants, market selling vegetables, fruits, fish etc communication hall, religious places etc are the institutional wastes. Unconcerned throwing littering made by pedestrian traffic, vehicular traffic stray animals, roadside tree leaves, rubbish from drain cleansing debris, etc. are of street speeding. Manufacturing and material processing trade generated wastes are the paid wastes. Offal wastes are generated from slaughter houses, food packing factories and cold storage premises etc. It is really difficult to gather proficient data from the diverse sources of waste generation in Jamshedpur city, such as households, commercial establishments and also difficult to translate that data to quantity to quantum of wastes that actually need to be collected by the municipal bodies.

7. Geomorphic consideration for urban land use planning:

Urban areas in the developing countries, particularly in the industrial city have been equated since very beginning with "Problem area", where the problems develop first and planning comes later. The urban planners, here have considerable faith in this "post-effect" planning which follows only when the city has outgrown and chaos and disorder have already entered the scene.

"As a consequence of the continuous migration inflow, a city becomes a place where lies the highest pressure of human beings as these plans were implemented only in the Tata Owned area. The old land use plan for a limited area has remained not much beneficial in the present context, There is need of

exhaustive land use plan for the rapid growing Adityapur, Mango, Bagbera, Kitadih, Paradih, Gadhra, Halludbani, Ghorabanda area. Planning process for non planned area may be done in four cyclic stages. Review Operational Stage Projection Stage I Implementation Stage Adjustments Evaluation Stage Operation stage is a programming or goal formation phase which begins immediately after the selection of spatial unit for planned development, and consumes 2 to 5 years the plan at this stage involves : a. An assessment of available physical space, and of existing population and land uses to know future land requirement; b. Determination of appropriate quantitative and qualitative physical standards for each uses; c. A decision on the type of land use control required to assume conformity with the adopted standards and methods for effective enforcement.

8. Lay outing of the housing to make the city airy and suffocation free.

The confluence of the two hilly rivers the subarnarekha and kharkai, the undulating micashist plain, the rugged hills and hillocks of Chota Nagpur Plateau compose the picturesque setting and bedrock of Jamshedpur. Geomorphologically, the whole city region is a hilly upland tract of relict hills alternating with valleys, steep forest - clad hills. It washed down by the Subarnrekha, its natural outlet and its important tributaries with height varying from 150 to 900 meters and located about 100 km from the south - west the region, has a tropical monsoon climate, water resources are very merge.

Pattern of housing is very haphazard particularly in the recently developed and developing areas in the city. The south-eastern part of the city i.e. Susaigeria, Kalimati, Jojobera, Sarjamda, Gadhra, Parsudih, Need an exhaustive plan and consideration of geomorphic attributes in the housing development. Several environmental problems have emerged due to faulty method of settlement in the area. The predominantly agrarian economy spells out the rural settlement type and the distribution pattern in the region, the industrial towns and the contiguous area, however, remain different to and immune from this, unlike the plain tract of the city area. Compact and linear settlement thus is the basic characteristics in the city area. Two rows of hamlets forming a typical ribbon like settlement have developed in Dobo, Kapali, Dimna and Baliguma, in Bagbera, Sarjamda and Haludbani on the South and in Uttamdih, Chota Gamharia, Murkum, Asangi and Dindli in the west. The settlement has developed on the spurs above the valley bottom. Faulty settlement in the area like Jugsalai, Bagbera, Gadhra, Adityapur, Kalip Tanga, Karandih and Purihasa, Mango and Pardih needs comprehensive plan for the development.

Consideration of geomorphic attributes is quite essential for the haphazard growth of the city area. Mango area is quite vulnerable as the high hill of Dalma range delimits the further growth of the city in the north. Slope, drainage pattern, terrain characteristics be considered in the housing and further growth of the city, Slag dumping along the eastern bank of the Kharkai and the Subarnrekha has accelerated the rate of erosion along the western bank. The whole area flooded and converted into wetland for four months - Resident of this area had to suffer from the several environmental problems. An effective geomorphic consideration to be followed also in the area along the Jamshedpur Kandra road, Kalup tanga, Chotan Govindpur, Pardih, Turiabera, Kapali, Karandih, Haludbani, Gadhra, Ghagidih, Purihasa, Dindli, Bhetia, Sampura and Ghorbandha and Huilung, There are residential neighbor hoods of the city and decidedly form commuter's suburbs which are more extensive than the other suburbs of the city, To make the city open and airy with pollution consideration of geomorphic attributes becomes compulsory, Geomorphic consideration for water resources exploitation and management for the water supply.

In due course of urbanization the existing water resources i.e. the underground and the surface water always neglected and given not due consideration which ultimately results into the inconsideration of geomorphic parameters. In the area of impervious rock structure and excess urbanization has led to deterioration of water resources. Piezo metric level is being considered during the urban growth. Surface water and underground water consideration is compulsory for the urban planning and development. Ground water is a part of hydrologic cycle that lies beneath the surface and therefore is tied to surface supplies. Ground water is the largest potential source of forest water in the hydrologic cycle. Despite its

volume and important ground water is subject to abuse. In much area it is polluted and is consumed in quantities beyond natural recharge rates.

9. Conclusion

In the new townships and outgrowth city is sprawling haphazardly and causing severe sewerage and drainage problems. Unplanned housing and settlement development should be checked for the betterment of the city environment. The quantum of pollution differs in different sectors of the city depending upon the socio-economic strata and functions, Residents of the Jamshedpur city are aware of the pollution problems and environmental degradation of the city, but still in various town outgrowth of the city like in industrial suburbs and slums area workshops for environmental awareness and pollution monitoring would be helpful in increasing the perception level of individual understanding of pollution, the ground water sources should be utilized where the quantity of groundwater is sufficient and in areas which are not close to the surface water source. Ground water is utilized in the areas of deficient surfaces water source. Urban growth leading to the construction of high rise buildings requires more quantity of water supply. This results in more and more withdrawal of ground water for domestic uses which is augmenting the vacuum beneath surface of hard rock. Continuous withdraw and of the underground water from the hard rock is also serious problem. The most important problem of pollution is crowding due to urbanization people migrated from different states and now they are using the resources which are for the citizens but the load on resources and facilities are huge. Due to this the quality of life of jamshedpurian is deteriorating. It is clear from the water supply and consumption among citizens. Only JUSCO covered areas are getting 24X7 filter water and other areas are yet deprived of it and struggle during summer. It is not only access to clean water but is the fundamental right is being violated. Although a lot of positive measures are taken by the Tata Steel and government of Jharkhand but they are not enough, more effort is required. Most focus is required to spread awareness among the people of Jamshedpur.

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