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# Environmental Assessment of Gorakhpur Industrial Developmental Authority (GIDA) Project Area

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## Abstract

In the present study, Environmental Assessment of Gorakhpur Industrial Developmental Authority (GIDA) Project Area is carried out with a view to look into the present status of environmental quality and issues relating to public health. Environmental Assessment of GIDA Project Area has never been done earlier. Industrial pollution is considered to be the major problem in this area. Environmental Assessment should thoroughly examine the various environmental parameters related to water, air, noise and solid wastes because the pollution may adversely affects the adjoining areas and ultimately the city. So, there is a need to assess the environmental condition of the area and to look into mitigation measures to reduce, prevent or avoid the potential adverse environmental consequences from the project activities and to ensure a high quality environment in the region. Importance of this work lies in reducing environmental compliance issues, waste minimization and to protect occupational safety of workers and to promote sustainable development. Mitigation measures are needed in order to eliminate or minimize adverse environmental impacts. Various environmental issues are presented and discussed. The Environmental Assessment has included the assessment of Ambient Air Quality, Wastewater Characteristics, Groundwater Quality, Noise Pollution and Management of Solid Waste in GIDA Project Area.

**Keywords**: Ambient Air Quality, Wastewater Characteristics, Groundwater Quality, Noise Pollution and Management of Solid Waste.

## Introduction

Air pollution due to anthropogenic sources is a matter of concern in whole world. The urban areas may be viewed as dense sources of enormous anthropogenic emissions of pollutants which can alter the atmospheric composition, chemistry and life cycles in it's down wind regimes, extending over several hundred kilometres. Moreover, worldwide epidemiological study on the effect of air pollution has revealed that gaseous pollutants and particulate matter has enough potential to cause severe health effect like respiratory, cardiovascular diseases and cardio pulmonary mortality. Modernization and Industrialization of developing countries has led to the increased use of fossil fuels and their derivatives.

The existing scenario of water environment essentially deals with the availability of water resources of acceptable quality and the prevailing quality of utilisation pattern. The water resources of the region depend on the precipitation and the water available from the adjoining region by the way of surface water flows through canals. The recharge potential of groundwater reserves also influences the availability of year utilisable groundwater resources. The water resources are thus influenced by climate, physiographic and hydrogeology of the region. Each water use has specific quality need. Therefore, to set the standard for the desire quality of a water body, it is essential to identify the uses of water in that water body. In India, the Central Pollution Control Board (CPCB) has developed a concept of designated best use.

Noise can be defined as an unpleasant and unwanted sound. Exposure to loud noise is indeed annoying and harmful too. Various noise scales have been introduced to describe in a single number, the response of an average human being to a complex sound made up of various frequencies at different loudness levels. The scale has been designed to weigh various components of noise according to the response of a human ear.

The waste generated by industries is considered to be hazardous wastes because they contain substances that are toxic to plants, animals and human. These wastes are highly reactive, flammable, corrosive etc. Improper

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removal and disposal of solid wastes is a proven cause of health hazards which may even spread epidemics, like plague and water borne diseases. Apart from causing diseases, for which flies and rats act carriers, the handling and transfer of biological waste pose an infection threat to the workers, as well as those who come in contact with such infected workers. The garbage dumps lying unattended for a number of days may also contaminate the ground water as the rainwater seeping through the garbage may become poisonous leachate, as it may leach the toxic heavy metallic compounds from the solid wastes.

The husk generated during milling is mostly used as a fuel in the boilers for processing paddy, producing energy through direct combustion or by gasification. This Rice Husk Ash (RHA) is a great environment threat causing damage to the land and the surrounding area in which it is dumped. Rice husk removal during rice refining, creates disposal problem due to less commercial interest. Also, handling and transportation of RHA is problematic due to its low density.

## Materials and Methods

### Study Area

The Environmental Assessment was conducted in GIDA Project Area. The map of the study area is given in Fig.1.

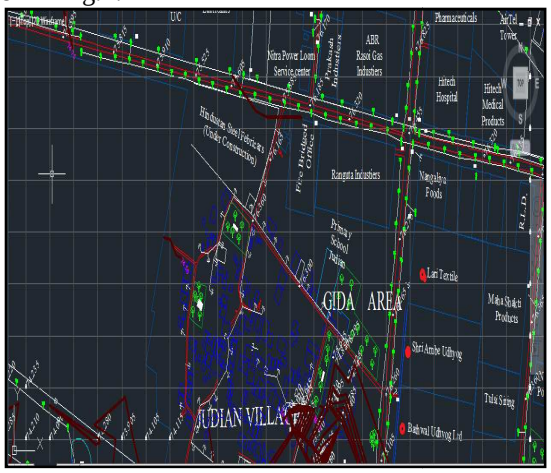


**Fig.1: Map of GIDA Project Area**

GIDA project area consists of large, medium and small industries. At present, there are 159 industries with 154 small and 5 large units. GIDA emerges as a model industrial township with latest technology and modern urban facilities. It is being developed in the shape of a new Gorakhpur City with the entire modern self-sufficient industrial township keeping in view its future needs.

Mainly, three components of air are analysed during the monitoring of Ambient Air Quality in GIDA Project Area including RSPM, $SO_2$, $NO_x$..

A large quantity of wastewater is generated from the various units located in GIDA Project Area. The wastewater quality parameters were analysed. Also, the groundwater samples from the India Mark-II and shallow depth hand pumps in the area were tested to determine their present status.

Progress in industrialization has resulted in creating noise pollution. So, the noise levels were also monitored in GIDA Project Area.

In addition the study also included the assessment of Solid Waste Management in the area.

## Results and Discussion

The results of the assessment of Ambient Air Quality, Wastewater and Groundwater samples, Noise Levels and Solid Waste Management in GIDA Project Area are given here:

The results of Ambient Air Quality monitoring are given in Table.1.

**Table.1: Seasonal Variation in Ambient Air Quality (2013)**

| Parameter | January,2013 (Winter) | April,2013 (Summer) | June,2013 (Monsoon) | NAAQS (permissible limits) µg/m$^3$ |
|---|---|---|---|---|
| RSPM | 152.2 | 135.9 | 118.0 | 100 |
| $SO_2$ | 23.5 | 21.7 | 20.4 | 80 |
| $NO_x$ | 43.7 | 37.5 | 31.9 | 80 |

The seasonal variation in different air quality parameters recorded in GIDA Project Area is given in Fig. 2.

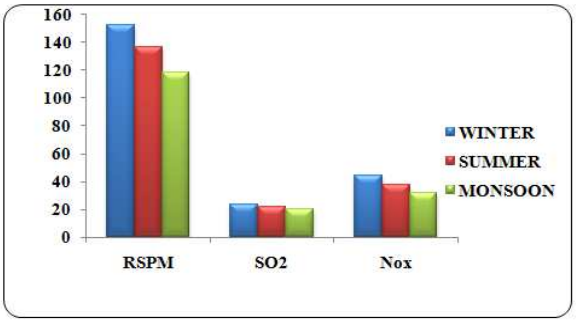


**Fig 2: Seasonal Variation in Ambient Air Quality Parameters in GIDA Project Area**

It is revealed from Table.1 that respirable suspended particulate matter (RSPM) is found to be more than the permissible limit whereas sulphur dioxide

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($SO_2$) and nitrogen oxides ($NO_x$) are within the limits. It is also evident from Fig.2 that the highest values for all the air quality parameters are observed in winter season followed by summer and monsoon seasons.

The results of the wastewater samples collected from the different industrial units of GIDA Project Area are given in Table 2.

**Table 2: Wastewater Parameters**

| Parameters | Lari Textiles and Dyeing Pvt. Ltd. | Ambey Processors Pvt. Ltd. | Bathwal Udyog Pvt. Ltd. |
|---|---|---|---|
| pH | 5.95 | 6.69 | 6.42 |
| Total Suspended Solids (mg/l) | 345 | 412 | 265 |
| BOD (mg/l) | 445 | 585 | 575 |
| (COD mg/l) | 1675 | 945 | 1167 |

The observed pH value ranged from 7.5 to 8.3. None of the samples were found to exceed the permissible limit of 6.0 - 9.0 for effluent discharge into streams and rivers.

The observed TSS value ranged from 345 to 412 mg/l. All the samples were found to exceed the permissible limit of 100 mg/l. From Table 2 it is evident that the maximum value of TSS of 412 mg/l was reported from Ambey Processors. The other two units also had a TSS value above the prescribed limit of 100 mg/l, but they were less in comparison to the TSS value of Ambey Processors.

The observed BOD value ranged from 445 to 585 mg/l. All the samples were found to exceed the permissible limit of 30 mg/l for effluent discharge into streams and rivers.

The observed COD value ranged from 945 to 1675 mg/l. All the samples were found to exceed the permissible limit of 250 mg/l. The maximum COD value of 1675 mg/l is found in the wastewater generated from Lari Textile and Dyeing Pvt. Ltd. The COD values of the effluents generated from the three units were found to be much greater than the prescribed limit of 250 mg/l.

The groundwater samples were collected from three India Mark-II and another three shallow depth hand pumps located in nearby areas of the industrial units. Some physico-chemical and biological parameters like pH, hardness, chloride, TDS alkalinity and MPN of the samples were analysed in the laboratory. The results are given in Table 4.3.

**Table 3.Water Quality Characteristics of Groundwater Parameters**

| Parameters (mg/l) | India Mark - II Hand Pump | | | Shallow Depth Hand Pump | | | Standards |
|---|---|---|---|---|---|---|---|
| | Sample (1) | Sample (2) | Sample (3) | Sample (4) | Sample (5) | Sample (6) | |
| pH | 7.30 | 7.15 | 7.10 | 7.10 | 7.25 | 7.64 | 6.5-8.5 |
| Hardness | 150.0 | 130.00 | 142.33 | 104.96 | 178.50 | 145..32 | 200 |
| Chloride | 120.00 | 98.23 | 142.65 | 125.45 | 99.23 | 153.85 | 250 |
| TDS | 420.25 | 378.20 | 359.00 | 576.25 | 405.96 | 780.5 | 500 |
| Alkalinity | 56 | 78 | 95 | 120 | 75 | 87 | 200 |
| MPN | Nil | Nil | Nil | 4 | 2 | 3 | 0/100 ml |

A glance at Table.3 reflects that the water quality of all the India Mark-II Hand Pumps is within the permissible limits. At the same time, it is also revealed that the water quality in shallow depth hand pumps is found within permissible limits in case of some of the physico-chemical parameters like of pH, hardness, chloride and alkalinity whereas in the out of the three samples total dissolved solids are found to be above the permissible limit.

In addition, MPN count of coliforms in all the three samples is found to be greater than zero. So, none of water sample taken from shallow depth hand pumps are found to be acceptable.

This indicates that in GIDA Project Area, the shallow depth sources of ground water are contaminated and not fit for drinking purposes. Alternatively, it is found that India Mark-II hand pumps yield contamination-free water of acceptable quality. However, the regular monitoring of groundwater is needed to ensure that the leaking of solid and liquid wastes generated from GIDA Project Area does not contaminate the groundwater in near future.

Noise monitoring was done at 5 locations in GIDA Project Area which are given in Table4.While the noise levels recorded from the locations is given in Table5.

**Table 4: Site Description**

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| S.No. | Site No. | Location |
|---|---|---|
| 1 | Site 1 | In front of Ambey Processors Pvt. Ltd. |
| 2 | Site 2 | Boundary of Bathwal Udyog Pvt. Ltd |
| 3 | Site 3 | In front of Lari Textile and Dyeing Pvt. Ltd. |
| 4 | Site 4 | In front of India Glycols Ltd. |
| 5 | Site 5 | Near National Highway-28 |

**Table.5: Noise Assessment Results**

| Sites | | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 |
|---|---|---|---|---|---|---|
| Noise Level Day (db(A)) | | 57.8 | 70.4 | 59.7 | 65.8 | 73.1 |
| Noise Level Night (db(A)) | | 46.3 | 58.1 | 53.0 | 54.5 | 60.2 |
| Prescribed Limit | (Day) | 75 | 75 | 75 | 75 | 75 |
| | (Night) | 70 | 70 | 70 | 70 | 70 |

The Day time noise level were recorded in the range of 57.8 -70.0 db (A). Noise levels at all industrial locations during day time were found below the prescribed limit of 75.0db(A) whereas during night time the noise level were recorded in range of 46.2 dB(A) - 60.2 dB(A) which were also below the prescribed limit of 70 dB(A). During industrial process and operations, heavy equipment and machinery generate noise, thereby causing a nuisance to the surrounding population and environment. The noise levels vary widely and depend on the type of activity performed.

Thus, it is revealed that the noise levels in GIDA Project Area are within the permissible limit prescribed by Noise Pollution (Regulation and Control Rules, 2000). However, there is a need to keep vigil on noise levels in near future also in view of the fact that industrial areas in surrounded by rural areas and any further increment in noise levels weight render adverse effects in the adjoining areas.

A lot of solid wastes including rice husk ash (RHA) is generated in GIDA Project Area. The production of rice husk ash itself is about 750 tonnes per months in GIDA Project Area. In addition, many industrial units also produce a lot of ash which is dumped in the nearby areas that is causing degradation of land in GIDA Project Area. RHA is also potential environmental problem causing damage to the land and the surrounding areas in which it is dumped. No management strategy has been adopted till now for the solid wastes in the area.

Thus, there is a need to adopt a scientifically planned solid waste management programme in GIDA Project Area. At the same time, considering the pozzolonic properties, the efforts should be made for utilization of rice husk ash (RHA) in construction activities.

## Conclusion and Recommendations

The study carried out, regarding the Environmental Assessment of GIDA project Area has revealed various important findings related to Air, Water, Noise and Solid wastes.

In this context, the important findings and recommendations are given below.

**1.**The Ambient Air Quality Monitoring has revealed that the Respirable Suspended Particulate Matter (RSPM) exceeded the permissible limits, which is a point of concern in respect of respiratory health of human beings living in the adjoining areas. However, the value of sulphur dioxide ($SO_2$) and $NO_x$ are found within permissible limits. It is also revealed that the concentrations of these air pollutants are found to be maximum in winter season with receding values during the summer and monsoon seasons. Thus, there is a need for regular Ambient Air Quality Monitoring in the area and to ensure the effective control of air pollutants in the industrial units. In addition, it is also necessary to take up Stack Monitoring in the area and to ensure safe dispersion of air pollutants by providing an effective stack height.

**2.** The Wastewater Quality Assessment from major water polluting industrial units indicates the poor state of pollution control measures being followed in the units. In view of the same, it is necessary to provide well designed Effluent Treatment Plant (ETP) of adequate capacity in such units. In addition, there should be a mechanism to ensure regular operation and monitoring of the Effluent Treatment Plant (ETP). Alternatively, the establishment of a Common Effluent Treatment Plant (CETP) could be another option, which may be capable of treating the entire effluent from industrial units operating in GIDA Project Area.

**3.** The Groundwater Quality Assessment has revealed that the India Mark-II hand pumps installed in the area yield satisfactory quality of drinking water whereas, the water from shallow depth hand pumps has been found to be contaminated and hence, not fit for drinking. So, there is a need of continuous Groundwater Quality Monitoring to make sure that no further degradation takes place in near future. It is also necessary to take up awareness campaign in the area to educate the population to decease the use of shallow depth hand pumps for drinking purposes.

**4.** The Assessment of Noise Pollution in GIDA Project Area has revealed that the noise level is found to be within the permissible limits during the day time as

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well as night time. However, Noise Level Monitoring should also be done regularly to make sure that the adjoining rural belt is not subjected to any adverse effect in future.

**5.** Then the assessment has revealed that there is no scientifically planned Solid Waste Management Programme in GIDA Project Area in spite of the fact that a huge quantity of Rice Husk Ash and other types of solid wastes are generated. Thus, there is a need to take up Solid Waste Management and utilization of Rice Husk Ash in construction activity in GIDA Project Area.

Therefore, it may be concluded that the adoption of a well-planned strategy for the Environmental Monitoring followed by implementation of Environmental Management Plan would go in a long way towards achieving the goals of Sustainable Industrial Development in GIDA Project Area.

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