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## **Brick Industry as a Source of Pollution-Its Causes and Impacts on Human Rights: A Case Study of Brick Kilns of Palasbari Revenue Circle**

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### **Abstract:**

*Through this paper a discussion is carried out to examine as how the manufacturing activities of brick kilns of Palasbari Revenue Circle lead to environmental degradation. It is observed that in performing manufacturing activities these industries ignore the concept of sustainable development. So as a consequence of their manufacturing activities, different environmental pollutions have been created which directly or indirectly violates the human rights. With a view to systematizing the discussion of the topic referred to here, the entire paper is divided in to three parts. First part entitled "Background of the Study" which includes Introduction, Review of literature, Meaning of human rights, Objectives and Methodology of the study. The second part entitled "Impact of Different Pollutions on Human Rights" is a comprehensive study where the brick kilns of Palasbari Revenue Circle are discussed and their production activities are examined. Thereby it is highlighted as how the production activities of these industries not only deteriorating but also directly or indirectly leading to violation of human rights. The third part entitled "Conclusion" whereby it is justified as how the manufacturing activities of the brick kilns have been violating the human rights.*

***Key words: Environmental Pollution, Human Rights and Brick Kiln***

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### **Part I- Background of the Study**

**1. Introduction:** The Indian brick industry is the second largest manufacturer of clay fired bricks after China which is estimated about more than 10 percent of global production. However brick making is recognized as a resource intensive and highly polluting industry by Central Pollution Control Board (CPCB). In Palasbari Revenue Circle brick kilns are the

major sources of pollution. These brick kilns are deteriorating the environment and degrading people's health nearby the brick kilns as well as vegetation. So far as environmental pollution created by the selected brick kilns is concerned it is observed that these industries mainly create three kinds of pollutions. These are air pollution, soil pollution or land degradation and water pollution. Though these industries are playing a decisive role in the economic development but yet to realize and adopt the way of sustainable development. Consequently the activities of these industries lead to violation of human rights caused by pollution. The right to healthy environment is also recognized as 'third generation' human rights in recent years. While human rights are necessary to promote the personality development of human beings, material comfort & healthy environment are necessary to safeguard conditions conducive to such a personality development, without hygienic goods nobody can strive towards this goal. That is why there is a natural link between environment, Development and human Rights (Jyogi, 1987). Keeping in view the above fact this paper aims at examining how far the manufacturing activities of the brick kilns in the study area create environmental pollution which directly or indirectly violates the human rights vegetation.

**2. Meaning of Human Rights:** Human rights are those fundamental moral rights of the person that are necessary for a life with human dignity. These rights are essential for the adequate development of human personality and for human happiness. Human rights include all rights that should be enjoyed by every individual irrespective of class, gender, age, caste, religion, language, creed, status and beliefs. It includes right to life, right to adequate food, right to shelter, right to clothes, right to pollution free air, right to noise free surroundings, right to have safe drinking water, right to vote, right to participate in all social, economic and political activities, right to embrace any religion, right to speak and so on.

Section 2 (d) of the Protection of Human Rights Act, 1993 ("Human Rights Act") defines "human rights" as "rights relating to life, liberty, equality and dignity of the individual guaranteed by the Constitution or embodied in the International Covenants and enforceable by courts in India." "International Covenants" have been further defined as the International Covenant on Civil and Political Rights, 1966 and the International Covenant on Economic, Social and Cultural Rights, 1966 and such other Covenant or Convention adopted by the General Assembly of the United Nations as the Central Government may, by notification, specify.

Devid Selby says, "Human rights pertain to all persons and are posed by everybody in the world because they are human beings, they are not earned, bought or inherited, nor are they created by any contractual undertaking" (Biswal, 2006).

According to Scott Davison " Human rights are closely connected with the protection of individuals from the exercise of state, government or authority in certain areas of their lives, it is also directed towards the creation of societal conditions by the state in which individuals are to develop their fullest potential"( Ray, 2004).

**3. Review of Literature:** A number of research studies have been undertaken on brick industry dealt with different aspects such as organisational and management structure of brick industry, environmental pollution, management of labour and their problems. Some studies dealt on methodological issues and some on empirical analysis. The researcher has tried to review the following:

The brick industry, as a whole depends upon the use of different raw materials and labour for its production. The use of raw materials often makes an impact on land, environment, surrounding vegetation and on the use of energy. Moreover the smoke and dust emitted by the brick industry creates adverse impact on the neighboring areas. Study conducted by Tuladhar (2006) in Kathmandu valley shows that brick kilns were responsible for 27% of PM<sub>10</sub> and 31% of TSP. The results showed that TSP, PM<sub>10</sub> level was about two times higher and SO<sub>2</sub> level was three times higher in Brick Kilns season compared to off season.

In Kathmandu Joshi and Dudani (2008) found that the concentration of various air pollutants was higher during the operation of Brick kilns and the health status of school children attending the school close to the vicinity of the Brick kilns was worse compared to the students attending the school away from the Brick kilns. Further they found significant high odds ratios for respiratory problems like tonsillitis and acute pharyngitis were observed among the students in close vicinity to the brick kilns.

A 2012 document titled Reducing Black Carbon Emissions in South Asia by the US Environmental Protection Agency (EPA) has a section devoted to the brick industry. "Brick production has negative climate impacts due to carbon dioxide and black carbon emissions". It reports that in India the industrial sector accounts for approximately 15% of all black carbon emissions, with approximately two thirds of those emissions or 9% attributable to brick kilns.

Another study conducted in Bangladesh by Ahmed and Hossain (2008) found that pollution load was very high within the cluster region of brick kilns for SO<sub>2</sub> and particulate matter. The study also revealed that particulate matter was a major pollutant in the region.

In the South Asian region, brick kilns are the major source for air pollution. Brick industries are growing rapidly in Bangladesh, India, and Nepal and air pollution increases along with it. More than 108000 brick kilns are in operation in these countries and for the urban air pollution, brick kilns are taking the leading position in rank (World Bank, 2012).

In Bangladesh, it is found that brick kilns produced PM<sub>2.5</sub> (particulate Matter). This fine PM is considering more harmful to human health, because it has deeper capacity to travel into respiratory system cause premature mortality and respiratory ailments (Guttikunda, 2009).

Le and Oanh (2010) conducted a comprehensive study about CO, SO<sub>2</sub> and PM emissions in a Vietnamese village with 21 operating batch brick kilns and found high levels of SO<sub>2</sub> and PM in samples in and around the village. The study revealed high variations of

emission factors in batch kilns depending on many factors, e.g. the type of fuel used and times of measurements.

**4. Objectives of the study:** The general objective of the study is to examine the various impacts of pollution created by the brick industries of Palasbari Revenue Circle on human rights. To achieve the general following specific objectives are taken under study:

- To identify the different environmental pollutions created by the brick kilns of Palasbari Revenue Circle.
- To measure the impact of environmental pollutions on human health and vegetation caused by brick kilns of Palasbari Revenue Circle.

#### **5. Research Methodology:**

The methodology of the study is described under the following points:

**(a) Nature of Study:** The present study is descriptive as well as Analytical in nature.

**(b) Present area of study:** The study covers the Palasbari Revenue Circle, which comprise of 279803B-04K-0L geographical area and is one of the twelve revenue circles comprising the district of kamrup in Assam. The circle is situated to the south of river Brahmaputra which passes from the east to the west across the heart of the district and almost 30 km away from Guwahati city. The Palasbari Revenue Circle occupies almost the central part of the south kamrup district and is composed of 190 revenue villages and 20 forest villages. The circle has one Municipal Board with 10 wards and one census town with one ward. According to 2011 census, the circle has 50,418 households with total population 2,39,026 of which 1,21,926 are males and 1,17,100 are females ( sex ratio 960). The rural and urban population of the circle in 2011 becomes 1,82,428 (Male 93,104 and Female 89,324, sex ratio 959)and 56,598 (Male 28,822, Female 27,776, sex ratio 964) respectively.

The literacy rate of the circle is 71.19% in 2011 census with rural and urban literacy rate at 68.87% and 78.65% respectively. The circle has experienced 76.19% male and 65.98% female literacy rate. In the rural area the male and female literacy rates are 74.04% and 63.48% respectively. The literacy rate for male and female in the urban area are 83.13% and 74.01% respectively.

Though the circle has been facing the problem of both erosion and flood, but it is endowed with natural resources enabling for mass production of bricks. At one time Palasbari Revenue circle was famous for the Saw Mills but due to the supreme court ban on logging, the people working those saw mills faced unemployed.

**(c) Sampling Design:** Multi stage sampling method is used by the researcher for the present study to collect primary data. At the first stage, Palasbari Revenue Circle is selected which comprises of 3 blocks. At the second stage, a total of 7 brick kilns are selected by choosing 50% from each block considering their highest level of production and high volume of employees and labours. Further from the total selected brick kilns, 7 owners are selected as sample owner for the purpose of exploring their view, attitude and perception regarding bricks production. To assess the impact of pollution on the villages, 4 villages having the

sample units are selected purposively. From each village 25 households are selected who lives within 2.5-3 km radius from the kiln randomly. Thus 100 respondents (usually the head of the family or the main income earner) are interviewed for the purpose of exploring their view.

**Table No- 1**  
**The universe and sample frame of the study is given below.**

Sl. No	Block	Total No of Brick kilns	No of brick kilns selected (50%)	No of selected villagers
1.	Chayani Barduar Development Block	08	04	50
2.	Rampur Development Block	04	02	25
3.	Rani Development Block	01	01	25
Total		13	07	100

**(d) Sources of data:** The study is based on both primary and secondary data. The primary data are being collected by the technique of field survey and personal interview. On the other hand secondary data are collected from various offices and libraries viz. Pollution Control Board, Ghy, District industrial Centre, Sub divisional Office, Palasbari, IIE (Guwahati), OKDISCD (Guwahati). Moreover books, newspapers, official reports and different journals are also consulted for the present study.

## **Part II- Impact of Pollution on Human Rights**

### **6. Air Pollution Created by the Selected Brick Kilns:**

**6.1 Air Pollution:** Air pollution is an atmospheric condition in which certain substances (including the normal constituents in excess) are present in concentration which can cause undesirable effects on man and his environment. These substances include gases, particulate matter, radioactive substances etc (Kaushik & Kaushik, 2012).

Recently, the air pollution emission from brick kilns has gained international attention (CAI Asia 2008; Ferdausi et al. 2008). These pollutants include a wide range of incomplete and complete combustion products emitted during the brick firing process. They originate from both the fuel used for brick firing and the raw brick materials (RERIC 2003; Zhang 1997). All the brick kiln operations that is from digging of earth to unloading of fired bricks from the kiln are accompanied by generation of dust which leaves the whole nearby and workplace dusty. Air pollution in brick kiln is produced both through the stack emission as well as the fugitive emission such as during charging of fuel, crushing of coal, clay excavation, loading and unloading of bricks, laying and removal of dust/ash layer over brick setting, cleaning of bottom of trench/side flues etc. Air pollutants after being discharged from the chimney are carried forward by the wind and expand in the dispersion

of pollutants changes the quality of air in the neighborhood of the stack and causes air pollution. The US Environmental Protection Agency (EPA) reports that in India the industrial sector accounts for approximately 15% of all black carbon emissions, with approximately two thirds of those emissions or 9% attributable to brick kilns. One examination was conducted by (Joshi & Dudani, 2008) in order to assess air quality in the areas with brick kilns and without brick kilns. According to them the average value of PM10 for the pre operation time was 0.029 mg/m<sup>3</sup>, whereas, it reached 0.050 mg/m<sup>3</sup> during the brick kilns operation time. Similarly, TSP value was found to be 0.033 mg/m<sup>3</sup> during pre-operation time and 0.056 mg/m<sup>3</sup> during operation time. The Respirable Suspended Particulate Matter (RSPM) and Suspended Particulate Matter (SPM) in almost all the monitoring stations in Guwahati is alarmingly high, beyond the prescribed standards set by the National Ambient Air Quality Monitoring Program in India (Bhuyan and Gupta, 2014). The study also revealed that an increase in vehicular pollution along with dust pollution and exhaust from the brick kiln industries are the primary causes of air pollution in Guwahati.

**6.2 Air Pollution from use of coal in the brick kilns:** Firing of tons of coals and wood causes air pollution, which has not only adverse impact on vegetation, agriculture and gardens but also the workers employed in brick kilns and people, residing nearby are facing serious health problems. The brick industry is the largest consumer of coal after the steel industry in India with an annual consumption of 35Mt (Maithel 2013).

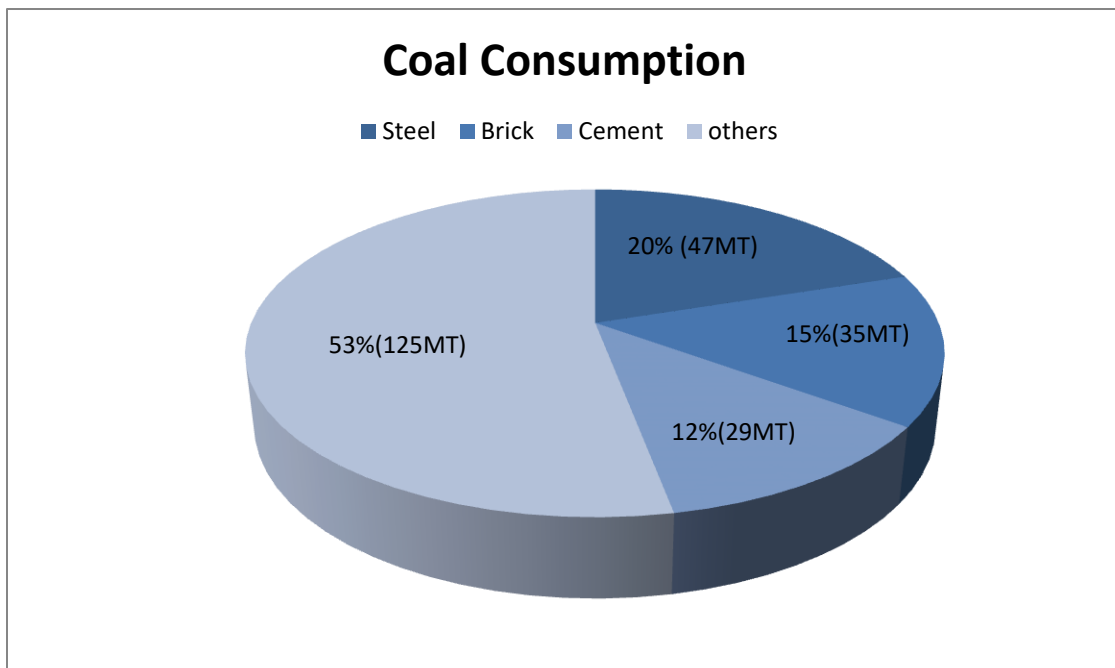


Figure1: *Share of coal consumption annually by brick kilns among industrial consumers of coal in India*

The use of large quantities of coal in brick kilns contributes significantly to emissions of carbon dioxide (CO<sub>2</sub>), particulate matter (PM), including black carbon (BC), sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), and carbon monoxide (CO) in the form of smoke, fumes, soot and ash.

In this connection it is to be mentioned that the entire brick kilns of Palasbari Revenue Circle have been using coal for firing bricks. However the use of firewood has also been observed during the initial firing period to dry up excessive moisture. Coal consumption is in the range of 25-30 ton/lakh bricks produced and these are purchased from Assam and Meghalaya. It is reported that emission of individual air pollutant varied significantly during a firing batch (7 days) and between kilns. However it is estimated that average emission factors per 1,000 bricks were 6.35–12.3 kg of CO, 0.52–5.9 kg of SO<sub>2</sub> and 0.64–1.4 kg of particulate matter (PM) (Le and Oanh 2010).

Further all the selected brick kilns of Palasbari Revenue Circle use Assam and Meghalaya Coal for firing their bricks which content high sulphur. Depending on the sulphur content of the coal in use, SO<sub>2</sub> emissions vary widely and high ash content and incomplete combustion of coal results in the higher emissions of SMP and CO (Mueller et al. 2008). The sulphur content of Indian coals ranges from 0.1% to 0.8%, with exception of Assam coals, which have a higher value of 3.9% (Coal Atlas of India, 1993). In a study (Barooah & Baruah, 1996) revealed that Indian coals from northeast possess high sulphur content varying from 2.7%-7.8% in general with 75%-90% of it in the form of organic sulphur and high-sulphur coals have a deleterious effect on the environments specially when these are used as a fuel. Combustion of high-sulphur coal forms SO<sub>2</sub> which is toxic and corrosive. Sulphur dioxide is a pollutant gas that contributes to the production of acid rain and causes significant health problems.

**6.3 Solid Waste Generation:** Coal ash is the main solid waste generated in the brick kilns. Its quantity depends upon the amount of coal/other fuel used and their ash content. In addition, over burnt and broken bricks also constitute a substantial amount of waste and air piled up near the stock yard. The whole amount of ash is either dumped back on the kiln top or is stocked along the kiln wall. This excess ash/dust gets dispersed to surrounding areas/pavements by a blowing wind or by human activities. This dust which is not removed/disposed of on daily basis, plays the most notorious role in making the brick kiln highly dusty.

**6.4 Fugitive dust emissions:** Like other brick kilns, the brick kilns of Palasbari Revenue Circle are very dusty. The quantum of dust evolved in brick kiln area from non-chimney sources is very high. Various sources of dust generation in the selected brick kilns are observed as follows:

- (1) Top of the Brick setting is covered with kiln ash for providing thermal insulation. The laying of this ash generates huge quantities of dust.

(2) Unloading of fired bricks from the kilns generate lot of dust. This includes the ash covered at the top and coal ash formed during the burning of bricks.

{3} Another major source of dust in work place is the dust blown by wind. Since all ash and dust present on the kiln top, along the kiln wall and adjoining passages are fine and uncovered, these are easily blown even by minor wind resulting in excessive dusty conditions.

In this regard it is to be noted that the dust of bricks is harmful as similar to the smokes. It contains Ca, Mg, Na, Cd, Zn, N, Cl, S, Mo and Si elements and high level of P and K and its nature is alkaline with pH ranging from 8.2 to 10.5. Soil modification with brick kiln dust was harmful to the nematode at all levels (Razvi, 2011). The alkaline nature of brick kiln dust directly affects the maturity of plant, leading to less penetration to the roots and consequently delayed its development.

**6.5 Air Pollution Due to use of traditional technology:** Use of thermally low efficient kilns, outdated technology such as Fixed Chimney Bull's Trench kilns (FCBTK), inefficient firing technologies and the lack of emission control devices often result in a large amount of released air pollutants. Initially BTKs had movable metallic chimneys. Movable metallic chimneys were banned through MoEF notification in 1996. Since then, most BTKs have changed over to fixed chimneys. FCBTK is a continuous, moving fire kiln operated under anatural-draught provided by a fixed chimney. It is comparatively also resource and energy intensive as compared to newer technology alternatives. In India almost 70% of total brick production done through the Fixed Chimney Bulls Trench Kiln (FCBTK)<sup>1</sup>.

The Ministry of Environment and Forests (MoEF), Government of India, has issued standards for suspended particulate matter (SPM) emissions and chimney height for different types and categories of brick kilns (Table 1).

**Table 5: Emission Standards for Brick Kilns by MoEF**

<b>Technology and size</b>	<b>SPM emission standard</b>
Fixed Chimney Bull's Trench Kiln (FCBTK)	Less than 750 mg/Nm <sup>3</sup>
Large and medium size (production less than 15,000 bricks/day)	
Small size (production less than 15,000 bricks/day)	Less than 1000 mg/Nm <sup>3</sup>

<sup>1</sup>Towards Cleaner Brick Kilns in India: A win-win approach based on Zigzag firing technology-2013. Report prepared by Greentech Knowledge Solutions Pvt Ltd and submitted to Shakti Sustainable Energy Foundation. New Delhi available at [www.gkspl.in/energy\\_efficiency/](http://www.gkspl.in/energy_efficiency/)



Vertical Shaft Brick Kiln (VSBK)	Less than 250 mg/Nm <sup>3</sup>
Down-draft kiln	Less than 1200 mg/Nm <sup>3</sup>

Source: Ministry of Environment and Forests, The Gazette of India, Part II, Sec 3(i).

In Palasbari Revenue Circle all the brick production takes place through traditional technology - the Fixed Chimney Bulls Trench Kiln (FCBTK).FCBTK suffers from incomplete combustion of fuel, indicated by high CO concentration in flue gas (PPM range), black smoke, and unburnt coal deposition at the floor of the kiln. The incomplete combustion of fuel results in high SPM and BC emissions in flue gases. The measured SPM emissions from FCBTK lie in the range of 150–1250 mg/Nm<sup>3</sup><sup>2</sup>. There are alternative technologies available that are more energy and resource efficient and emit lesser greenhouse gases. For instance the Vertical Shaft Brick Kiln consumes 40% less energy compared to FCBTK through the waste heat recovery system and emits almost 70% less emissions. The fly ash cured block technology does not use fossil fuel and therefore has no emissions.

In this connection when asked about the use of eco-friendly technologies that can reduce coal consumption, it is found that 5 (75%) entrepreneurs are not aware about the use of eco-friendly technologies. They had no inclination to modify or switch to new technologies as they don't want to take risk with any new technologies. Only 2 (25%) entrepreneurs are willing to modify their technology to make it more eco-friendly.

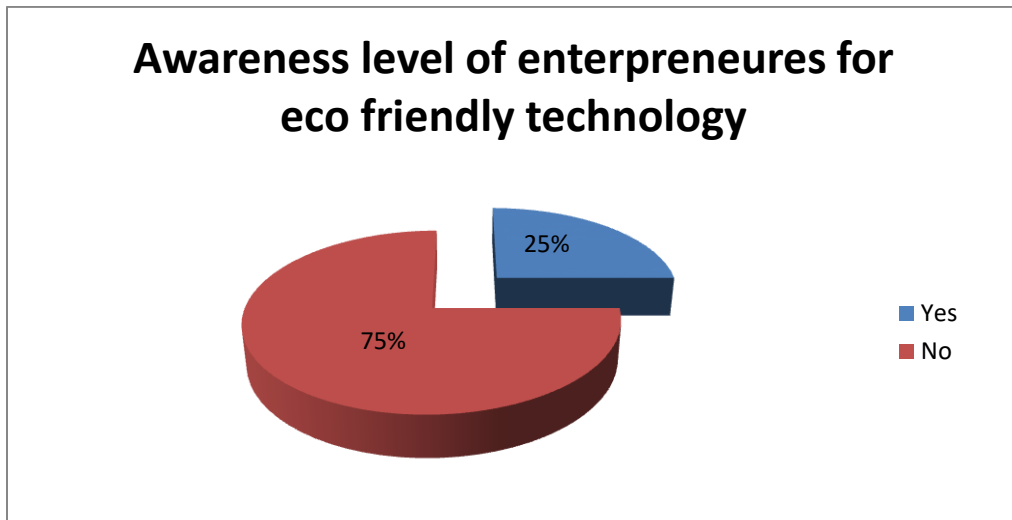


Figure 2: Awareness level of entrepreneurs for eco friendly technology

<sup>2</sup>Brick Kiln Performance Assessment – 2011. Report prepared by Greentech Knowledge Solutions, Enzen Global Solutions, University of Illinois and Clean Air Task Force and submitted to Shakti Sustainable Energy Foundation. New Delhi: Available at [http://www.unep.org/ccac/Portals/24183/docs/Brick\\_Kilns\\_Performance\\_Assessment.pdf](http://www.unep.org/ccac/Portals/24183/docs/Brick_Kilns_Performance_Assessment.pdf)

During field survey it is also observed that the brick kilns in the study area, have no filters and no facilities to store the toxic residues from the combustion process. From December to May, the air of the whole area fills with the distinctive smell of coal and biomass combustion and while the emissions stop with the beginning of the monsoon season in June, the toxic residues slowly distribute in the soil and plants.

**6.6 Effects of Air Pollution:** Air quality is an important environmental resource and its deterioration has many serious impacts on human wellbeing. Air pollution negatively affects the human health, the environment and the economy. The importance of clean air can be understood from the fact that an average adult male inhales about 15kg of air in a day compared to 1.2kg of food and 2.5kg of water for drinking (Gupta, 1991). Thus, of the body's intake, 8% consists of food, 12% of water and 80% of air. According to WHO for air pollution approximately 3 million people have died each year. Among them, 800,000 people die prematurely every year due to lung cancer, cardiovascular and respiratory diseases, which are caused by outdoor air pollution (WHO, 2000). The latest assessment by WHO's International Agency for Research on Cancer (IARC) concluded that worldwide seven million premature deaths annually are linked to air pollution (Jasarevic et. al., 2014). Approximately 150,000 of these deaths are estimated to occur in South Asia alone (World Bank, 2003). Inhalation is the most common route for pollutants to enter the human body and damage the respiratory system. Air pollution has a profoundly negative impact on human health. It is a major risk factor for a number of health conditions including heart disease, respiratory infections, stroke, chronic obstructive pulmonary disease and lung cancer. Air pollution affects the respiratory system, the cardiovascular system, the nervous system, the urinary system, and the digestive system (Nilsson, 2015). Exposure to high levels of coal and dust particles may also cause irritation of skin and eyes.

Air pollution is not just a threat to human health. It also damages the environment. Toxic air pollutants cause harm to things such as crops, trees, wildlife, and all types of bodies of water. The same pollutants can also harm fish and other aquatic life.

Plant health is affected by air pollution because pollutants like fluorine, lead, and mercury damage the plants.  $\text{SO}_2$  is transformed in the atmosphere to various forms of sulphate that are damaging to plant life. Plants are directly injured when excessive sulfates accumulate in their tissues. High concentration of carbonaceous and siliceous particulates coupled with soot and tar cause perceptible damage to plants. Research carried out in Indian Agricultural Research Institute has shown that this smoke causes various diseases in fruits such as black tip disease and necrosis in mango. Moreover acid rain can kill trees, destroy the leaves of plants, can infiltrate soil by making it unsuitable for purposes nutrition and habitation. Fog is another phenomenon whose effect can extend to nearby areas. Due to air pollution, ratio of fog formation is accelerating. This fog can damage normal transportation systems, reduce the growth of crops due to decrease of sunlight. Bio-diversity of different areas can degrade due to air pollution because all these chemical components are affects the organisms (WHO, 2011).

Though the brick kiln air pollution affects the public generally, workers are the class more prone to health hazards than any others since they are exposed to high concentration for extended period. In the study area brick kiln workers are exposed to these hazards in an extensive way because they are working and living only a few meters away from the ignited and emitting kilns. The houses of the workers are located directly at the sites of the kilns and as there are whole families living there, it can be assumed that also their children are affected. Workers engaged in different activities of brick manufacturesuch as brick making, loading and unloading in kiln, coalcrushing fuel charging etc. are under various thermal and physiological stresses due to extremely unhygienic conditions prevailing on selected brick kilns. During survey it is found that the entrepreneurs have not taken any precautionary measures in order to protect the workers from the ill-effects of particulate and gaseous pollutants. Moreover both agricultural crops and fruit trees growingaround these kilns have been found to be damaged as a direct effect of these pollutants.

Keeping in view the above facts The Assam Pollution control Board has issued a set of guidelines regarding the location of brick kilns in Assam. The Brick kiln shall be established at least 300 m away from residential area having a minimum population of 100-150 people or 500 m away from residential area having a minimum population of more than 150 people and also 500 m away from the registered hospital, school, public building etc. But in reality it is observed that among the selected brick kilns two brick kilns are situated hardly 400 m away from a Government LP school and two brick kilns are located directly in two different villages.

During field visit when asked to the nearby household regarding air pollution, it is revealed that more than 80% respondents have strong believe that brick kilns are the main reason for air pollution. They also believed that due to air pollution from brick kilns, community people are facing breath problem, nasal problem, eye burning and other diseases. According to them apart from their health problem, they were facing low food production, scarcity of ground water and all types of plants nearby brick kilns were in exhausted condition. So, it is clear from people perception that people living nearby brick kilns are suffering more and they feel the adverse effect of air pollution.

**6. Land Degradation from the Manufacturing Activities of Selected Brick Kilns:** Land degradation implies the temporary or permanent decline in the productive capacity of the land (UNEP, 1992). Land degradation takes place commonly due to wind, surface runoff and of course human activity. Over population, over exploitation of land resources, intense demand for fuel and other forest resources, unsuitable cultivation, intensive input applications are the main factors responsible for emergence of degraded land.

**7.1: Land Degradation through brick making activities:** Apart from air pollution the brick industry also consumes large quantity of top soil. Soil quarrying activities by the brick kilns causes serious damage to agricultural land. Carrying a soil from different sources to the brick industries assimilates dust particles in the atmosphere and vegetative cover in the surrounding areas. Soil quarrying, generates solid wastes, and it causes water

management problems, water logging etc. Soil application of brick kiln dust at lower levels increased plant growth and yield of plants. The available nutrients present in brick kiln dust were beneficial up to a certain level but that at larger concentration they were toxic and prevent to plant growth. The removable of top layer removes the organic material from the soil. The infertile soil reduced the capacity of production. The traditional mode of production system not only reduced the production of crops but also it raises the amount of expenditure.

The traditional method of making bricks by hand requires good quality clay. This good quality clay is also used for raising various crops. In Palasbari Revenue circle also the potential raw materials for brick making is soil. The brick manufacturers of this area uses top layer of soil as raw material by digging up the earth in the nearby area of the brick industry either from the good agriculture land or marginal land<sup>3</sup>. These soils are takes on lease from the farmers or villagers of the area. The soil and climatic conditions in the study area are ideal for rice, but as the agriculture in the study area is only rain-fed, paddy fields are fallow in the dry season and only a few fields are planted with rabi-crops and some fields are used for vegetables. The diagram given in Figure 4 shows the present land utilization scenario of select brick kilns of Palasbari Revenue Circle for brick making.

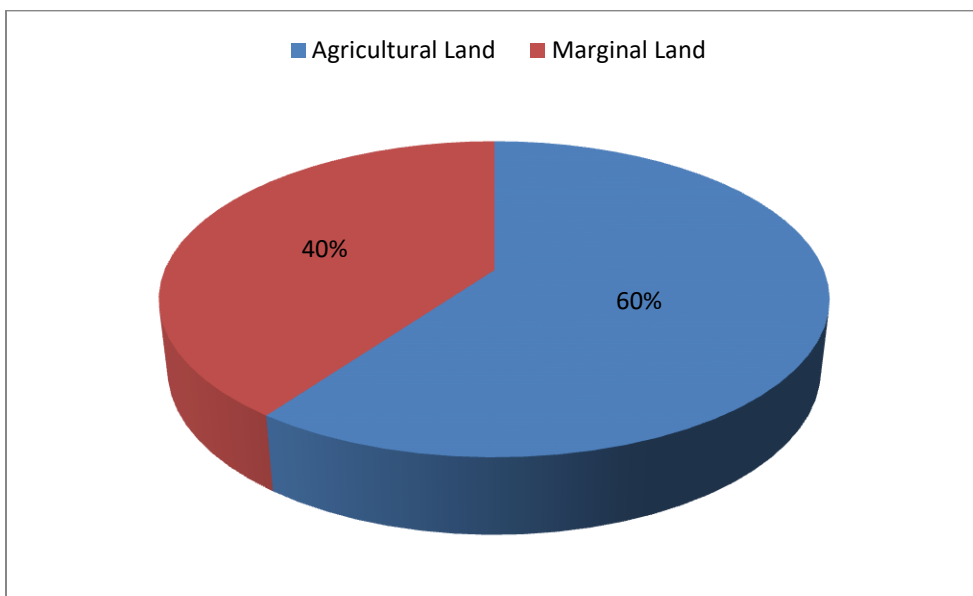


Figure 4: Land utilization scenario

It is revealed from the above diagram that mostly agricultural land (60%) is used for brick making purpose in the study area. However it is also observed that sometimes

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<sup>3</sup> Marginal land is the land that is of little agricultural value because crops produced from the area would be worth less than any land paid for access to the area.

marginal lands are also used for brick making. On the contrary all the brick kilns of the Palasbari Revenue Circle use ¼ th alluvial soil (sandy soil) to get the right properties. Therefore due to use of top fertile soil (3ft to 10ft) for brick making, a huge amount of agriculturally fertile lands are getting converted in to waste land.

During personnel interview, some farmers of the selected area reported that in these quarried lands farmers practice subsistence type of agriculture because the returns are very low due to removal of the fertile soil by the brick kilns. They also reported due to poverty and huge capital investment in agriculture, they are forced to lease out some part of their land to the brick kiln owners. During survey, it is found that 45 (45%) respondents mention the problem of land degradation in their locality.

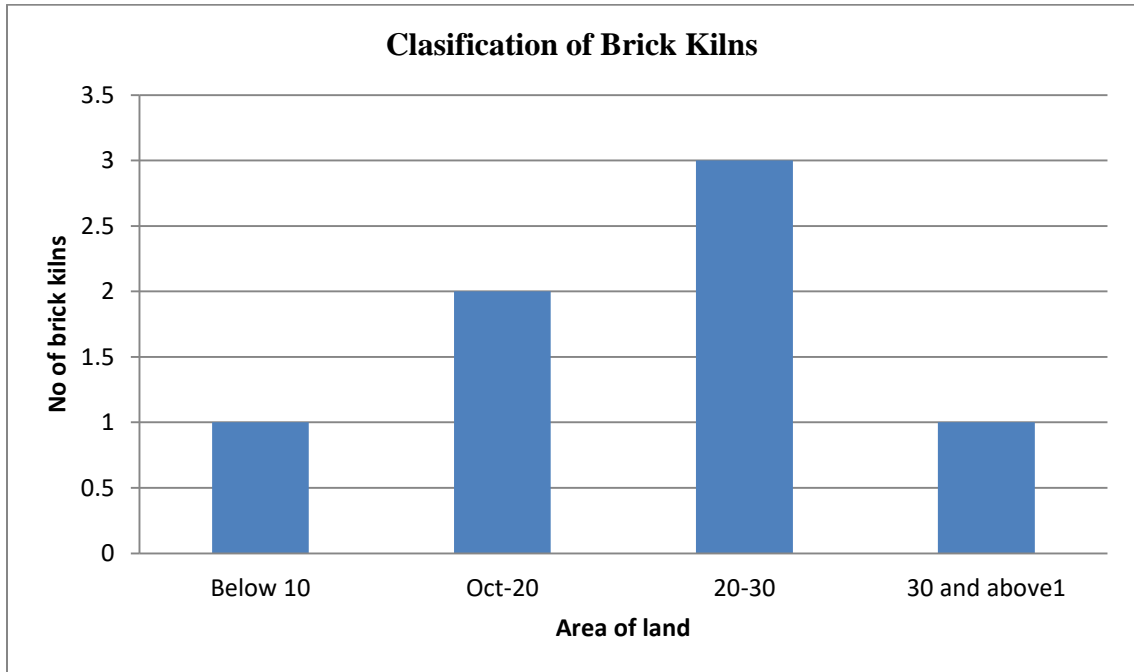
It is also observed in the study area that due to excessive digging for clay the vegetation has been cut at these sites. The good quality clay is not only used for raising various crops but it is also used for making bricks. But after the brick industry stops its work, quarrying makes the land infertile. The soil quarrying activities are lowered the agriculture land 2-4 feet than the surrounding land. This activity not only changes the existing slope of the area but also it changes the composition of soil in the quarrying field. Moreover the land has an animal grazing value but once the raw material has been removed, the pit is simply abandoned and the land is lost for animal grazing.

**7.2 Quantitative Measurement of Degraded Land in the study area:** The measurement of quantity of land degraded due to the brick industry can be classified into two main categories. One, the land use to establish kiln which burn the soil of that land up to a few feet deep from the top. Another, the land used to quarrying activity. Each brick industry quarried approximately 2-4 bigha and above top soil per year. Therefore a huge amount of cultivable turn in to degraded land. Table 7 shows the classification of brick kilns on the basis of land used by the selected brick kilns.

**Table 7: Classification of brick kilns on the basis of land used**

<b>Land Used (in bigha)</b>	<b>No of Brick Kilns</b>	<b>Percentage</b>
1-10	01	14%
10-20	02	29%
20-30	03	43%
30 & above	01	14%
Total	07	100%

Above table shows that 3(43%) kiln out of twelve having the area between 20-30 bigha of land, 02(29%) unit have 10-20 bigha of land, 01 (14%) unit used below 10 bigha of land. Another 01 unit (14%) have above 30 bigha of land for functioning of a single industrial unit.



**7.3 Loss of Soil Fertility:** The brick loam quarrying has another major impact on soil nutrients, which is usually unseen in the quarried lands. Loss of  $\frac{3}{4}$  of soil fertility through brick production was reported from different regions in Bangladesh, where the same methods for topsoil extraction for brick production were used (Khan et al. 2007).

In Palasbari Revenue Circle the rich agricultural topsoil is quarried away for brick making, leaving behind the sub-soil, which is lack of nutrients. The nutrient element which is essential for plant growth are carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, potassium, calcium, magnesium, copper, zinc, boron, silicon, sodium, chlorine etc. Among all these plants obtain carbon, hydrogen, oxygen from the air. However the essential elements like boron, iron, manganese, copper, zinc, phosphorus, nitrogen, potassium are obtained from soil fixation. Although all elements are more or less responsible for plant growth, but nitrogen, potash and phosphorus are main essential elements to plant growth and crop yielding (International Food Policy Research Institute, 2000). Moreover the underground fire in the kiln reduces the surrounding soil moisture and unplanned hacking of the land alters the drainage pattern of the area.

**7.4 Erosion Caused by Adjacent Quarried Lands:** One of the major adverse effects on agricultural land by brick soil quarrying is soil erosion. Field surveys showed that topsoil, which is very fertile, is carried away by water along the steep slopes caused due to soil quarrying. Thus a huge amount of fertile topsoil is removed from the elevated agricultural land, which lies adjacent to the quarried land. Owner of the quarried land does not bear the cost of inconvenience of the neighboring affected land. Due to this process the owner of the adjacent land, which is not under quarrying process, becomes bound to lease their land to

the brick kiln owners. Such understanding between land owner and brick kiln owner degrades not only land but also the environment. The immediate benefits made them blind about sustainable development of environment.

**7.5 Water logging:** Water logging is a serious problem in the quarried land around the brick kilns. Water logging means the flooding of land by rain water. It occurs in places where soil quarrying is done. Brick kilns generate waste and sometimes the burrow pits or the huge ditches or the brick manufacturing sites are used for dumping city garbage and solid waste. Water logging is not only the problem of rainy season but it also occurs occasionally in other seasons. If the land is cultivated, the crop can be spoiled when drowned by the excessive water. Consequently, cultivation of the quarried lands can be a more risky task. In many cases, the crops are not being cultivated due to the water logging problems.

During the field survey it was observed that the lands from where the soil has been quarried became ditches because in such areas the land has not been leveled. During the rainy season these ditches are full of water and they become ideal breeding sites for mosquitoes and other pests. The water becomes contaminated. Sometimes villagers / workers living near the water pools, use this water for washing, bathing etc. This causes serious health problems.

**7. Water pollution:** The term water pollution is referred to the addition to the water of an excess of material (or heat) that is harmful to humans, animals, to desirable aquatic life or otherwise causes significant departures from the normal activities of various living communities in or near bodies of water (Prabhakar, 2001).

Brick kilns are the major sources of water pollution. These industries affect the ground water quality due to leaching of compounds from raw materials used in brick industries (Khan et al. 2007). The level of water pollution in the study area have not studied. There are various literatures available in this field. Dey & Dey (2015) analyzed the various physico-chemical properties of like WT, pH, EC, Transparency, TA, DO, FCO<sub>2</sub>, Nitrate and Phosphate to study the impact of brick industries of Cachar district, Assam on the aquatic bodies by using Standard Methods. They found that the water temperature (WT) in the aquatic system near to the brick kilns increases due to the emissions of heat from the kilns which slightly raise the water temperature in nearby aquatic systems. Moreover the study also revealed that the water is more turbid in affected site which might be due to dumping of ashes, extraction of sand and cutting of land that causes high silt content in water from the catchment areas. The high turbidity might be responsible for high level of water temperature in the aquatic bodies near brick kiln industry because the suspended particles absorb the heat from the sunlight making the water warm. Khan & Vyas (2008) found in their study that the brick kiln waste along with water flows back in the Kshipra river, increasing the total solids, suspended solids, dissolved oxygen, calcium hardness, total hardness etc.

The brick manufacturers of Palasbari Revenue Circle do not keep records about the usage of water for brick production as it seems to be an abundant and freely available resource. Out of the selected brick kilns two brick kilns are situated around 200/300 meters away from Brahmaputra River. Waste water from the sites of these brick kilns contains large quantities of suspended solids. Moreover the workers of these kilns use open spaces near the river as latrines and urinals causing bad smell and unhygienic conditions. Sewage and other oxygen demanding wastes from these sites are the major water pollutants because their degradation leads to oxygen depletion, which affects fish and other aquatic life, impairs domestic and livestock water supplies by affecting taste, odors and colors (Prabhakar,2001).

There are several types of human infections that are transmitted through water are cholera, typhoid fever, bacillary dysentery, infectious hepatitis etc. The World Health Organization (WHO) has estimated that 1.1 billion people do not have access to drinking water resources, and 2.4 billion people have inadequate sanitation facilities, which accounts for many water-related acute and chronic diseases. Some 3.4 million people, many of them young children, die each year from preventable water-borne infectious diseases, such as intestinal diarrhea (cholera, typhoid fever and dysentery), caused by microbially contaminated water supplies that are linked to deficient or non-existent sanitation and sewage disposal facilities (Ahmed, 2003).

### **Part-III**

#### **11. Conclusion**

In this part an attempt is being taken to highlight as how the environmental pollution created by the brick kilns leads to the violation of human rights. In doing so, the various provisions of the different international treaties, national acts and the constitution of India are discussed.

Human rights and environment are inter-related and are concerned with development and promotion of human welfare. The sole aim of human rights is to provide some immunity to fulfil some basic necessity of all human beings so that they can live a life with dignity. But dignity of human beings is not possible if one cannot enjoy the right to life, have safe drinking water, healthy and nutritious food to eat and adequate means of livelihood due to adverse impacts of environmental degradation. While human rights are necessary to promote the personality development of human beings, material comfort & healthy environment are necessary to safeguard conditions conducive to such a personality development. That is why there is a natural link between environment, Development and human Rights (Jyoti,1987). The Rio Declaration on environment and Development, 1992 has clearly declared that human beings are at center of concern for sustainable development. They are entitled to a healthy and productive life in harmony with nature. Therefore in order to achieve sustainable development environment protection constitutes an integral part of development process and it cannot be considered in isolation.



The brick industries of Palasbari Revenue Circle have been identified as a major contributor to environmental degradation and human rights violations due to the pollution created by these industries and other impacts on the land, air and water. These industries adversely impact the health or livelihoods of local as well as workers of the industry through environmental pollution and this way threatens the two fundamental human rights – the right to life and health. Again exhaustion of natural resources also leads to Unemployment problem in Palasbari Revenue Circle. Right to life has been protected and safeguarded by Article 21 of the Indian Constitution. The right to enjoyment of the highest attainable standard of health is fundamental part of our human rights. The rights are also guaranteed through different instruments of human rights to ensure quality of human lives. Internationally, it was first articulated in the 1946 Constitution of the World Health Organization, where states that **“The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition”**<sup>4</sup>. In Article 25(1), the Universal Declaration of Human Rights, 1948 also mentioned that -**“Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family . . .”**The right to health was again recognized as a human right in the 1966 International Covenant on Economic, Social and Cultural Rights where Article 12 states **“The right of everyone to the enjoyment of the highest attainable standard of physical and mental health”**.

Failure to inform local communities of environmental impacts. Air pollution causes not only health related problems but also environmental degradation such as acid rain, eutrophication, haze, ozone depletion, crop and forest damage, and global climate change (UNEP, 2011). The first UN Conference on the Human Environment, which took place in Stockholm, shed light on the relationship between human rights and the environment. The preamble to the Stockholm Declaration proclaims that:

**“Both aspects of man’s environment, the natural and manmade, are essential to his well-being and to the enjoyment of basic human rights – even the right to life itself”**.

Furthermore, the 1992 Rio de Janeiro Conference on Environment and Development, United Nations Environment Programme (UNCED) focused on the link that exists between human rights and the environment in terms of procedural rights. Despite the fact that the 1992 Rio Declaration does not grant the right to a clean environment directly, it places emphasis on the importance of nature. It states that, **“human beings . . . . are entitled to a healthy life in harmony with nature”**

The importance of the environment as a human right is outlined not only by international bodies but also the right to a healthy environment is included in Indian constitution. In the year 1976, 42nd constitutional amendment was adopted in response to the Stockholm International Conference on Human Environment in 1972 and came into

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<sup>4</sup>WHO. Constitution of the World Health Organization. Geneva: WorldHealth Organization, 1948. <http://apps.who.int/gb/bd/PDF/bd47/EN/constitution-en.pdf?ua=1> (accessed June 8, 2014).  
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effect on 3rd January, 1977. The Directive principles of State Policy (Article 48-A) 38 and Fundamental Duties (Article 51-Ag) 39 under the Constitution of India explicitly announced the national commitment to protect and improve environment and preserve air quality (Bhave&Kulkarni, 2015). Nowadays through judicial interpretations, the right to clean air has been identified as element of right to life under Article 21 of the Constitution. In the realm of statutory law the Indian response to the Stockholm Declaration was the enactment of the Water (Prevention and Control of Pollution) Act in 1974 followed by the Air (Prevention and Control of Pollution) Act in 1981. This is the first act formulated with the sole purpose to provide for the prevention, control and abatement of air pollution. The Environment (Protection) act, 1986 came into force on 23rd May, 1986 to provide for the protection and improvement of environment and for matters connected there with.

Thus it is clear that the environmental and atmospheric pollution amounts to violation of Article 21 of the Constitution. In fact, the right to life guaranteed in Article 21 of the Constitution embraces the protection and preservation of nature's gifts without which life cannot be enjoyed (Agarwal, 1980). Moreover, environmental degradation has disastrous impact on right to livelihood which is a part of the right to life. The right to a healthy environment is now found in a number of global and regional human rights instruments around the world. Government of India as well as Assam has also taken various measures in order to control environmental pollution. But it is observed that although various legal provisions are available for controlling pollution in the brick kilns but the brick kilns of Palasbari Revenue Circle are continuously violating the different acts by creating environmental pollution which adversely affects the life of the workers as well as local people and it amounts to reducing the life of these people because of the hazards created. More over the owners of the brick kilns of this area are also not aware about the various provisions of different acts and thereby negatively impact on right to life. In order to minimize the violation of human rights, there is a need to create awareness among the local people of Palasbari Revenue Circle about the promotion and protection of human right and healthy environment.

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