International Journal of Applied Research 2016; 2(8): 648-656

ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2016; 2(8): 648-656
www.allresearchjournal.com
Received: 05-06-2016
Accepted: 06-07-2016

Manashi Mazumdar
Research Scholar, Assam down town University, Guwahati, Assam, India

Dr. Arabinda Debnath
Assistant Professor and HOD, Humanities and Social Science B.B. Engineering College, Kokrajhar, Assam, India

Correspondence
Manashi Mazumdar
Research Scholar, Assam down town University, Guwahati, Assam, India

Impact of air pollution on human rights (An empirical study on select brick kilns of Palasbari revenue circle)

Manashi Mazumdar and Dr. Arabinda Debnath

Abstract
Through this paper a discussion is carried out to examine as how the manufacturing activities of selected brick kilns of Palasbari Revenue Circle lead to violation of human rights. It is observed that in performing manufacturing activities these industries ignore the concept of sustainable development. So as a consequence of their manufacturing activities, various air pollutions have been created which ultimately 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 air pollution and human rights, Objectives and Methodology of the study. The second part entitled "Impact of Air Pollution on Human Rights" is a comprehensive study where seven selected 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 creating air pollution 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 selected brick kilns are claimed by different act and law as the activities of violating human rights.

Keywords: Air pollution, human rights and brick kiln

1. Introduction

Air is an important natural resource for the sustenance of life and other activities in the biosphere. As atmosphere plays a vital role in the existence of life, proper understanding of the atmosphere, viz. its properties, behavior and its effects on human beings and the effect of human activities on it are very essential. But various factors such as population boom, rapid industrialization and urbanization have resulted in the deterioration of the air quality. Another important cause of deterioration of the air quality is vehicular traffic and brick kiln industry which is increasing day by day. Air pollution has both short-term and long-term adverse effects, and it is also acknowledged as a public health threat and is viewed as an inevitable consequence of energy use and industrial production. In Palasbari Revenue Circle brick kilns are the major sources for air pollution. These brick kilns are deteriorating air quality and degrading people's health nearby the brick kilns. 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 air 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)[1].

[1] Yogesh k, jyogi. An Integrated Approach to Environment, Development & Human Rights Law, science & environment, R.P Anand, Lancer Books, New Delhi,1987, P 221

Keeping in view the above fact this paper aims at examining how far the manufacturing activities of the selected brick kilns create air pollution which directly or indirectly violates the human rights.

2. Meaning of Air Pollution and Human Rights:

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.

Gaseous pollutants include oxides of sulphur (mostly SO_2, SO_3) oxides of nitrogen (mostly NO and NO_2 or NO_x), carbon monoxide (co), volatile organic compounds (mostly hydrocarbons) etc. Particulate Pollutants include smoke, dust, soot, fames, aerosols, liquid droplets, pollen grains etc. On the other hand radioactive pollutants include radom-222, iodine-131, strontium-90, plutonium-239 etc. (Kaushik & Kaushik, 2012).

Air pollution has local as well as global impacts. Both living and non-living organism are facing the adverse effect of pollution. Industrialization is the major reason for acid rain because industries emit sulphur dioxide and oxides of nitrogen, which combines with water vapour in the atmosphere and forms mild acids. When it comes to the earth as rain, it is called acid rain. It causes extensive damage to plant lives, buildings and contaminate of lakes and rivers (EPA, 2012).

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. But in case of Assam there is very little evidence concerning the working of the industry in the state. Some studies dealt on methodological issues and some on empirical analysis. The researcher has tried to review the following:

According to the World Health Organization (WHO), Air pollution is contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere. Household combustion devices, motor vehicles, industrial facilities, and forest fires are common sources of air pollution (WHO, 2013).

In Europe, the World Health Organization and the European Commission estimated that more than four hundred thousand deaths in 2010 and 2012 were attributable to air pollution (EEA, 2014).

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. A study conducted in Kathmandu by 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.

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 $PM_{2.5}$ (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_2 and PM emissions in a Vietnamese village with 21 operating batch brick kilns and found high levels of SO2 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 effects of air pollution created by the brick industries of Palasbari Revenue Circle on human rights. To achieve the general objectives following specific objectives are taken under study:

- To identify the different air pollutants created by the brick kilns of Palasbari Revenue Circle.

- To measure the impact of air pollution on human health and vegetation caused by brick kilns of Palasbari Revenue Circle.

5. Methodology

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

(a) Nature of Study: The present study is descriptive as well as empirical 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 eleven 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. The Palasbari Revenue Circle occupies almost the central part of the south Kamrup district and is composed of 202 villages. Palasbari Revenue Circle is endowed with natural resources enabling for mass production of bricks. Almost all the brick kilns are cottage and small scale traditional skill oriented enterprise. It is estimated that there are 13 brick kilns in different parts of Palasbari Revenue Circle and about 2500 laboures are employed in one season. Each of these brick kilns produces almost 20-70 lakhs bricks per season to serve the local demand of the Circle.

(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 employers, 10 senior citizen and customers, 30 nearby villagers from each block were interviewed for the purpose of exploring their view, attitude and perception regarding bricks production and the condition of workers in brick kiln.

Table 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%)
1.	Chayani Barduar Development Block	08	04
2.	Rampur Development Block	04	02
3.	Rani Development Block	01	01
Total		13	07

Part II- Impact of Air Pollution on Human Rights

6. Air Pollution from Brick Kilns

How far the selected brick kilns of Palasbari Revenue Circle lead to the air pollution in the area, that can be estimated on the basis of various study conducted on brick kilns so far as air pollution is concerned. Because the findings of those earlier studies are also applicable in case of the brick kilns of Palasbari Revenue Circle. 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/m³, whereas, it reached 0.050 mg/m³ during the brick kilns operation time. Similarly, TSP value was found to be 0.033 mg/m³ during pre-operation time and 0.056 mg/m³ 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.

7. Air Pollution from the 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).

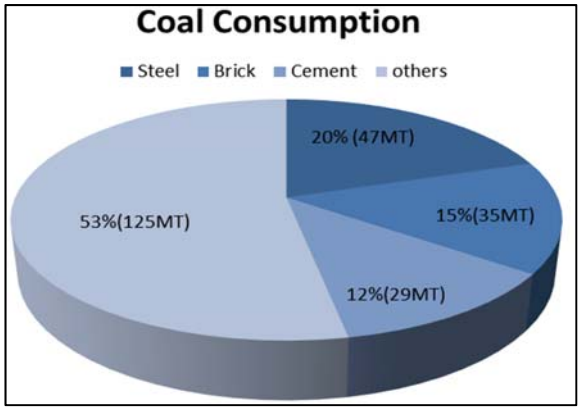


Fig 1: Share of coal consumption annually by brick kilns among industrial consumers of coal in India.

The use of large quantities of coal in brick kilns contributes significantly to emissions of carbon dioxide (CO_2), particulate matter (PM), including black carbon (BC), sulphur dioxide (SO_2), oxides of nitrogen (NOx), 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 20-25 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 SO2 and 0.64–1.4 kg of particulate matter (PM) (Le and Oanh 2010). If we calculate taking the above figures then a serious problem is observed. Table 2 shows the annual consumption of coal and emission of different pollutants from the selected brick kilns (7) of Palasbari Revenue Circle.

Table 2: Annual Consumption of Coal and Emissions of Pollutants from the Brick Kilns of Palasbari Revenue Circle

Blocks	Selected No Brick Kilns	Level of Production (in lakhs)	Use of Coal (in tons)	Emission of CO (in kg)*	Emission of SO_2 (in kg)*	Emission of PM (in kg)*
Chayani Barduar Development Block	04	190	38,00-4,750	1,20,650-2,33,700	9,880-1,12,100	12,160-26,600
Rampur Development Block	02	50	1,000-1,250	31,750-61,500	2,600-29,500	3,200-7,000
Rani Development Block	01	30	600-750	19,050-36,900	1,560-17,700	1,920-4,200
Total	07	270				

*Calculation of CO, SO_2 and PM is based on (Le and Oanh 2010)'s estimation.

This table reveals that from the 7 brick kilns, the annual emission of carbon 1,20,650-2,33,700 kg in Chayani Barduar Development block, 31,750-61,500 kg in Rampur Development Block and 19,050-36,900 kg in Rani Development Block. SO_2 emission is in the range of 9,880-1,12,100 kg in Chayani Barduar Development block, 2,600-29,500 kg in Rampur Development Block and 1,560-17,700 kg in Rani Development Block. On the other hand PM emission is in the range of 12,160-26,600 kg in Chayani Barduar Development block, 3,200-7,000 kg in Rampur Development Block and 1,920-4,200 kg in Rani Development Block. Therefore it is clear that Chayani Barduar Development block has the highest concentration of air pollutants because this block has the highest no brick kilns. It is to be mentioned here that out of 8 working brick kilns of this block 7 brick kilns situated within the radius of 1 km.

Further all the 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_2 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_2 which is toxic and corrosive. Sulphur dioxide is a pollutant gas that contributes to the production of acid rain and causes significant health problems.

8. Solid Waste Generation

Coal ash is the main solid waste generated in the selected 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.

9. 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 harm 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 affect the maturity of plant, leading to less penetration to the roots and consequently delayed its development.

10. 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 Bull's Trench kilns (BTK)s had movable metallic chimneys. Movable metallic chimneys were banned

through The Ministry of Environment and Forests (MoEF) notification in 1996. Since then, most BTKs have changed over to fixed chimneys. FCBTK is a continuous, moving fire kiln operated under a natural-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)[2].

The Ministry of Environment and Forests (MoEF), Government of India, has issued standards for suspended particulate matter (SPM) emissions and chimney height for diff rent types and categories of brick kilns (Table 3).

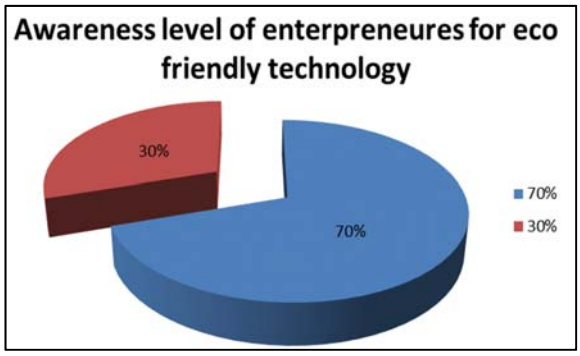
Table 3: Emission Standards for Brick Kilns by MoEF

Technology and size	SPM emission standard
Fixed Chimney Bull's Trench Kiln (FCBTK) Large and medium size (production less than 15,000 bricks/day) Small size (production less than 15,000 bricks/day)	 Less than 750 mg/Nm3 Less than 1000 mg/Nm3
Vertical Shaft Brick Kiln (VSBK)	Less than 250 mg/Nm3
Down-draft kiln	Less than 1200 mg/Nm3

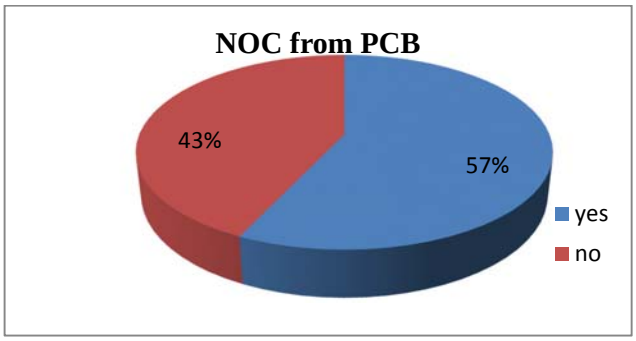
Source: Ministry of Environment and Forests, the Gazette of India, Part II, Sec 3(i).

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^3 [3]. 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 (70%) 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 (30%) entrepreneurs are willing to modify their technology to make it more eco-friendly.



Moreover most of the entrepreneurs of brick kilns in Palasbari Revenue Circle have not registered themselves with DIC[4]. Out of seven selected brick kilns only one brick kiln is registered with DIC. It is also contradictory on the availability of State Pollution Control Board NOC, since without a valid DIC registration NOC cannot be available. In Palasbari Revenue Circle only 4 (57%) out of 7 brick kilns have NOC from Pollution Control Board.



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.

11. Effects of Air Pollution

Air quality is an important environmental resource and its deterioration has many serious impacts on human well being. 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 World Health Organisation, 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). 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

[2] Towards Cleaner Brick Kilns in India: A win–win approach based on Zigzag fi ring 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/

[3] 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

[4] District Industry Center (DIC) is the state government body which promotes small and micro enterprises at the district level and provides access to various schemes like subsidy, pollution control, registration etc

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[5]. Exposure to high levels of coal and dust particles may also cause irritation of skin and eyes. Table 6 presents the various health effects of specific pollutants from combustion.

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 (USEPA, 2014. Plant health is affected by air pollution because pollutants like fluorine, lead, and mercury damage the plants. So2 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).

Air pollution also has negative impacts on the economy. Due to the numerous illnesses that air pollution causes, everyday thousands of people are forced to miss work or school. On top of this, air pollution reduces agricultural crop and commercial forest yields by billions of dollars each year.

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 manufacture such as brick making, loading and unloading in kiln, coal crushing 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 growing around 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.

About 80% respondents of nearby household have strong believe that brick kilns were 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 skin 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.

[5] A. Nilsson(2015), The Use of Human Rights in the Fight Against Air Pollution, Cory Segal, JUCN 21

Table 4: Different Types of Air Pollutant and their effect on Human Health

Pollutants	Effects	
	Human/Flora/Fauna	**Environment & Property**
Sulphur dioxide (SO2)	• Respiratory illness • Visibility impairment • Aggravate existing heart and lung diseases.	• Acid rain • Aesthetic damage
Oxides of Nitrogen (NOx)	• Irritates the nose and throat • Increase susceptibility to respiratory infections.	• Precursor of ozone formed in the troposphere • Form atmospheric fine particulate matter burden as a result of oxidation to form nitrate aerosol
Respirable Suspended Particulate Matter (PM_{10})	• Cardio-pulmonary problems • Asthma, bronchitis, and pneumonia in older people	• Visibility reduction
Particulate Matter 2.5 ($PM_{2.5}$)	• Oxidative stress • Respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing. • Decreased lung function • Aggravated asthma • Chronic bronchitis • Irregular heartbeat cardio-pulmonary disorder • Premature death in people with heart or lung disease	• Aesthetic damage • Visibility reduction
Ozone(O3)	• Lung function deficits • Respiratory illness • Premature death, asthma, bronchitis, heart attack, and other cardiopulmonary problems. • Ground-level ozone and pollution which interferes with photosynthesis and stunts overall growth of some plant species.	• Ozone cracking in car tires, gaskets, O-rings is caused by attack of ozone on any polymer possessing olefinic or double bonds within its chain structure, • Ozone present in the upper troposphere acts as a greenhouse gas, absorbing some of the infrared energy emitted by the earth.
Lead	• Pb is rapidly absorbed into the bloodstream and is believed to have adverse effects on the central nervous system, the cardiovascular system, kidneys, and the immune system • Causes blood disorders like anemia increase in blood pressure. • Potent neurotoxin that accumulates both in soft tissues and the bones. • Causes nephropathy, and colic-like abdominal pains. • Weakness in fingers, wrists, or ankles. • Miscarriage and reduction of fertility in males, delayed puberty in girls. • permanently reduce the cognitive capacity of children	
Carbon monoxide (CO)	• CO enters the bloodstream through lungs and combines with haemoglobin forms carboxy haemoglobin. This condition is known as anoxemia, which inhibits blood's oxygen carrying capacity to organs and tissues. • Adverse effects on the fetus of a pregnant woman • Infants, elderly persons, and individuals with respiratory diseases are also particularly sensitive. • Anti-inflammatories, vasodilators and encouragers of neovascular growth	
Ammonia (NH3)	• Irritating to skin, eyes, throat, and lungs and cause coughing • Burns • Lung damage and death may occur after exposure to very high concentrations of ammonia	Odour

Source: National Ambient Air Quality Status & Trends, 2011-Report prepared by Central Pollution Control Board and Ministry of Environment & Forests, Website: http://www.cpcb.nic.in/

Part-III

12. Conclusion

In this part an attempt is being taken to highlight as how the manufacturing activities of the selected Brick kilns of Palasbari Revenue circle have been violating the human rights. In doing so, the various provisions of the different international treaties, national acts and the constitution of India are discussed.

In order to achieve sustainable development environment protection constitutes an integral part of development process and it cannot be considered in isolation. Moreover polluted environment affects directly the health- mental as well as physical, of human beings, and therefore, it is human being whose survival has become difficult due to change in Physical, chemical and biological conditions of the environment.

The brick industry of Palasbari Revenue Circle extracted various natural resources, other raw materials and energy from the environment to produce bricks which have resulted in large scale emissions of wastes into the environment causing severe threats to traditional agrarian practices, and thereby reduced the quality of human life. These industries directly linked to the following human rights impacts:

- Adversely impact the health or livelihoods of local as well as workers of the industry through air pollution and this way threatens the two fundamental human rights –

the right to life and health. Right to life has been protected and safeguarded by Article 21 of the Indian Constitution. The right to fresh air and the right to whole some environment are the attributes of the right to life as these are basic elements of life. The right to enjoyment of the highest attainable standard of health is fundamental part of our human rights. 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"[6]. 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 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 the various legislations relating to air pollution are as follows:

1. The Factories Act, 1948: Chapter III, Sects. 13, 14 and 15 of this act focuses on proper ventilation, dust, fumes and humidity related to the health of labour.
2. The Mines Act, 1952: The consideration of air pollution was again limited to the ventilation, actions to be taken in respect of dust fire and inflammable and noxious gases including precautions against spontaneous combustion, underground fire and coal dust.
3. The Inflammable Substances Act, 1952: The act was indirectly stirring air pollution through safety.
4. The Atomic Energy Act, 1962: The act was addressing only health impact and safety from the radioactive substances with the sole purpose of control over atomic energy and radioactive substances.
5. The Municipal Solid Waste (Management and Handling) Rules, 2000 Ambient air quality monitoring has been made mandatory at the landfill sites including installation of landfill gas control system

The above given information is prerequisite to say that clean environment is one of the fundamental human rights. Everyone has the right to demand environment that is adequate to their well-being. Since clean air is a major part of a clean environment, it can be said that air pollution threatens this basic human right – the right to a clean environment. The human rights to life, health, and a clean environment are powerful tools available for citizens to strengthen the enforcement of existing laws and regulations and combat air pollution. Moreover in order to minimize the violation of human rights, the local people of Palasbari Revenue Circle should collectively give effort and force to the Government of Assam for immediate elimination of the activities leading to air pollution. Accordingly Government of Assam should frame legal action and exercise for the survival of people.

13. References

1. Barooah PK, Baruah MK. Sulphur in Assam Coal, Fuel Processing Technology. 1996; 46:83-97.
2. Bhave PP, Kulkarni N. Air Pollution and Control Legislation in India. J Inst Eng India Ser A. 2015; 96(3):259-265.
3. Bhuyan B, Gupta R. Assessment of Urban Air Quality in Guwahati City, India Using Air Quality Index, ZENITH International Journal of Multidisciplinary Research. 2014; 4(10):90-99. Online available at zenithresearch.org.in
4. Biswal T. Human Rights Gender and Environment, Viva Books Pvt. Ltd, 2006, 44.
5. CAI-Asia. Clean air initiative for Asia cities. Clean brick making technology—success of VSBK in Kathmandu, 2008. http://www.cleanairnet.org/caiasia/1412/ article-70695.html.
6. Coal Atlas of India, Coal India Ltd., Calcutta, India. 1993.

[6] WHO. Constitution of the World Health Organization. Geneva: World Health Organization, 1948. http://apps.who.int/gb/bd/PDF/bd47/EN/ constitution-en.pdf?ua=1 (accessed June 8, 2014).

7. EPA. What is Acid Rain?. Environmental Protection Agency. 2012. Retrieved from http://www.epa.gov/acidrain/what/
8. European Environmental Agency, Air Quality in Europe – 2014 Report 5 EEA Report. 2014.
9. Ferdausi SA, Vaideeswaran S, Akbar S. Greening brick making industries in Bangladesh, Presentations at the Better Air Quality Conference. Bangkok, Thailand. 2008.
10. Guttikunda S. Impact Analysis of Brick Kilns on the Air Quality in Dhaka, Bangladesh. Dhaka: Sim-air Organization. 2009. Retrieved from http: //www.cgrer.uiowa.edu/people/sguttiku/ue/simair/SIM-21-2009-Dhaka-AQ Brick%20Kilns.pdf
11. Joshi SK, Dudani I. Environmental Health Effects of Brick Kilns in Kathmandu Valley. Kathmandu University Medical Journal. 2008; 6(21):3-11.
12. Kaushik A, Kaushik CP. Perspective in Environmental Studies, New age International publisher, New Delhi, 2012, 140-142.
13. Le HA, Oanh NTK. Integrated Assessment of Brick Kiln Emission Impacts on Air Quality._ Environmental Monitoring and Assessment, 2010; 171:381-394. Accessed on July 2016. Retrieved from: http://link.springer.com/article/10.1007/s10661-009-1285-y.
14. Maithel S. Towards Cleaner Brick Kilns in India: A Win-Win Approach Based on Zigzag Firing [presentation]._ Regional Intergovernmental Consultation on Near-Term Climate Protection and Clean Air Benefits in Asia and the Pacific, Bangkok, Thailand. 2013,
15. Ray A. National Human Rights Commission of India', (NHRC), Khama Publishers, New Delhi, 2004, I-II.
16. RERIC, Regional Energy Resources Information Center Small and medium scale industries in Asia: Energy and environment, brick and ceramic sectors. Bangkok: Asian Institute of Technology. 2003.
17. Rizvi R *et al*., Influence of brick kiln dust on penetration and development of meloidogyne javanica in eggplant roots and its impact on plant growth and yield in nematol, medit. 2011; 39:35-39.
18. United Nations Human Right Office of the High Commissioner (UNHRC,), 2012. Retrieved from http://www.ohchr.org/EN/Issues/Environment/SREnvironment/Pages/SRenvironmentIndex. spx
19. United States Environmental Protection Agency (UNEP,), 2011. Retrieved from https://www3.epa.gov/airquality/peg_caa/concern.html
20. United States Environmental Protection Agency, Why Should You be concerned about Air Pollution, 2014. online: USEPA,<http://www.epa.gov/airquality/peg_caa/concern.html>
21. World Bank (WB). Health Impacts of Outdoor Air Pollution. New Delhi: South Asia, Urban Air Quality Management Briefing Paper No. 11, Energy Sector Management Assistance Programme. 2003. Retrieved from http://www.euro.who.int/_data/assests/pdf_file/005/74732/ E71922.pdf
22. World Bank (WB). Workshop on Public Policies to Mitigate Environmental Impact from Brick Production. Maxico. World Bank. 2012. Retrieved from http://www.ine.gob.mx/decargas/dgcenica/2012_ladrilleras_pon_s6_jli_eng.pdf.
23. WHO. Guidelines for Air Quality. Geneva: World Health Organization. 2000. Retrieved from http://www.rshm.saglik.gov.tr/hki/pdf/Guidelines_for_Air_Quality.pdf 21
24. WHO. Air Pollution. World Health Organization. 2013. Retrieved from http://www.who.int/topics/air_pollution/en/
25. WHO. Climate change and human health. World Health Organization. 2011. Retrieved from http://www.who.int/globalchange/ecosystems/biodiversity/en/
26. Yogesh K Jyogi. An Integrated Approach to Environment, Development & Human Rights Law, science & environment, R.P Anand, Lancer Books, New Delhi, 1987, 221.
27. Zhang Z. Energy efficiency and environmental pollution of brick making in China. Energy, 1997; 22(1):33-42.