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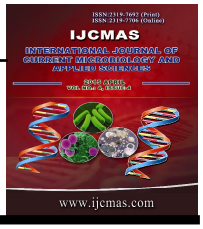

Original Research Article

Environmental Impact of Red Brick Manufacturing on the Bank of the Blue Nile at Soba West, Khartoum, Sudan

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Keywords

Animals dung, Bank of the river, kiln, silt soil and vegetation

A B S T R A C T

Manufacturing of red brick on the Blue Nile banks has multiple environmental effects on vegetation life that are, herbaceous, woody shrubs, trees, soil, air, people and animals. The objectives of the study are to find out the impact of red bricks manufacturing on environment and to come up some recommendations to protect the environment of the Blue Nile banks. Different methods were used for colleting the data, including field survey to observe the features of the study area. Reading the coordinates, distribution of questions, interviewed men who worked in the same field. The main results explained that, the annual production of red brick in the study area ranged between 140 and 450 thousand red bricks. 90 % of the respondents answered that, the main materials used in manufacturing red brick are silt (clay) ,animals dung and other substances. Hundred percent of the respondents answered that, the main materials used in the firing red brick are the woods. Also 90% of the respondents answered that, the households who reside near the bank of the river are affected by the exposure to dust and burning of different gases. The vegetation is affected due to the heat, soot, and smoke particles deposited on the leaves. Then the plant respiration and photosynthesis may be affected.

Introduction

The red bricks are composed of silt sediments on the Blue Nile, clay, sand, animals dung, water and other substances (Halla & Muatasim, 1993). This was used by ancient Egyptian for building Pyramids, walls and palaces (Halla & Muatasim, 1993).More than 50% of energy is used for burning the bricks is from woods (Mohamed, 2002). The main components in the brick making process are loose and compacted cow dung, clay, water, and fuel wood (Internet,2015) wherein clay made from Nile flood sediments is mixed with loose cow dung, pressed into moulds, and left to dry in the sun. Subsequently, the raw bricks are burned using compacted cow dung and wood as a source of energy. Bricks are made up of a combination of natural elements, i.e. clay, sand, water, air and fire. Tanned leather and textile industries as well as those that make dyes and pigments can

discharge both chromium (III) and chromium (VI). Therefore the solid wastes of leather are used in the mixture of making the bricks. When you breathe air containing chromium (111) or (V1), chromium particles can be deposited in the lungs. Particles that are deposited in the upper part of the lungs are likely to be coughed up and swallowed. Particles deposited deep in the lungs are likely to remain long enough for some of the chromium to pass through the lining of the lungs and enter the bloodstream. Once in the bloodstream, chromium is distributed to all parts of the body. Chromium will then pass through the kidneys and be eliminated in the urine in a few days (Mohamed, 2008). It has been reported that the presence of chromium (111) or (V1), chromium particles human body can cause cancer.

In Sudan the total number of kilns has increased from 1,750 in 1995 to 3,450 in 2005, of which 2000 kilns are located in Khartoum. The overall production of red bricks in Sudan has considerably increased from an estimated134 Millions in 1975 to 1,804 Millions in 2004 and to 2,800 millions in 2006 (Ishtiag et al, 2012). The use of substantial amounts of fuel wood accelerates deforestation and leads to the emission of GHGs such as carbon dioxide (CO2), carbon monoxide (CO), methane (CH4), nitrous oxide (N2O), nitric oxide (NO), and nitrogen oxide (NOX), reported by Ishtiag et al (2012).

P**roblem**

Cutting down of trees on the bank of the Blue Nile for bricks accelerate the bank erosion, disappearance of bank scenery, migration of wild animals. While the firing of bricks polluted the fresh air in the area with smoke, soot and emission of different gases and causes the death of ground organisms. On the other hand the created deep holes after have taken the clay/ silt used for making red bricks will covered by the flooding water during the rainy season and will pose a danger to the children who want to swim. It has reported that many of children have died as a result of these man-made holes.

The study has come up with the following objectives:

1. To find out the impact of red bricks manufacturing on environment in the study area.
2. To suggest recommendations to protect the environment of the river bank.

Methodology

For collecting the data, the following methods are used:

1. Global Positioning System (GPS) for coordinates was used that gives the latitude 15° 30 58 North and 32° 36 59.5 East.

2. Questionnaire: designed twenty questions for the households residing near the bank of the Blue Nile and the workers in Brick Kilns. The questions include the condition of the environment and the nature of the area.

3. The people who specialist in brick making were also interviewed.

4. Observation of the nature of the site is also done.

Result and Discussion

Estimation of annual production

The results show that, the age of respondents range between 30 and 40 years and their

education level is under graduate. The respondents answered that the history of brick making in the study area extends more than 70 years. In Table (1) 35% of the respondents answered that the annual production of red brick ranges between 140 and 450 thousand red bricks approximately.

This is due to of silt availability and the high demand of bricks in the local area couple with increased of population growth and the expansion of the towns. This is the same as reported by Ishtiag et al (2012).

Materials used in making red brick

Table (2) explains that, 90% of the respondents answered that the materials used in making red brick consist of Clay (silt) + animals dung & leather treated in tannery. Therefore the kilns owners said that, there is cutting down trees from the bank of the Blue Nile for firing the kilns. This is the same as mentioned in the internet (2015)

Materials used in firing red bricks

In table (3) all the respondents answered that, the main material used in the firing red brick are the woods.

This is similar as reported by (Mohamed, 2002) more than 50% of energy uses for burning the red bricks from woods, this because the wood is available in the bank of the river near the kilns.

Effects of brick making on the water of the river

75% of the respondents answered that, the water of the river is affected by waste of red brick materials that may be thrown into the river water. These wastes polluted the water and affect the fishe and other organisms.

Effects of red brick making on the vegetation on the bank of the river

Half of the respondents in table (5) answered that, making of red brick affects the vegetation cover on the bank of the river. This due to the heat, soot, and smoke particles deposited on the plant leaves, plant respiration and photosynthesis may be affected. Additionally, the soil pit excavation for Brick Manufacturing on the River banks make agricultural areas more susabtible to the erosion floods of the River Nile may prevent cultivated land to be enriched by sediment deposits. This is the same as stated by Ishtiag et al (2012)

Table. 1 Estimation of annual production

Production/1000 bricks	Frequency	Percentage
140 -450	7	35
450 – 660	1	5
660- 720	1	5
720- 1000	4	20
Unknown	7	35
Total	20	100

Table.2 Materials used in making red brick

Materials	Frequency	Percentage
Clay (silt) + animals dung & leather treated in tannery	18	90
Clay (silt) + animals dung	1	5
Clay (silt) + crops residues	1	5
Total	20	100

Table.3 Materials used in firing red bricks

Materials	Frequency	Percentage
Woods	20	100
Kerosene	-	-
Gas	-	-
Total	20	100

Table.4 Effects of brick making on the water of the river

Answer	Frequency	Percentage
Yes	15	75
No	5	25
Total	20	100

Table.5 Effects of red brick making on the vegetation on the bank of the river

Answer	Frequency	percentage
Yes	10	50
No	10	50
Total	20	100

Table.6 Effects of brick making on households residing near the bank of the river

Answer	Frequency	percentage
Yes	18	90
No	2	10
Total	20	100

Table.7 Effects of brick making on wild animals & ground organisms

Answer	Frequency	percentage
Yes	3	85
No	17	15
Total	20	100

Effects of brick making on households residing near the bank of the river

In table (6), 90% of the respondents answered that, the households residing near the bank of the river are affected by the exposure to dust, burning gases such as carbon dioxide (CO2), carbon monoxide (CO), methane (CH4), nitrous oxide (N2O), nitric oxide (NO), and nitrogen oxide (NOX) and Chromum111 and V1 this is the same as reported by Ishtiag et al (2012).

Effects of brick making on wild animals & ground organisms

The 85% of the respondents answered that, wild animals migrate from the area due to the noise of the labors and removal of trees. Also the ground organisms die as a result of heating of firing the bricks and ground excavation for silt/clay.

Making red brick on the bank of the Blue Nile affects the environment in the area due to the deforestation of the vegetation cover, degradation of the soil, air pollution as a result of emission of different gases that effected the human health. The study concluded that, the red brick making on the bank of the river must be forbidden in order to conserve the environment.

Recommendations

The results have revealed the following recommendations:

1. The licenses of red brick making along the Blue Nile must be stopped so as to conserve fertile soils, re-ecosystem and minimize the air pollution.
2. Leather treated in tannery by chromine111 must be strictly forbidden to be used in red brick making.

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