Negative Impact of Industrialization along Lumbini Road, Nepal

INTRODUCTION

Lumbini, the Birthplace of the Buddha, and a UNESCO World Heritage Site is a destination point for both pilgrims and visitors from Nepal, and around the world. As a world heritage site, Lumbini is the pride of Nepal and a major source of revenue for the Government of Nepal. It could become a major embarrassment.

The route from Bhairahawa to Lumbini has been for many years a verdant region of fertile farmland with plantings in the paddy fields of rice, wheat, various vegetables, and mustard. We still see farming, but rapid change is creating an extremely endangered region.

Triveni Distillery (2053), Reliance Paper Mills (2053), and Jagadamba Cement Industry Pvt. Ltd (2058) were among the first factories to be established in Kamhariya VDC, Semari VDC, and Gonaha VDC 7 of Rupandehi District, Nepal. Since then a total of 24 factories have been established in Gonaha VDC 6, 7, 8 and Kamhariya VDC 3 – 6, eleven of which are cement factories, and two steel factories. 46% of all factories established in the seven VDCs are cement factories – a very high concentration. At present Ambe Cement and Maihar Cement are applying to set up two more cement factories. Within just 13 years this area – seven VDC's - has changed from an agricultural region around a world heritage site to an industrial park. We have become an industrial corridor. No doubt, the industrial enterprises in Gonaha VDC 6 – 8 and Kamhariya VDC 3 - 6 were established because there is a demand for cement, steel, flour, noodles, garments and the like. These industrial enterprises definitely contribute to the revenue of this economically depressed region and to the Government of Nepal. We would never underestimate the need of the people who live here. However, do we want this rapid economic development to have such an impact? We must consider what this will do to the entire area of Lumbini – the people and the entire environment including: archaeology, pilgrimage, traffic, peace, and social stability for the region. This article focuses on industrialization along the Lumbini Road in particular the far reaching consequences of cement production. The purpose of the following presentation is to alert the general public to the serious and far-reaching consequences facing us all. We must ask what can we do?

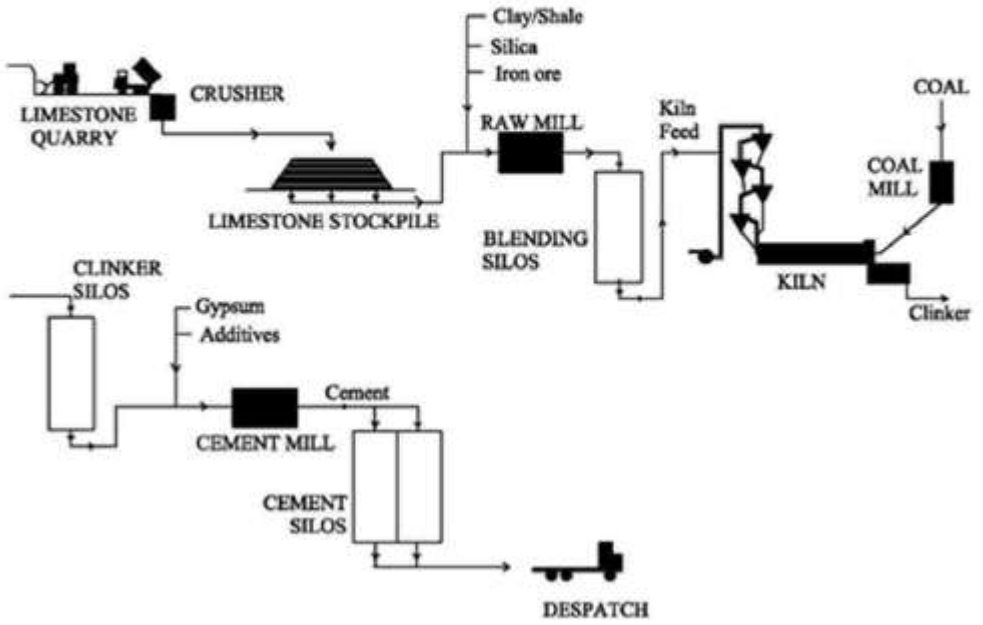
Cement Factories in area of Lumbini

SL. No.	Name of Factory	Address	Established date	Distance from Lumbini	Production capacity
1	Siddhartha Cement Ind.	Gonaha	**2060**	13.4 km	1500000 MT
2	Suprim Cement Ind.	Kamhariya-5	2059		150000
3	Kailash Cement Ind.	Kamhariya-6	2061		45000MT
4	Nepal Ambhuja Cement Ind.	Kamhariya-6	2060		60000
5	Jagadamba Cement .	Gonaha-7	2058		66000
6	.Brija Cement Ind	Gonaha-7	2058		60000
7	.Reliance Cement	Kamhariya-6	2061		150000
8	Buddha Cement	Kamhariya-6	2058		300000
9	Jayakali Cement Ind.	Gonaha-7	2064		12000
10	Lumbini Cement Ind.	Kanaiha	2053		150000
11	Agni Cement Ind				

Cement production

The existence of a 33 kV power line supplied by NEA, water, a road, proximity to India where most of the raw materials come from, cheap land and labor are some of the factors that have contributed to the setting up especially of cement factories in the area.

The diagram below shows the classical process of cement production in Nepal.



A report by the Confederation of Indian Industry (CII) is very outspoken about the environmental impact of cement production. Producing one ton of cement requires about 2 tons of raw materials (shale and limestone) and releases approximately 1 ton of CO_2, about 3 kg of NOx (nitrogen oxide, an air contaminant that contributes to ground level smog) and 0.4 kg of PM 10 (an air borne particulate matter that is harmful to the respiratory tract when inhaled). After aluminum and steel the manufacturing of Portland cement is the most energy intensive process as it consumes 4GJ of energy in electricity, process heat and transfer.

Impact on Air Quality

11 cement factories with an aggregate installed annual production capacity of 2,493,000 MT potentially emit 2,493,000 tons of carbon dioxide (CO_2), 7,479 tons of nitrogen oxides (NOx) and 997 kg of PM 10. Photos recently taken in the area clearly show substantial ground level smog. One of the major air polluters in the area is Reliance Cement Pvt. Ltd. Himalayan Snacks and Noodles factory regularly burns waste materials without employing the least pollution control measures.

Impact on Surface Water

The Lumbini Road Industrial Corridor in Gonaha VDC 6 – 8, and Kamhariya VDC 3 - 6 is located between the Dano River and Tinau River.

A number of factories do not treat their waste water and discharge it directly into nearby creeks and rivers. Examples are:

Reliance Cement Pvt Ltd. channels its untreated waste water (washing/mixing water, cement slurry) directly into the Dano River. Himalayan Snacks and Noodle factory discharges untreated effluent into the surrounding area.

River water polluted by industrial effluent is a hazard to human beings, domestic animals and wildlife, and even agriculture.

Impact on Ground Water

Heavy industry is likely to need huge amounts of ground water. This is likely to lead to a drop in the ground water level making it more difficult for the local population to cover its needs for water. Heavy water consumption for industrial purposes may even lead to a depletion of the ground water in the area. According to researcher Dr. Gitu Giri some local farmers have already complained about a drop in the ground water level.

Impact on Soil

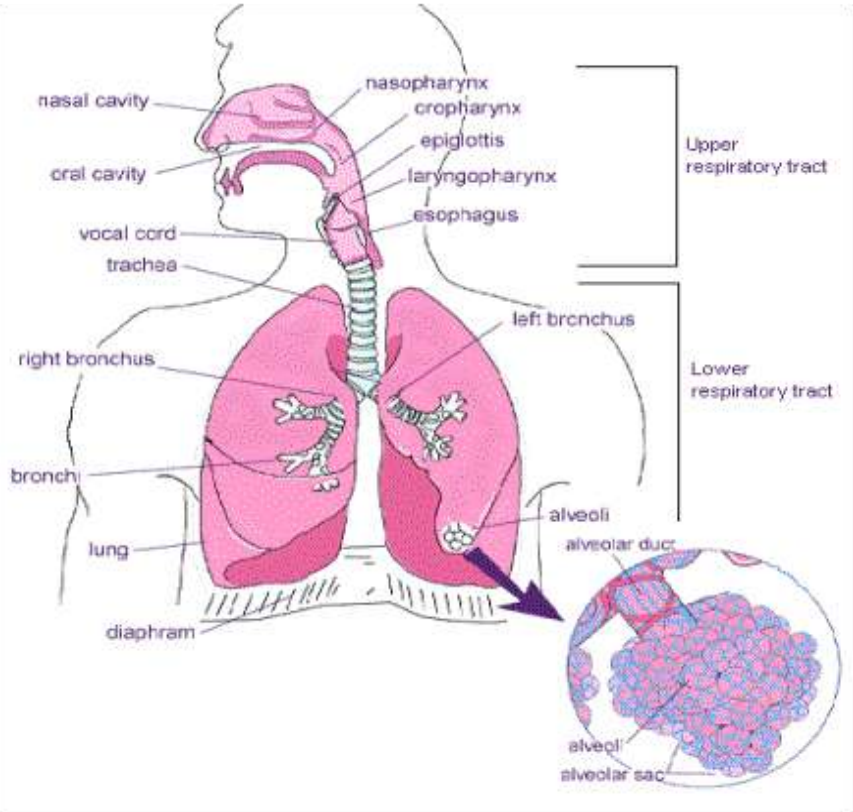
The résumé of a paper entitled "Effect of volatile cement dust on the soil properties surrounding the area around cement factories" presented by L. O. Morghom, N. A. Karid, H. A. Sreiweel, and Y. A. Soliman at the 11th International Cement Conference in Tunis-Hammamet (13 – 16 November, 2000) states the following. "**Cement dust produced by cement manufacturing process is considered one of the most hazardous pollutants, which affects the surrounding environment.** This dust is produced as a by-product of the cement manufacturing process. It can be volatized at all manufacturing stages. The effect of cement dust on the chemical properties of neutral soil of the area surrounding Zileation, Leibda, Almergib, and Suok-Alkamis are studied in this paper. Soil samples for each factory have been taken at the four coordinates, North, South, East and West at different distances on radius vector equal to 20 km^2 from the emission sources. Positive significant correlation was found between the distance from emission sources in km and the percentage of the loss on ignition (LOI) R=+0925372 while (P<0.001). In addition, negative significant relation found between the distance from emission sources in km and each of the following: Silica (R=-0.805332;P<0.001), Calcium (R=-0.896365; P<0.001), Magnesium (R=-0.739582;P<0.005), Iron (R=-0.748828; P<0.005), Sodium (R=-0.80459; P<0.001), Potassium (R=-0.574468; P<0.01) and the pH (R=-0.663435; P<0.01). **Cement dust could form a solid layer, which prevent water absorption from the soil surfaces.** In addition to that, **most of the cement dust compositions are of non-dissolvable materials.** The different soil properties between the surface and deep soil were produced. **There is significant increase of (LOI) between surface soil (19.73%) and deeper soil at 20cm deep (4.102%)**, were the confident limit is higher than (P<0.001). There is significant increase of calcium content of surface soil (23.56%) than that of deeper soil 10.56% with confident limit of (P<0.001). Also there is significant increase of iron content of the surface soil as compared with the deeper soil 3.86% with confident limit (p<0.005). Elevated level of potassium were found in the surface soil (1.53%) when compared with the soil at 20cm depth (0.24%); with confident limit (P<0.001). From the previous finding, it could be concluded that the values of LOI, Silica, Potassium and Calcium could be used as indication for the level of environment pollution of the area surrounding the cement factory. By

using this category it could be found that higher pollutant to surroundings environment are Zileation, Leibda, Suok-Alkamis, and Almergib cement factory respectively."

Impact on Health

There is a general consensus that industrial production and especially cement production causes a number of respiratory and cardiac diseases ranging from occupational lung diseases, to asthma, lung cancer, chronic obstructive pulmonary disease (COPD), coronary artery disease, heart failure, heart-rhythm problems to eye irritation.

Diagram of Human Respiratory System



The respiratory system is sensitive to air pollution. The cardiovascular system can be affected as well.

Health information reported by the Government of Canada and many other international agencies like the World Health Organization shows that air pollution from industrial production can lead to a range of respiratory and other diseases among the general population living within the range of deposition of effluent from such enterprises. Therefore, the health of students attending Semari Lower Secondary School and Shre Guruwani Mai Lower Secondary School in the vicinity of Reliance Cement Factory and Jagdamba Cement respectively is undoubtedly at serious risk. District Public Health Officer Shankar Prasad Gautam from Madhubani VDC has stated that winds blowing from the east to the west carry cement dust all the way to Lumbini, a distance of 11+ km. Dr. James Heller, a health policy consultant

and epidemiologist from Canada, confirms that air pollution in the form of particulate matter discharged by industry takes a heavy toll on the health of the workers and the surrounding general public in the form of lung diseases, including asthma, silicosis, chronic obstructive pulmonary disease, lung cancer, as well as heart and eye diseases, etc. The costs of this burden of illness would include lost years of life and income, health care costs, and quality of life related costs. Beyond the toll on human health, there will also be corresponding impacts on domestic animals and food production.

Impact on Traffic

The Lumbini Road was originally built by King Mahendra around 1956 to provide pilgrims a direct access to Lumbini.

With the establishment and operation of 24 major factories in the Lumbini Road Industrial Corridor the need for raw materials and dispatch of manufactured goods has increased. The number of industry-related heavy trucks, especially from India has increased tremendously and is effectively causing traffic congestions. Indian trucks delivering raw materials to Jagadamba Cement Industry Pvt. Ltd. line up on the narrow road leaving very little space for other vehicles to pass. Bridges over the Ghaghra River and Tinau River are narrow and single-lane. With vehicles approaching from both sides and competing for the right of way many traffic jams have occurred. In order to control the traffic Nepal Police has to station one traffic police officer in the area the annual cost of which amounts to NRs. 168,000.

"The local stone crushers and trucks carrying boulders are other source of noise and air pollution apart from causing traffic jam along the road to Lumbini," said local environment engineer K.R. Dahal who is doing his PhD in the environmental aspect of local Tinau River.

According to him, about 800 heavy trucks carry sand and boulders from Tinau River across the Nepal border to India via Bhairahawa every day, which is not only creating traffic jam but it is also responsible for the environmental degradation in Lumbini and surrounding areas (Ram Humagai, Lumbini Facing the Brunt of Environmental Degradation, June 05, 2009).

Due to the increase in traffic and aggressive driving the number of traffic accidents along the Lumbini Road, some are even fatal, has increased tremendously.

Impact on Pilgrims

Prior to the industrialization traffic jams along the Lumbini Road were very rare. With the recent and rapid industrialization along the Lumbini Road all of this has changed. Frequently pilgrimage groups end up in a traffic jam and thus loose precious time for their visit to Lumbini.

Several thousands of Hindu devotees worship Shankar Shiva at Prakateshwor Mandir during the month of Srawan (July). The air pollution caused by nearby factories directly affects these Hindu pilgrims.

Impact on Population

Industrial development must be healthy and sustainable economically, socially, and environmentally. It is possible for industrial developers, government departments and the banks supporting this investment to treat such decisions in purely short term economic terms. This is ad hoc development, responding to the presence of a good road, but without thought of estimating and planning for consequences in all spheres. At a macro-level, this kind of rapidly imposed development is harmful to health but also to social stability, as it replaces patterns of community relations and interactions which are centuries old in a far too short period of time. Not to mention the impact on Lumbini's sacred qualities. On a micro-level, the lack of planning or the bad planning (without provision for loading and unloading yards) has long lines of trucks parked on the road.[1] It is important not to be against development but for well rounded sustainable human and social development going hand in hand with economic development.[2] When interviewed by journalist Pralad Yadav and social activist Moti Lal Yadav locals near the newly established factories have stated that they sold their land not being told that it would be turned into a factory. Some of them have turned into lowly paid factory workers.

(1) Personal communication with Prof. Herb Stovel, Member of the World Heritage Committee, July 20th, 2008

(2) Personal communication with Prof. Herb Stovel, Member of the World Heritage Committee, August 4th, 2008

Impact on Archaeology in Lumbini Area

Air polluting substances (particulate matter, carbon dioxide, nitrogen oxides and other pollutants) emitted by the factories in Gonaha VDC 6 – 8 and Kamhariya 3 - 6 are likely to damage the Lumbini Ashoka pillar with its inscription and the archaeological remains at the World Heritage Site Lumbini and other archaeological sites. Historic stone structures in Europe, notably the Cathedral of Seville, Spain, have been damaged by air pollution in a manner similar to what is occurring at the ruins of the great Maya cities in Mesoamerica. This is what we will experience shortly.

Impact on Flora

The effect of Sulphur Dioxide (SO_2) on beans and tomatoes is very sever. Sulphur dioxides enter the stomata directly and the plant cells in the mesophyll. It converts to sulphite and later to sulphate.

Nitrogen dioxide (NO_2) causes suppressed growth in beans and tomatoes.

The impact of air pollution and dust pollution on local crops, forests, and natural vegetation has to be studied.

Impact on Fauna

Polluting industries within the Lumbini Road Industrial Corridor are already threatening the habitat of the Sarus Cranes (grus antigone). Sarus Cranes, which are mostly migratory, are protected by Nepal National Parks and Wildlife Conservation Act, 1973. They face a high risk of extinction in the wild due to loss of habitat and various types of pollution, including industrial. Gonaha VDC 6 – 8 and Kamhariya VDC 3 - 6 – which is along the Lumbini Road - is designated by Bird Life International as an International Bird Area. Here cranes, storks, and vultures breed, incubate and fledge their young. Rajendra Suwal, a well-known environmentalist and protector of Sarus Cranes stated in a telephone interview on November 2nd that the factories, road traffic, and agriculture using pesticides are destroying the habitat of the Sarus Cranes that live in this area. The future of the Sarus Crane alone is tied to the quality of its habitat.

Impact on Employment

The factories are providing employment to Nepalese and Indian nationals.

Impact on Public Infrastructure (Roads and Bridges)

The Lumbini Road was originally designed as a light-weight road. The drastic increase of industry-related 20 – 30 ton trucks has caused much damage to the Lumbini Road. Subsequent road repair work will cost the Road Department dearly. The single lane bridges over the Ghaghra River and the Tinau River are designed for light traffic. The heavy trucks transporting steel bars, coal, shale and limestone, cement and other goods might cause the bridges to collapse one day.

Impact on Regional Tourism Plan

"The (Kenzo Tange) Master Plan for the Development of Lumbini requires the integration with the Regional Development Plan of Gandaki-Lumbini area and also provides impact on the future development of the Lumbini sub-regional tourism" (Master Plan for the Development of Lumbini, Phase II, final report, Kenzo Tange & Urtec, March 1978, p. 19). Instead of traveling through a peace corridor tourists and pilgrims traveling from Bhairahawa to Lumbini are confronted with the dark sides of rapid and heavy industrialization, for sure not a pleasant experience. The negative impact of over 24 major industrial enterprises in the seven VDCs along the Lumbini Road on the Gandaki-Lumbini regional tourism plan has been widely ignored.

Impact on Administrative Processes

The Government of Nepal, especially the Ministry of Tourism and Civil Aviation and the Ministry of Culture, is doing it's very best to develop and promote Lumbini. By encouraging the establishment of industry in the closest vicinity of Lumbini the Ministry of Industry with its line agencies (Department of

Industry in Tripureshwor and the District Cottage and Small Industry Office in Bhairahawa) and industrialists are directly threatening the very existence of the World Heritage Site Lumbini. The Ministry of Environment is not protecting the World Heritage Site Lumbini as it is supposed to do according to its mandate as stated in the Nepal Environment Protection Act, 1997. This lack of coordination among the responsible government ministries is detrimental to Lumbini. According to the Nepal Environment Protection Act it is the responsibility of the Ministry of Environment to reject or approve Environment Impact Assessment applications handed in prior to the establishment of a new factory. Yet, the Ministry of Industry has taken over this function which amounts to a serious conflict of interest. The main interest of the Ministry of Industry is to encourage the establishment of factories in the country. Environmental concerns are of very little interest to the Ministry of Industry. The Initial Environment Examination (IEE) and Environment Impact Assessments submitted by new industry applicants do not contain detailed plans that address the likely impacts to the health of workers and the local public and to the environment arising from their operations. Nor do they describe how potential impacts will be monitored, the frequency of monitoring and reporting to regulators and the local community, and the mitigation strategies to resolve harmful impacts that arise.

Possible Infringement of Laws

- According to Narayan Prasad Agrawal, an industrialist, the administration of Rupandehi District has not designated a specific area as an industrial zone.
- Most of the factories operating in the Lumbini Road Industrial Corridor are clearly violating the Nepal Environment Protection Act and related guidelines for the protection of the environment.
- Concerning the Nepal National Parks and Wildlife Conservation Act, 1973, the sarus cranes are losing their natural habitat because of environmental impacts.
- The preamble to the Lumbini Development Trust Act 1985, amended 2003, states the following:

"Whereas it is expedient to provide for the Lumbini Development Trust in order to present before the people of the world the commitment of the Government of Nepal to project the goal and ideal of development of Lumbini more effectively and operate the Lumbini Development plan in a more coordinated and smooth manner."

Future Trend towards an Industrial Park at the Gateway to Lumbini

In just ten years eleven cement factories and thirteen other factories were established in the seven VDCs. Extrapolating this development into the future could mean that the World Heritage Site Lumbini will soon be surrounded by a cement production industrial park creating an environmental catastrophe and threatening the very existence of Lumbini.

Impact on Future of Lumbini

- If the Industrialization along the Lumbini Road does not get checked soon Lumbini's Ashoka pillar will be surrounded by smoke stacks of many cement factories.
- Is that what we want Lumbini to be like in the future? Or do we want Lumbini to be in a region of historic Buddhist sites where the environment is well respected?

Conclusion

The negative impact caused by factories in the Lumbini Road Industrial Corridor has been described above to some extent. An in-depth study of the negative impact of industrialization involving regular air sampling, and testing the quality of water, soil, health etc. is needed.

The Buddha himself had a great respect for the environment. Over many centuries his followers have upheld this attitude towards the environment. Hence, a **clean environment within the Lumbini Development Area stretching from Kapilavasthu in the west to Ramgram in the east is an essential requirement.**

The factories within the Lumbini Road Industrial Corridor no doubt are producing cement, steel, noodles, garments etc because there is a strong demand for these goods. This, however, does not give the factories a free license to threaten the very existence of the World Heritage Site Lumbini, nor to severely threaten the health of the general public, and the integrity of the environment. In pursuing their manufacturing activities, these factories must live up to responsible standards of **Corporate Social Responsibility** to Lumbini, the surrounding population, and the environment.

For years Kathmandu has had major air pollution problems caused by brick kilns and other point source polluters and it has been very difficult to reduce the air pollution. The World Heritage Site Lumbini, the Birthplace of the Buddha, deserves to be free of industrial pollution.

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Author: Bhikkhu Vivekananda with valuable contributions by Prof. Dr. Herb Stovel, Dr. Gitu Giri, Dr. James Heller, Pralad Yadav, Motilal Yadav, Shankar Prasad Gautam, Ven. Bhaddamanika, Ven. Pannavati, Liesel Briggs, David Crespo, Rajendra Suwal, Allan Cooper