

Summary of Environmental Impact Study

of industrial development around Lumbini,
the birthplace of the Lord Buddha and a World Heritage Property



Background

The importance of Lumbini

Lumbini, the Birthplace of the Lord Buddha, was inscribed onto the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List in 1997. It is situated in the Rupandehi district of Nepal and is rich in cultural, spiritual and religious values. The sacred site is the pride of Nepal and has the potential to become a major source of revenue for the country.

Land use pattern change around Lumbini

The land use pattern around the Lumbini World Heritage Property (WHP) has undergone a significant change from agricultural to industrial use in the last 16 years. As a result, the universally outstanding archaeological remains at the Lumbini WHP are being negatively affected by rapid industrial development. Similarly, local people, pilgrims, tourists and agricultural and industrial workers are suffering the ill-effects of industrial pollution. The development of industries at the site has also adversely affected existing fauna and flora and precious environmental resources such as water, soil and air.

Government action

In order to address these negative impacts, the Government of Nepal (GoN) decided in November 2009 that carbon-emitting industries would not be allowed to operate in the Lumbini Protected Zone (LPZ), as well as in an 800 metre designated area

on both sides of the Bhairahawa-Lumbini Road (B-L Road)¹. The GoN also issued a decree that industries operational at the WHP must respect the Environmental Protection Act and those that failed to do so would face compulsory relocation within two years.

Despite the government ruling on sensitive industrial development and environmental protection measures, adverse environmental and social impacts have been observed in the WHP due to the establishment of industries which do not adhere to the government's environmental rules and regulations.

With this background, IUCN Nepal was requested by UNESCO in 2011 to prepare an "Environmental Impact Study of Industrial Development around Lumbini, the Birthplace of Lord Buddha and a World Heritage Property", with the following terms of reference:

- identify and locate industrial activities in the study area;
- prepare an environmental plan and a monitoring strategy to reduce the impact of industrial activity in the protected zones; and
- develop zoning classes with guidelines establishing the type of development and industrial activities permitted or prohibited in the protected zones.



¹ Industrial Promotion Board, Government of Nepal, 2009 and Lumbini Environment Protection Alliance, 2010. Petition to protect human health and the environment of Lumbini, Birthplace of the Buddha & World Heritage Site, Appendix 2



Main Findings

This study

An interdisciplinary study team comprised of ecologist, EIA expert, statistician, socio-economist, GIS expert, architect, biochemist was formed. Six Village Development Committees (VDC) [Ama, Bisnupura, Gonaha, Kamhariya, Labani and Madhuvani] located close to industrial sites were selected to assess the social status of the region. Data and information related to the socio-economic condition of the local population, the environmental situation and industrial activities, were collected from organizations and experts and a desk review was undertaken. Research tools such as focus group discussions, transect walks and observations with stakeholders, key informant interviews, and field observation and surveys, were used to collect biophysical and socio-political data. Data related to pollution was obtained by using laboratory soil and water analysis. Likewise, statistical tools including Likert's attitudinal model, the Chi-square model, and the correlation coefficient model were used for assessing the perception of concerned communities of the impact of the industrial enterprises.

The study covers the Lumbini Protected Zone (LPZ), a rectangular area extending from the boundary of the Lumbini Project Area (1 mile by 3 miles) to 15 kilometres to the north, east, west and south (within Nepal). An alluvial plain, it is a largely flat land created by the deposit of sediment over a long period by the Tinau River. The LPZ lies between 27° 19' 34.803" to 27° 38' 31.992" N and 83° 06' 58.011" to 83° 26' 7.977" E in both the Rupandehi and Kapilvastu districts in the Western Development Region of Nepal.

Industrial expansion in LPZ

In 2011, 57 factories existed in the region. They are located at different distances from the Bhairahawa- Lumbini (B-L Road) in the LPZ varying from 51 to 2,663 metres. Industries include the production of:

- Bricks (30 factories);
- Cement and clinker (11 factories);
- Steel (2 factories);
- Noodles (1 factory);
- Paper (1 factory);
- Flour (2 factories);
- Other products such as plywood, edible oil and sacks (10 factories)

Of these industrial operations, some are major industries in terms of their production processes and pollutant emissions. Fifteen major industries include 11 cement manufacturers, two steel manufacturers, one paper processing factory and one noodle producer.



About 33,000 metric tonnes of cement is produced annually in the region. A raw materials-based cement factory and a clinker-based cement factory are currently operational. The major waste products of the latter are particulate matter such as dust, smoke and alkaline compounds. Its Green House Gas (GHGs) emissions such as dust, CO₂, CO, sludge and SO₂ amounts to about 912 metric tons per day. Other waste products from nearby industries include plastic, sludge, wood dust and paper sludge.



Major impacts

The study identifies a variety of major impacts on the socio-economy and health, flora and fauna, water, soil and air due to industrial development in the LPZ.

Socio-economy and health

Local people have gained very little from the nearby industries. Out of 11,246 households [of the study site] only 80 to 90 families have benefitted directly. This includes local people who are directly employed in the industries and are paid on average 150 Nepalese Rupees (NPR) per day. Others, who have shops near the industrial area, generate incomes of 8,000 to 18,000 NPR monthly.

Local residents also indicate that they have indirectly benefitted from the services linked to tourism development in the region such as more accessible road links. This in turn has enhanced local services such as water supplies, education and health care.



People living nearest to the industrial sites, or working in the industries are at high risk of exposure to hazardous industrial by-products such as dust, contact with allergic substances and extreme noise pollution, all of which pose serious health risks. Intensive air quality monitoring is still required to find the actual level of pollution. The health of local communities, especially school children studying at the school located near factories. Most of the road network is chaotic because of heavy industrial operations leading to huge traffic jams and associated transportation problems.

Flora and fauna

The LPZ is rich in flora and fauna, but the change in land use from natural habitat into industrial use with increased human intervention and urbanization has a harmful impact on the native fauna and flora. The local people have seen a decrease in the population of the blue bull (*nilgai*), reptiles and amphibians and birds. In addition, a wide range of aquatic creatures and the Sarus crane have been victims of the industrial pollution affecting wetlands, lakes, village ponds, reservoirs, rain water ponds and paddy fields.

Water

The by-products of industrial activity, particularly cement sludge, paper sludge and *ghee* sludge are discharged into rivers without any treatment. The surface water quality near to the industrial sites is heavily degraded with a water quality index of 45 which is well below the desirable levels of 90-100 for excellent quality.



There is strong evidence that industrial operators are releasing untreated waste into the River Dano and its tributaries. This harmful practice is making water sources unsuitable for domestic consumption and for wild animals.

Water contamination is found not only around the industrial sites but also downstream from the industrial area. In addition, according to the local people excessive withdrawal of groundwater for the operation of large-scale industrial activities causes an ongoing decrease in the level of water resources for communities and the native fauna and flora. A lack of data means that the observations of villagers about groundwater depletion cannot be verified.

Air quality

Most of the cement factories do not use regular water sprinklers in order to reduce the negative impact of fugitive industrial emissions. Meteorological parameters such as wind velocity, temperature, humidity, rainfall, cloud coverage and solar radiation determine the dispersion, diffusion and transportation of particulate matter and emissions into the atmosphere.

Local people observe that the air pollution has the highest impact in a radius of about three kilometres from the industrial sites; it has a medium impact in a three to eight kilometre radius and a low impact beyond eight kilometres.

However, to turn these perceptions into hard evidence, monitoring stations are needed at varying

distances from the sources of the pollution to assess the volume and consequences of the differing levels of industrial emissions on air quality.

Soil quality

Industrial operators follow the harmful practice of releasing industrial sludge into rivers and onto land without treatment, thus seriously disturbing the soil's organic qualities. The soil was found to be alkaline with an organic matter level lower (2.4 percent) than the normal standard (5.1 percent). The soil is also harmed by fugitive effluent from the cement factories. Anecdotal evidence indicates that as a result of the accumulation of dust, crop yields near the industrial site have dramatically decreased compared to the pre-industry era. During the flowering periods, photosynthesis and pollination are disturbed by dust accumulation on plant surfaces and in the soil.

Noise levels

Cement manufacturing plants adjacent to residential, institutional and educational areas use heavy industrial equipment such as fans, engines, generators and cement grinding machinery. In addition to the noise pollution caused by these devices, the excessive noise and vibration from heavy trucks associated with quarry operations and the transport of raw materials and finished products (about 100 trucks per day) causes noise and air pollution.

Historical vestiges

A study by Costantino Meucci entitled "*Lumbini, the Birthplace of the Lord Buddha: project to Strengthen the Conservation and Management of Lumbini, Preliminary Analytical Report*" prepared in 2011 highlighted that gypsum salt in the atmosphere is damaging the Asoka Pillar. It is also likely that other historical vestiges are equally threatened.





Legal frameworks

There are a variety of Acts that are applicable to control environmental hazards.

- The **Ancient Monument Protection Act, 1956** does not state the permissible distance that industrial activities can be set up from heritage sites. The act also does not address any other kind of pollution control measures to prevent damage to the surrounding environment, be it biological, physical or socio-cultural.
- The **Water Resource Act, 1992** prohibits any action that may pollute water resources surpassing the threshold value.
- The **Industrial Enterprise Act, 1992** has the power to impose fines, cancel the registration, or close down an industrial operation if there is any violation of this act or non-compliance. But the act does not address monitoring mechanisms in a specific manner.

According to the **Environment Protection Act 1996**, it is the responsibility of the Ministry of Environment to accept or reject an Environmental Impact Assessment/Initial Environment Examination (EIA/IEE) request submitted prior to the establishment of a new industry. However, the application of these laws and law enforcement measures are not satisfactory in the study area. Only a few industries seem to use state-of-the-art environmental friendly procedures. Many more are operated without adopting proper mitigation measures as per IEE/EIA. EIA or IEE documents submitted by potential industrial operators frequently do not contain detailed plans that address the likely harmful impacts on the health of workers, local people resident in the area and on the environment. Nor do they describe potential effects, monitoring and evaluation plans, the frequency of monitoring and reporting to regulators and the local community, and mitigation strategies to resolve harmful outcomes.

Recommendations

In order to conserve the natural environment of the Lumbini area and to foster the livelihood of the local communities in a sustainable manner, the study recommends a variety of measures as follows.

A) Zoning

- Classify the LPZ into five zones as follows:

Zone 1-Restricted Zone: One mile in the north, east, west and south from the boundary of the Lumbini Project Area (LPA). This zone needs to be protected by developing a control mechanism with by-laws and restricted principles for human intervention except for conservation and research. This zone requires the highest level of protection. In its existing condition, this zone has been rapidly changing with public infrastructure and associated concerns that pose threats to the LPZ. It needs a control mechanism with by-laws and restricted principles for human intervention except for conservation and research.

Zone 2-Buffer Zone: 2 miles north and south and 1 mile east and west from the boundary of Zone 1. The focus in this zone needs to be on the integration of the improvements to the local communities' livelihood and the conservation of the buffer zone. The buffer zone will contribute to the protection of the World Heritage Property. The importance of the environment must be properly emphasized and recognized.

Zone 3- Special Conservation and Management Zone: 1 mile distant from the boundary of the buffer zone to the east, west and south, and 6 miles distant to the north (natural forest land and major lakes) It should also cover some areas of land in the west and south near the Nepal - India border. The aim of this zone is to conserve natural resources and preserve the natural habitat, flora and fauna.

- Conduct a community-based watershed/lake management programme (Zones 3, 4, 5).

F) Air

- Maintain air quality controls in the LPZ as per the national standard.
- Prohibit air and sound polluting vehicles especially in zones 1 and 2.
- Provide green stickers as per the In-Use Emission Standard of the government of Nepal to environment friendly vehicles.
- Adopt short-term and long-term strategies to control air pollution by the existing industries in the region.
- Adopt Polluter Pays Principle (PPP) to control the air pollution in the region.
- Monitor the air polluting industries and sources by the concerned authority.
- Widen the Lumbini-Bhairahawa Road and make a green belt on both sides of the road.
- Promote renewable energy for domestic use in zones 1 and 2.
- Encourage reuse and recycle of solid waste.
- Adopt noise pollution control measures by the existing industries in the region.

G) Soil

- Encourage reuse, recycle and proper disposal of solid wastes.
- Plantation in open (both public and private) space so that it could conserve soil.

H) Noise pollution

- Prohibit air and sound polluting vehicles and provide green stickers to environment friendly vehicles such as low emitting vehicles, electric vehicles as per the In-Use Emission Standard of the Government of Nepal (Zones 1, 2).
- Prohibit the use of horns (Zones 1, 2 and around dense settlement by the Bhairahawa-Lumbini Road).

I) Historical vestiges

- Take conservation measures for archaeological sites exposed to environmental hazards (Zones 1, 2).
- Prohibit development around archaeological sites except development essential for the protection and enhancement of the sites (Zones 1, 2).
- Undertake, if necessary, emergency archaeological excavations before development work is started.

J) Legal frameworks

- Establish procedures for the review and approval of development projects including industrial enterprise in the LPZ.
- Ensure that the projects are accompanied by an evaluation of their impact on the environment. Include an alternative projects to minimize the adverse effects (EIA/IEE).
- Incorporate an archaeological study of respective zones in future assessments of potential environmental impact.

K) Community involvement

- Conduct an awareness programme about the inter-relationship between the importance of the World Heritage Property and biophysical impact and air pollution.
- Sensitize local communities about the importance of the conservation of archaeological assets and traditional values of these archaeological assets (Zones 1, 2).
- Promote renewable energy for domestic use (Zones 1, 2).



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