

Effect of Cement Industries on Rural Environment – A Review

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ABSTRACT:

Construction is one of the primary components of infrastructure, which provides the foundation for economic development. Construction's lifeblood is the cement sector. The cement sector contributes significantly to the GDP, jobs, and exports. The cement industry includes both positive and negative features. One of the industries that pollutes the environment the most is the cement industry. Cement plant emissions are a significant cause of climate change and global warming. The soil, air, flora, animal and human health are all negatively impacted by the dust particles and greenhouse gases that come from cement factories. In India, most cement factories are found in rural areas, close to small towns, and far from major cities. The majority of the activities in the rural economy are related to agriculture. The pollution from cement plants has a negative impact on vegetation, degrades soil, lowers food yield, and is harmful to both human and animal health. Cement factories harm the rural economy in this way. We can lessen the externality of cement factories by taking some important steps.

Key Words: Construction, Cement Plants, Global Warming, Rural Economy

I. INTRODUCTION:

Today, numerous industrial organizations are polluting the environment more and more, especially the soils, water, and air. Particularly, there is a degradation of agricultural lands and changes in a number of soil qualities throughout the process of industrial waste, the finding of natural deposits, the manufacturing of construction materials, and their use in the national economy. In emerging countries, the agricultural sector is being crippled and agricultural lands and resources are rapidly deteriorating due to pollution from cement industry effluents.

For many years, the career of choice for societal advancement and economic growth has

been cement. The best material for construction is cement-based concrete. The raw material process, clinker burning process, and finish grinding process are the three key steps in the production of cement. Cement is made through a number of processes, including mining, crushing, and grinding of the raw materials, calcining and cooling of the materials in a rotary kiln, producing clinker, combining the clinker with gypsum, milling, and bagging the final cement. The technologies used in cement production cause extensive power consumption, noise pollution, environmental heating and emissions of fuel gas (CO₂, NO_x, SO₂ and CO and SPM) from the kiln and precalciner. The dust particles by cement factory cause leaf injury, impairment of photosynthesis and loss of water by blocking the stomatal aperture of plants (Purwanta, Marnoto, Setyono & The effect of pollution on plants varies from species to species as the morphology, physiological and biochemical characteristics of plants are different Kumarswamy, 1991). The pollutants- kiln, dioxin, cement dust and particulates emitted from cement plants affect not only human beings but plants, vegetation and animals also. Effect of dust on health is more intensive near the cement plant and the intensity decreases as distance increases (Oyinloye 2015). (Handono Ramelan, 2017). According to a number of academic studies, people who have been exposed to cement dust have experienced negative consequences on their respiratory health. Exposure to cement dust has been linked to human respiratory symptoms, chronic lung function impairment, and lung disease. Skin, eye, and respiratory system irritation are caused by cement dust particulates.

Following are the areas of Adversities that cement plants have on Rural Environment:

Loss of Greenery, Vegetation and Plants:

Dust and particles from the cement industry are very common. High levels of calcium

carbonate, potassium, silicon, sodium, and nitrogen sulfides, oxides of silicon, and sodium and nitrogen sulfides, which accumulate on the surface of vegetation and also create an alkaline micro-environment, are among the atmospheric pollutants brought on by the cement industry. Plant leaves and foliage are obscured by the dust and particles. (Koppel and Heinsoo, 1996; Shukla, Nagpure, and Sharma, 2013) They are extremely destructive to plants. Sunlight and fresh air cannot reach the leaf's surface or the vegetative portion of plants because of dust and particles. They also respond to chlorophyll dysfunction, which has an impact on photosynthesis. Plant growth and vegetation are negatively impacted as a result. According to Dwivedi and Dubey's (2017) research, dust-exposed plant species had lower levels of carotenoid pigments, chlorophyll, pH of leaf wash, pH of leaf extract, and leaf size than those at control sites. According to Suthar, Gupta, Kansara, and Goswami's (2014) research, leaves suffer gradual declines in physiological processes like photosynthetic capacity and respiration rate as a result of highly concentrated cement dust pollution. Due to the alkaline nature of cement dust particles, less mineral matter is absorbed from the soil, which affects plant physiology and morphology. Senthil, Sobana, Kavitha, and Jegadeesan (2015) made an effort to determine the severity of the effect of dust pollution on the sesamum plant. They discovered that the amount of chlorophyll a, chlorophyll b, total chlorophyll, and carotenoids in the leaves of plants cultivated in polluted environments has decreased.

Loss of crops and soil pollution:

In Jaintia Hills, Meghalaya, Lamare and Singh (2020) looked into how cement dust deposition affected the physico-chemical characteristics of the soil there. The results of the investigation showed that the quality of the soil around cement facilities had been altered by cement dust. The area's typical soil pH is acidic, but soil pH around cement plants has been observed to be slightly alkaline. Near cement plants, soil properties like bulk density and electrical conductivity had higher values; nevertheless, water holding capacity, soil moisture content, soil organic carbon, and total nitrogen content had lower values. Although the changes in soil characteristics may not be severe at the moment, if pollution trends continue, a large area surrounding cement plants' soil characteristics are anticipated to deteriorate, having a variety of negative consequences on the region's flora, fauna, and socioeconomic system. According to Purushothaman, Mukundant,

and Viswanath's (1996) study, the particle deposits from cement kiln effluents have an impact on the cropping intensity and ecotypes of the area flora. The components of cement kiln dust induce an imbalance in the soil's cation concentrations as well as negative effects on stomatal function, photosynthesis, and pollen germination (Sreerangaswami et al., 1973). Within the contaminated zone, the dust particulates have a negative impact on agricultural productivity and, consequently, farm income.

Animal husbandry losses include cattle, poultry, and other livestock:

According to Rai, Mishra, and Parihr (2013), different human ailments have long been linked to air pollution. Animals and birds are also harmed by air pollution in addition to humans. Pollution has a direct impact on any species that needs to breathe oxygen to survive.

The gas and dust emissions from cement mills have a potentially fatal composition (Mishra & Siddiqui 2014). In the vicinity of a cement business, particulate matter and hazardous gases are released during cement production, posing health dangers to nearby living things. The pollutants include sulphur dioxide (SO₂), nitrogen oxides (NO_x), and suspended particulate matter (SPM), as well as respirable suspended particulate matter (RSPM) and non-respirable suspended particulate matter (NRSPM) (Mehraj, Bhat, Balkhi & Gul 2013).

Remedial Measures / Recommendations:

1. Although the environment's exposure to dust and gaseous pollutants from the cement industry cannot be totally eliminated, they can be decreased to a point where they may be less harmful to us. Here are some recommendations:
2. Industrial designs should combine cutting-edge and novel approaches, and adequate machine efficiency and maintenance would ensure a decrease in the production of dust and gases during various activities.
3. Mining activity causes a lot of complications for the village near the cement business. As soon as the mining of a certain area is finished, backfilling of abandoned mines should begin in order to solve this problem.
4. It is advised that affected region inhabitants relocate in order to lower health risk issues.
5. To prevent dust from spreading and to absorb the dust, an adequate vegetation belt needs to be built around the cement plant and in the hamlet.

II. CONCLUSION:

One of the main pollutants is cement dust, which is released from cement manufacturing facilities. During various stages of cement manufacture, dust and particles are likely to have a negative effect on environmental elements such as the air, water, soil, and flora and wildlife. When dust settles on the soil, the pH rises and the soil becomes more alkaline. Cement dust has been shown in numerous academic studies to have a degradable impact on the soil characteristics of the surrounding area. The study demonstrates that the morphological and yield properties of the plants are adversely affected by the particle contaminants in cement dust. Crops in the area around the cement factory suffer from air and soil pollution. Crop cultivation suffers in the vicinity of cement facilities, both in terms of crop size and quality. It is possible to draw the conclusion that cement plants have a detrimental effect on the variety of the vegetation, animal life, and human health based on the studies of a number of academics. The entire cement producing process has an impact on the local population and economy of nearby settlements.

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