



The Stone waste generation in District Chittorgarh- from Environmental Burden on Clean and Green Environment to reusing of waste in different industries, Rajasthan, India

¹Sarita Kumawat, ²Rajesh K. Yadav¹

School of Life Sciences, Suresh Gyan Vihar University

² Department of Environmental sciences, S.S.Jain Subodh P.G. College, Rambagh circle, Jaipur

ABSTRACT

Natural and artificial stone industry generates large volume of stone waste. It is in various forms such as powder or fines, aggregates, larger stone pieces and cobbles, damaged blocks or slabs and stone slurry. By the mining industry has quality of groundwater resources disturbed in the State of Rajasthan and these industries are becoming centres of pollution sources which need timely actions at government level so that natural resources such as groundwater can be protected. Stone industry generates both solid waste and stone slurry. Where solid waste results from the rejects at the mine sites or at the processing units, stone slurry is a semi liquid substance consisting of particles originating from the sawing and the polishing processes and water used to cool and lubricate the sawing and polishing machines. Stone waste generated during processing corresponds to around 40% of the final product from stone industry. The main objective of this study was to examine the possibility of stone waste recycling in useful materials such as house building materials and various different industries etc. The other objectives can be summarized in saving natural resources and reducing their used quantity.

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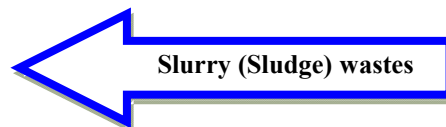
INTRODUCTION

Mining industries increase comfort of human life on one hand while on other hand; it pollutes the air and water. It has shown harmful effect of the landscape as well as established social-economic and socio-cultural values. The stone industry generates an extremely large number of wastes from mined areas in the form of mine wastes to processing and polishing wastes at gang saws locations. Production of slurry, the waste dust along with heat consumes more than 43,000 litres of water per hour per gang saw. There are two types of by-products of stone processing. During processing, 30% of the stone goes to scrap and the other waste material is slurry. It is basically the water containing fine powder. The environmental impact of stone slurry waste resulted from quarries and stone processing industry is disturbing air quality, surface and ground water, and contaminated agricultural soil. The major component of stone slurry is the calcium carbonate. This compound is accumulated in the water channel and on the soil surface, causing the formation of lime cemented hard pans that restrict infiltration of water and root penetration into the soil layer [1]. The slurry generated from this industry in many cases is disposed in the municipal sewer system causing blockage in these networks and many harms consequences [2], and when it is transported to landfills and open areas, it pollutes the surrounding and causes poor soil fertility and penetrates to the ground water. Moreover, when slurry becomes dry, the resulted powder flies and deposits on agricultural lands and vegetations harshly affect the environment and the ecosystem. On the other hand, the accumulation of waste in landfills is also a pressing problem for many economic activities from economic point of view [3].

SOURCES OF WASTE FROM MINING:

- a) **Solid wastes:** This type of wastes result during the levelling of the unshaped blocks and slabs with huge amounts and consists of stone fragments with variable dimension.

- b) **Slurry (Sludge) wastes:** These wastes result during the sawing and polishing processes of the marble, granite, Limestone (estimated as >30% of the volume of the sawn block).



ENVIRONMENTAL PROBLEM DUE TO WASTE

Slurries are produced during different stages of the processing of natural stone products: cutting of blocks, cutting of slab sand polishing of the slabs and tiles. In those processes, very fine particles of the stone are originated and mixed with water. When stone slurry is disposed in landfills, its water content is drastically reduced and the stone dust resulting from this, presents several environmental impacts. In other words, in dry season the stone powder dangles in the air, flies and deposits on vegetation and crop. Due to stone slurry salinity of soil increases ultimately productivity of crops effects. Problems are mainly related to mining blasts, noise, vibrations, dust, increase in siltation, stone missiles, environmental degradation, landslides, run off etc.

POSSIBLE APPLICATIONS OF THE WASTE

So far, a lot of researches have been done all around the world in utilization of natural and artificial stone wastes in different types of industries, in particular, construction materials. Nearly one thousand Gang saws and thousands of cutters are producing 15-20 lac tons of marble slurry waste which is indestructible waste and harm to general Public. Some possible uses of the slurry may be listed as under:

- ❖ As a filler material for roads and embankments (As per Khadi Board of India ItemNo 31 from sr no. 1 to 9 of this chapter)
- ❖ For manufacture of bricks Central Brick Research Institute (CBRI), Roorkee.
- ❖ Manufacture of Portland Cement
- ❖ Manufacture of Ceramic Tiles
- ❖ Manufacture of Thermoset Resin Composites The Macromolecular Research Centre at Jabalpur.
- ❖ Manufacture of lime
- ❖ Manufacture of Activated Calcium Carbonate
- ❖ Hollow Blocks and Wall Tiles
- ❖ Manufacture of Ground Calcium Carbonate
- ❖ Making Cement mortar (Partially replacing sand) and
- ❖ Making Cement concrete (Partially replacing sand).

Other industries consist of Paper industry, Ceramics industry (faience), Agriculture soil corrective, for example granite powder can be utilized as amendments and fertilizers for acid soils. Natural stone in powder form can be used in fertilizer or as a sidewalk bed. Arslan *et al* [4] found that waste sludge up to 9% could effectively be used as an additive material in cement. Stone slurry was used for production of clinker, mosaic tiles, faiences and in asphalt mixtures as a commercial filler substitute [5-8].

DISCUSSION AND CONCLUSION

The incorporation of sludge wastes in building blocks' production has proven to be safe for health and environmentally friendly. According to waste management methods, these kinds of wastes need to be treated through sound solutions like reusing, reduction and recycling instead of being accumulated at open-air dumpsites or landfill, or disposed at waterways and around the production facilities, which causes environmental and health problems. Using mine waste in concrete mix proved to be very useful to solve environmental problems and produce green concrete. Therefore, it is recommended to re-use these

wastes in concrete to move towards sustainable development in construction industry. The use of mine wastes in the production of building materials can be successfully carried out.

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