
EFFECT OF KOTA STONE SLURRY ON QUALITY OF WATER

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ABSTRACT

The aim of this paper is to address the effect of kota stone slurry on quality of water. The kota stone is a flaggy dimensional lime stone. By virtue of its good geological structure, texture, physical properties it can be cut, dressed, carved in any shape and polished easily. Mirror polished kota stone tiles give attractive and fine grained appearance. The kota stone usage as flooring material is very popular in India as well as across the world. The most of the processing units are located in Indra Prastha Industrial Area, Kota and RICCO Industrial area of Ramganj Mandi. The production of kota stones slabs and tiles is playing a significant role in economic growth of India and is enhancing revenue in term of foreign currency day by day. On other hand the cutting, dressing, and polishing processes of kota stone slabs and tiles are also generating huge volume of kota stone waste slurry as by-product. As the need of kota stone slabs and tiles increases the volume of the slurry would increase. Each ton production of the slabs and tiles generates approximately 3000 liter volume of the slurry. The slurry is being disposed in low lying landfills and on agricultural land. Moreover, this by-product is disposed directly in natural Nallahs. The slurry disposed in landfills is overflowing. The slurry disposed in this manner finds its way to nearby natural water channels or Nallahs or water bodies. The intensity of environmental damage is so high that decrease in depth of a natural nallah running in Indra Prastha Industrial Area, Kota is about one foot per year due to sedimentation and solidification of kota stone slurry at its bed. Cross sectional dimensions are decreasing day by day. The slurry content in natural nallah water is degrading its quality. Native vegetation and aquatic life is on verge of absolute destruction which is a matter of environmental concern of this hour.

INTRODUCTION

India is quarrying and processing variety of stones e.g. marble, granite, slates, sand stone and limestone. Flaggy limestone is exposed between Deoli Kalan (N24° 48'-E75° 52') and Suket (N24°37'-E75° 03'). It is, geologically, a part of semi-series of lower Vindhyan Group in Kota and Jhalawar District of Rajasthan. This lime stone take good polish and is commercially known as the 'Kota Stone'. Flooring of the most of the modern buildings is being made of kota stone. It is comparatively cheaper than granite and marble. It gives elegant and colorful pleasing appearance and is available in brown, green, blue and combination thereof. Rate of progress of work of fixing stone slabs could be achieved high. Kota stone is very tough, hard, durable, quite impervious, fine to very fine grained, compact and can be mirror polished. It can be carved easily. It is suitable both for interiors as well as exteriors. It has minor color variation but within tolerance limit. Kota stone production work has been carrying out since 1942.

The improper handling and disposal of waste substantially increase the risks to the environment. The changes in water quality due to kota stone slurry in RIICO Industrial Area of Kota city and Ramganj Mandi town is the most burning problem of the recent time. By knowing the extent of the pollution a plan could be thought of regarding control of this pollution. Making awareness and advertisement in society are other tools for the same. Aim of this paper is to present the effect of kota stone slurry on water so that agencies keen to control may be benefitted and enabling them to adopt a strategy to mitigate the same. Processing units throw daily tons of slurry. Composition of slurry of all kotastone processing unit is not definite and carelessly discharged into low laying area or open drains/brooks. Kota stone slurry is ultimately finding their way to stream which are contributing water to chambal river, soil or air, public places because due care is not being taken for proper disposal of the same. It is degrading water quality day by day. Although processing of kota stone is generating revenues, employment and income but on other hand it is crucial to maintain the stability

of the ecosystem which includes conservation of water and the forest cover, soil fertility, surface drainage system like basins of rivers and streams from being polluted with stone slurry / waste powder. However Eco-friendly Mining Guidelines, Government of Rajasthan (2010) provide sufficient provisions to protect environment described in Minor Mineral Concession Rule, 1986. Dr.Fergus Sinclair (2009) has studied Livelihood impacts of quarrying and the restoration of quarry sites in Kota and Bundi Districts of Rajasthan, India and had concluded about the effect on local hydrology, the negative impact of dust and other pollutants, on the composition and productivity of natural vegetation as well as of agriculture drastically. Ashutosh Vyas, Archana Pancholi (2009) “Environmental degradation due to mining in south Rajasthan: A Case study of Nimbahera, Chittorgarh” During the course of field studies they observed that the mining is injurious for health and is polluting the soil and water bodies also.

RESEARCH METHODOLOGY:

To analyze effect of kota stone slurry on water general study and some physical tests have carried out.

GENERAL STUDY:

Kota Stone Industry can be divided in two sectors that is Kota Stone Mining and another one is Kota Stone Cutting and Polishing Industry. Kota Stone Industry is one of the major industries in Kota and Jhalawar district of Rajasthan. Kota Stone is categorized as minor mineral. This mineral is regulated by Rajasthan State Minor Mineral Concession Rules (RSMPCR) under which mining lease rights are granted to applicators for 4.0 hectare area. In Indra Prastha Industrial Area (I.P.I.A.) at Kota the most of processing units are located near urban population and market. It was set up by RIICO in 1969-70. Ramganj Mandi Industrial Area is situated in Kota district and was set up by RIICO in 1972-73.

EFFECT OF KOTA STONE SLURRY ON WATER:

The Kota stone slurry is generated from various processing units located in Indra Prastha Industrial Area of Kota city and industrial area of Ramganj Mandi Tehsil. Slurry is resulted from cutting and policing process of the Kota stone. It is degrading water quality of nearby streams and rivers. Cross sections and longitudinal grade is being affected due to silting, deposition and solidification of Kota stone slurry. The slurry is being dumped in dumping yards located at low lying areas, nearest convenient places like natural Nallahs as shown in fig. 1 below.



Fig. 1: Disposal of slurry in Nallah and drain

Solid stone slurry generated by stone cutting and polishing industries situated at Kota city and Ramganj Mandi tehsil is being disposed off through spreading over the valuable land. Native vegetation is being covered with the slurry disposed-off by these industries as shown in fig. 2.



Fig. 2: Loss of native vegetation by slurry

During last 13 year it has been estimated that 112813 thousand tons slurry had been produced by factories. The water content in slurry has been observed more than 85% by weight. After dumping the slurry dumped slurry waste retain only 15% water content and balance 70% water get escaped in ground or nearby natural channels or water bodies or low lying areas. About 33843.9 thousand tons slurry remained in dumps.

PHYSICAL TESTS FOR WATER POLLUTION

TEMPERATURE

Temperatures were measured immediately before and after adding kota stone waste powder to reagent water samples by means of ordinary thermometers. No change in temperature found, hence concluded that the powder is non reactive chemical compound with water.

COLOUR

Normally minute amount of organic matters in form of colloidal state are responsible for colour in water but some mineral and dissolved organic impurities also impart colour. When kota stone waste powder is added to reagent water it turns it into a white milky solution immediately but milky colour remain no longer strong with passes of time. Gradually in few hour colour of solution become very faint and after 24 hours almost whole quantity of powder get settled in measuring cylinder. After one week it has been observed that the solution become almost colourless Hence concluded that the colour impart by the powder is temporary. In flowing water milky white colour remain continuous due to mixing of the kota stone slurry and as and when flow stops the colour get disappeared after one week due to process of silting at bed of channel/ streams.

TURBIDITY

Sample of the kota stone waste powder and reagent water were prepared. The concentrations of the powder were 20 gram per litre, 40 gram per litre and 60 gram per litre in the samples. All samples were shaken vigorously before examination. It has been observed that turbidity increases with increase in content of slur but goes on decreasing with lapse of time

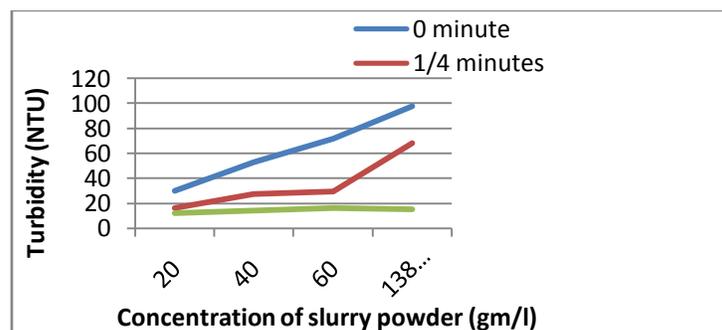


Fig. 3: Impact on turbidity due to slurry of kota stone

Turbidities of slurry mixed water of Nallah along road number 5, IPIA were found to be 98, 68 and 15 after lapse of times equal to 0.0, 15.0 and 300.0 minute time periods which is beyond permissible limit 1. Impact of the slurry on turbidity is shown in Fig. 3.

TASTES AND ODOURS

Tastes and odours occur due to presence of dead and live organisms, dissolved gases or oxygen combined with organic the mineral like sodium chloride, iron compounds, carbonates and sulphates of some elements may produce the taste. No chemical test is available but by smell tests were performed for odour. The samples of the kota stone waste powder and reagent water were prepared. The concentrations of the powder were 10 gram per litre, 20 gram per litre and 40 gram per litre in the samples. No smell felt in all samples immediately after preparation, after 24 hours and even at period of one week when these were stored at different temperatures in dark and lighted places. No different testes in compared to potable water were observed when the sample prepared as above were tasted personally at interval of time equal to 30 minutes, 2 hours and 24 hours but the taste immediate after preparation was like to lime water hence agreeable.

CONCLUSIONS

After analyzing the results of general and experimental study it can be concluded that the kota stone processing units are producing imbalance in the ecosystem. The environmental impact is significant and is major economical drawback of this industry. Environment of 'kota stone' processing area is changing day by day and its consequences are affecting adversely the health of human and animals, biodiversity, water bodies and land, plant growth rate and their premature death. Restoration of environmental damage is utmost urgent requirement of the hour in surroundings. Kota stone processing units are located nearby streams and uneven rocky area. Water is also being degraded. Hence environmental degradation due to kota stone industries is increasing in surrounding of town Ramganj Mandi and other places like Kumbhkot, Julmi, Chechat, Kudayala, Satalkheri, Pipakheri, Laxmipura, Suket, and many small villages. Kota city is facing the problem of disposal of kota stone slurry being generated by processing units established in Indra Prastha Industrial Area. Slurry is being dumped in and along natural Nallahs and manmade open storm drains. Depths of Nallahs are decreasing day by day. The depth of Nallah running along road number 5 of Indra Prastha Industrial Area was 15 feet about 10 year back but today it is found to be 5 feet deep only below Culvert Bridge hence the rate of decrease in depth of the Nallah is 1 foot per year. A day would come when depth of these Nallahs will become zero. The area will become a flood prone zone.

Physical test results regarding turbidity and colour, shows that quantum of impurities due to slurry dust powder depend on time lapsed after adding it to water and its concentration. Hence almost all parameters exceeds its prescribed limits set by IS 10500-2012.

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