GROUND WATER QUALITY EVALUTION IN STONE QUARRY AREA AT VIRUDHUNAGAR DISTRICT

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Abstract

Stone quarrying is a small scale labor oriented industry which has provided jobs too many people but at the same time it has brought a host of environmental pollution problems in the vicinity. The study is carried out to understand the ground water quality in the stone quarry area. The various parameters studied are pH, Temperature, Turbidity, Total dissolved solids, Total hardness, Calcium, magnesium, Alkalinity, Chlorides, Fluorides, Sulphates, Phosphates and Nitrates. The present study aims to understand physico-chemical characteristics of ground water in the stone quarry area and its public utilization. Along with the damage of water pollution by dust and combustion gases of blasting, coal pits have a significant negative impact on water resources. Polluted quarry water worsens the ecological situation on a much larger area than covered by water pollution. The sampling sites were selected on the basis of their various quarry surrounding the Virudhunagar district such as, Sivakasi yellow granite quarry in Thiruthangal, Sivakasi, blue metal quarry in Nadukkudi, Siva jeyam quarry in Santhaiyur village, Tulukkapatti, Mettur quarry in Keelamettur, Yasmin quarry in Nedungulam, stone quarry in karunkulam.

Keyword: *Ground Water Quality - Stone Quarry- Physical – chemical parameter*

Introduction

Natural water resources are subjected to pollution comprising of organic and inorganic constituents. The stone quarrying industry greatly contributes as a major source of water pollution which eventually becomes hazardous to various environmental attributes. The environmental impact of mining quarrying activities is very complex and it not only destroys the existing vegetation but also affects the surface and ground water quality.

Dust

Transfer of dust from the air to surface waters can result in contamination. Impacts generally relate to the presence of suspended solids (in addition to those arising from water erosion). In rare cases, physical impacts may be aggravated by the presence of chemically active minerals in the dust (e.g. limestone contains alkaline calcium carbonate and sulfides) that can alter water chemistry and suitability for the fauna and flora that it supports.

Suspended solids

Suspended solids are generally inert, although there may be exceptions (the most common being minerals that alter the water pH). Even inert solids can have a significant impact on water, and on the fauna and flora that it supports. The presence of suspended solids can affect water quality far beyond the site boundary; this can seriously impair the use and increase the cost of water for other users and uses (e.g. drinking water, industrial uses, irrigation, and fisheries, as a coolant and for recreational purposes).

Disposal

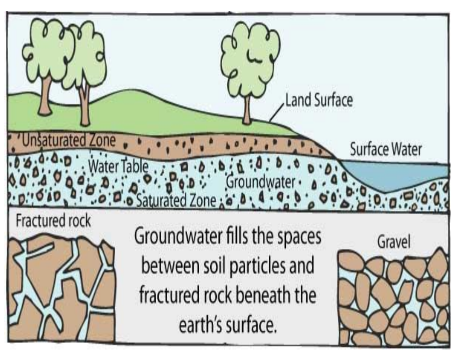
Disposal areas are a major potential source of suspended solids in run-off that may ultimately report to surface waters. Disposal areas may affect the surface water regime (e.g. by changing surface water flow paths). Quarry waste or quarry fines disposal may also create problems if dumped in or near areas prone to flooding.

Ground Water

Groundwater isn't as free-flowing as surface water. Predicting and modeling how it flows is wildly complex, factoring for what's dissolved in the water and what materials it's moving through, in three dimensions. What is easy to say is groundwater moves slower than surface water, and it gets recharged more slowly. Because modeling is complex, and tracking depletion involves drilling wells, it's far more difficult to gauge groundwater depletion than water shortages on the surface.

When groundwater is depleted, it is still there, just lower down, as many as several hundred feet lower in extreme cases. However unseen it is, groundwater depletion – and the lowering of the water table – is very serious for several reasons.

For people who rely on well-water, depletion can be equally disastrous. As the depth needed to reach the water increases, the amount of energy required to pump it out also increases. Lowering the water table can pollute the water, as saltwater zones can underlay freshwater zones.And even for those who depend on surface water, which is all of us, groundwater depletion can have its effect because ground water feeds surface water and vice-versa. Groundwater depletion can reduce the amount of water in streams and lakes, even if the effects take years to become obvious.



Ground Water

In areas where material above the aquifer is permeable, pollutants can readily sink into groundwater supplies. Groundwater can be polluted by landfills, septic tanks, leaky underground gas tanks, and from overuse of fertilizers and pesticides. If groundwater becomes polluted, it will no longer be safe to drink

Ground Water Quality

We often think of water quality as a matter of taste, clarity and odour, and in terms of other properties which determine whether water is fit for drinking. For other uses different properties may be important. Water for most industrial uses, for instance, must not be corrosive and must not contain dissolved solids that might precipitate on the surfaces of machinery and equipment.

Pure water is tasteless and odorless. A molecule of water contains only hydrogen and oxygen atoms. Water is never found in a pure state in nature. Both groundwater and surface water may contain many constituents, including microorganisms, gases, inorganic and organic materials.

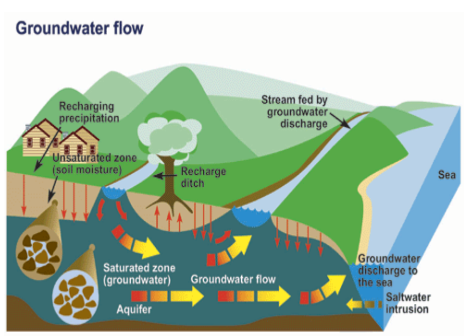
The suitability of water for a given use depends on many factors such as hardness, salinity and pH. Acceptable values for each of these parameters for any given use depend on the use, not on the source of the water, so that the considerations important for surface water are equally applicable to groundwater.

The natural quality of groundwater differs from surface water in that:

- for any given source, its quality, temperature and other parameters are less variable over the course of time and
- in nature, the range of groundwater parameters encountered is much larger than for surface water, e.g., total dissolved solids can range from 25 mg/L in some places in the Canadian Shield to 300 000 mg/L in some deep saline waters in the Interior Plains.

Ground Water Flow

Groundwater flow is the part of stream flow that has infiltrated the ground, has entered the phreatic zone, and has been discharged into a stream channel, via springs or seepage water." It is governed by the groundwater flow equation. Groundwater is water that is found underground in cracks and spaces in the soil, sand and rocks. An area where water fills these spaces is called a phreatic zone or saturated zone. Groundwater is stored in and moves slowly through the layers of soil, sand and rocks called aquifers. The rate of groundwater flow depends on the permeability and the hydraulic head.



Quarry and Environment

Few minerals are in an expendable form when they extracted by low technology due to its abundant distribution and low cost. Consequently, quarry is closely related to such form of minor minerals and release lots of dust pollutants and noise disturbance. And the pollutants in turn mixed with numerous domestic activities and substances of the inhabitants around the area. The largest amount of dust is only produced by this activity and all sorts of problem arise from this process, since it has not reached a highly developed stage or a sophisticated operational level. Besides giving the socio-economic status it gives some attention on environmental perception toward air and sound pollution of the human inhabitation in the mining area including the migrated workers.

Need for the Study

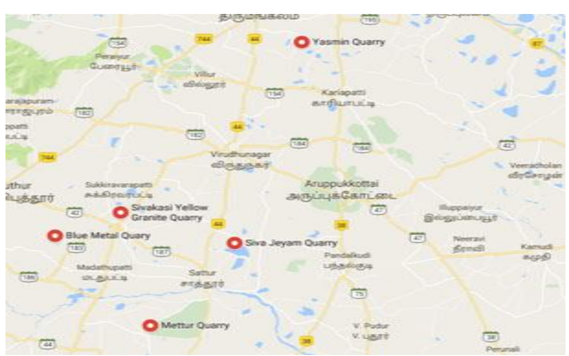
- To help local officials, the public, and the mining industry understand the main issues surrounding mine establishment.
- To provide suggestions for monitoring and mitigating strategies to prevent significantly harmful impacts on water resources.
- To effects on ground-water levels from mining operations and mine dewatering.
- To turbidity in wells due to blasting and quarry operations.
- To interruption of conduit flow paths by rock removal.
- To temperature change (thermal impacts) in springs and surface-water streams.

Objectives

- To investigate the impacts of quarry on the physical and human environment.
- To assess the pollution and other impacts on the surrounding environment.
- To make comparative study of social and economic status of the workers and non-worker inhabitants.
- To identify different problems faced by inhabitants and their environmental perception.
- To study the attitudes of both beneficiaries and non-beneficiaries of the quarrying activity.
- To highlight certain of impacts on livestock health and productivity of crops

Study Area

Virudhunagar district is situated in South India of Tamil Nadu State. The city is situated on 9°35' N longitude and 77°57 E longitudes. The sampling sites were selected on the basis of their various quarries surrounding the Virudhunagar district such as, Sivakasi yellow granite quarry in Thiruthangal, Sivakasi, blue metal quarry in Nadukkudi, Siva jeyam quarry in Santhaiyur village, Tulukkapatti, Mettur quarry in Keelamettur, Yasmin quarry in Nedungulam, Stone quarry in karunkulam.



Show that study Area of Virudhunagar district Samples Sites.

Sample collection quarry area

Places	Samples no.
Sivakasi yellow granite quarry in Thiruthangal, Sivakasi,	1
Blue metal quarry in Nadukkudi,	2
Siva jeyam quarry in Santhaiyur village, Tulukkapatti	3
Mettur quarry in Keelamettur,	4
Stone quarry in karunkulam.	5
Yasmin quarry in Nedungulam,	6

Activities in Project Phase II

1. Collection, Testing And Analyzing Of Ground Water Samples
2. Compare The Results With Various Standard Water Quality Parameters
3. Quarry Water Purifying Using Artificial Filtering Arrays Method
4. Result and discussion
5. Conclusion

Conclusion

1). Help the public, and the mining industry understand the main issues surrounding mine establishment. provide suggestions for monitoring and mitigating strategies to prevent significantly harmful impacts on water resources.

2). Control the effect on ground-water levels from mining operations and mine dewatering. Control the range of turbidity in wells due to blasting and quarry operations. interruption of conduit flow paths by rock removal.

3). Control climate change (thermal impacts) in springs and surface-water streams.

Reference

1. Zhironkin S A, Khoreshok A, Tyulenev M A, Barysheva G A, Hellmer M C 2016 Economic and technological role of Kuzbass industry in the implementation of national energy strategy 012127.

2. Tyulenev M A, Gvozdkova T N and Zhironkin S A et al. 2016 Justification of Open Pit Mining Technology for Flat Coal Strata Processing in Relation to the Stratigraphic Positioning Rate Geotechnical and Geological Engineering 34 (6) doi:10.1007/s10706-016-0098-3.

3. Alagbe, S. A.: Groundwater resources of river Kan Gimi Baisn, north-central, Nigeria. *Environmental Geology,* **2002,** *42,* 404 - 413.

4. Punmia B. C.; Jain A. K.: Wastewater Engineering. *Laxmi Publications (P) Ltd, New Delhi,* **1998.**

5. American Public Health Association: Standard methods for the examination of water and wastewater, 20th edition, *APHA, AWWWA, WEF,* Washington DC, **1998.**

6. World Health Organization: Guidelines for drinking water quality, *2nd edition, Geneva,* **1998.**

7. Adekunle, A. A.; Adekunle, I. M.; Ndahi, N. P.: SWM by combustion: Implication on the metal in the environment, *Proceedings of 29th WEDC International Conference, Abuja Nigeria,* **2003,** p3- 5.

8.Lesin Y.V., Lukyanova, S.Y. and Tyulenev, M.A. 2010. Mass transfer of dispersed particles in water filtration in macro-grained media. ***Journal of Mining Science.*** 46-1: 78-81.

9**.** Lesin Y.V, Lukyanova, S.Y. and Tyulenev, M.A. 2015. Formation of the composition and properties of dumps on the open-pit mines of Kuzbass. *IOP Conference Series: Materials Science and Engineering.* 91: 012093.

10. Maximovich N.G. and Khayrulina E. 2014. Artificial geochemical barriers for environmental improvement in a coal basin region. *Environmental Earth Sciences.* 72 (6): 1915-1924.

11. Karanth, K.R. 1997. *Ground Water Assessment Development and Management*.TatMc-Graw-HillPublication.