

# Land and Water Conservation–Abandoned Quarries in Bangalore

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**Abstract**—Rapid growth and construction activity to meet the modern requirements of increasing population and housing and infrastructure development needs of the society, has immensely boosted the demand for building materials. Stone quarrying continues to play major role in this process. Stone quarrying is a collective term for extraction of various natural stones, fairly massive and deep deposits of hard or soft rocks, used for structural or decorative purposes in construction and monumental applications. It can also be defined as extraction of non-fuel and non-metallic minerals from rocks, but has disturbed the natural environment and led to degradation of quarry lands.

*This paper discusses the environmental impacts of stone quarrying in Bangalore and recommends effective means for dealing with the practical aspects of conservation and reclamation within the context of environmentally responsible business practices.*

## 1. INTRODUCTION

Bangalore is the capital city of Karnataka State, India. In and around Bangalore there are many hillocks composed of igneous rock formation (granite). In India, stone is considered minor mineral and falls under the control of state government. With the increase in urbanization over the past decade and a half; infrastructure, developmental activities, and building construction has seen a boom. With this, the requirement for granite in the form of ornamental building stone and construction material has increased many folds; due to which, quarrying activity had accelerated up until 2010. Forest department identified the area within 100 m from the forest boundary as sensitive zone and imposed a ban on quarrying. Mines and Geology Department imposed a ceiling of 3m as the depth up to which quarrying can be carried out. These changes in the policy were not favorable to the quarry owners and quarrying was deemed uneconomical which lead to a major dip in quarrying since 2010 and many of the quarry sites have been abandoned. Lack of efforts in monitoring, rehabilitation, restoration, post-mining programs for minimization of adverse environmental impacts has resulted in degradation of quarried land over years.

## 2. IMPACTS OF ABANDONED STONE QUARRYING SITES IN BANGALORE

The major impact of stone quarrying is aesthetic visual impact. Alteration of natural terrain leads to soil erosion, blockage of natural drainage systems, increased runoff and decrease in ground water recharge. The balance in the hydrological and geological systems is affected. Due to the disturbance of the earth's surface, flora/existing vegetation and ecosystems are disturbed. Loss of habitat for some fauna and flora species and biodiversity reduction due to vegetation clearing of the site. Reduction in grazing areas. In many instances, water pooling can be noticed, which not only poses safety and health issues but also transforms into a mosquito breeding centre. The dust from the quarry sites lead to respiratory issues. As these sites are abandoned with negligible human activity, it may even transform into a setting of social nuisance.

## 3. MATERIAL AND METHODS

Bangalore, is situated in the southeast of the South Indian state of Karnataka. It is positioned at 12.97° N 77.56° E and covers an area of 2,190 square kilometers (850 sq mi). A landlocked city, Bangalore is located in the heart of the Mysore Plateau (a region of the larger Deccan Plateau) at an average elevation of 920 meters (3,020 ft). Quarry belts in and around Bangalore can be majorly classified as Kanakapura belt, Devanahalli belt, Chikaballapura belt, Kolar belt, Magadi Bidadi and Ramanagara belt, Dabaspeta belt. Kanakapura area has been identified as wildlife sanctuary belt and Devanahalli area has been identified as a sensitive area due to the location of Bangalore International Airport in Devanahalli; and hence quarrying activities have mostly been ceased in these two belts.

Methodology included field observation and photo documentation to assess the change and status of environmental impacts of quarrying. A structured

questionnaire to know the local people perception about the impacts of quarrying was administered in the field during the study.

### 3.1 Jayanagar T block Quarry Site

This site is located in the heart of the city in a completely developed urban setting. Quarrying activity had been discontinued more than a decade and a half ago. The land use of this site was changed to form institutional land about 7 years ago and a college was constructed. No traces of the quarry can be seen now. The depression in the quarry site has been utilized to form basement and the site has not been filled unnecessarily to match the level with the surrounding.



**Fig. 1: Location map of Jayanagar T block quarry site showing the current status**

### 3.2 Two Quarry Sites in Banashankari

Quarrying activity had been discontinued more than a decade ago. One of the quarries is abutting the bus stand and the other quarry is abutting the new metro station. Though this part of the city has been dense urban growth over the past 10 years, these two quarry sites have been neglected completely. The quarry site next to the bus stand is completely degraded with water pooling in low lying areas with anaerobic weedy growth and squatter settlement in relatively higher areas in unhealthy living conditions. It's a sore to the eye.



**Fig. 2: Location map of Banashankari quarry site next to bus stand showing the current delapidated status with squatters**

The quarry next to the new metro station also has water pooling at the low lying areas with squatter settlements created by the metro workers. There is a government proposal of converting this land into a park after completion of the ongoing metro work.



**Fig. 3: Location map of Banashankari quarry site next to metro showing the current delapidated status**

### 3.3 M.S. Palya Quarry Near Vidyaranyapura

This quarry site is in the new extensions of Bangalore. Quarrying activity was stopped about 7 years ago. There has been a sudden development and growth of the surrounding area over 5 years with many residential developments mushrooming around the quarry site. Despite this, the quarry site has been neglected. There is water pooling in the quarry site which overflows into the adjacent road network carrying the sludge during monsoon. A thesis has been prepared by a Bangalore based architecture student after thorough study on how this quarry site can be rehabilitated and converted into museum cum recreation centre.



**Fig. 4: Location map of M.S. Palya quarry site showing the urban sprawl and the current status**

### 3.4. Chikkasanne Quarry Near Devanahalli

This quarry site is in the outskirts of Bangalore close to the Bangalore International Airport. The zones around the airport have been identified as sensitive zones, hence the quarrying activity has been stopped over the past few months. The surrounding area is sparse residential development with predominant agricultural activity. Water pooling is noted in the low lying area. The same can be further developed into a water body with the construction of check dams at appropriate location to help store water which can be used for irrigation purpose for the agricultural lands in the vicinity. The overflow rainwater can be channelized to the nearby lake. In some parts of the quarry land growth of pioneer species can be observed. Favorable conditions can be provided for the plant succession to facilitate growth of climax community.



**Fig. 5: Location map of Chikkasanne quarry showing the current status of the site with water pooling and growth of pioneer species**

## 4. CONSERVATION/RECLAMATION OF STONE QUARRY

The term rehabilitation / conservation can be used for the range of activities relating to the remediation of environmental damage to the surface of a quarry site after extraction is completed. The land is to be rehabilitated to a predetermined and agreed standard or land use which conforms to the concept of sustainable development.

The size of the quarry varies from as small as 3 gunthas to about 25 acres. Reclamation / conservation practice varies widely depending on size of quarry, its location, and the applicable legal requirements. Each quarry requires a particular solution depending on the region where it is situated and the context based on the surrounding land use. The following are some of the consideration,

### 4.1 Landscaping

Establishment of storm water retention basins at the lower side of the site will help recharge the groundwater table. An overflow system can be worked out for the quarries with lakes in the vicinity which will help restore ecological balance.

These water bodies can also be converted into fisheries creating an employment opportunity or maybe used for irrigation purpose.

For the future quarries, the topsoil is to be removed and stockpiled at the commencement of quarrying activity. The erosion from the site can be managed to a minimal by construction of radical terraces towards the periphery and lower part of the site and by planting grass to stabilize the soil.

### 4.2 Re-vegetation

Re-vegetation to be made integral part of reclamation activities. The reasons for this are that re-vegetation is the most effective and economic method of stabilizing the soil against erosion assists in re-establishing biodiversity in the reclaimed area and helps ameliorate visual impacts. Plant succession can be identified, pioneer species like algae and moss to be introduced initially to facilitate the growth of serule or secondary succession which develops through increasing complexity until it becomes stable or self-perpetuating as a climax community. Depending on in which belt the quarry is located, the climax community may get regenerated into lush green over decades or may just develop into grasslands or made suitable for agricultural fields. Although the results are not immediate, with a long-term vision, this aids in creating lung space within an urban setup.

### 4.3 Urban Utility

Based on the surrounding land use appropriate land use can be assigned to the degraded stone quarry site. In urban context, the quarry sites can be converted into galleries, museums, recreational spaces, rock gardens, theme parks, lung spaces, multi-level parking areas, public utility spaces, etc. which unifies itself with the urban landscape fabric.

### 4.4 Policy Changes

During the operational phase of a quarry's life, the impact on the environment can be lessened by planning with future closure in mind. By bringing about appropriate revisions in the existing policies, haphazard stone quarrying activity can be controlled. For the ongoing or future stone quarries, it is essential to generate a environment impact assessment report and a feasibility report. The lessee of the quarry to submit a detailed post-mining reclamation measures report before the kick-start of the quarry. This distributes the liability of development/conservation/reclamation of quarry land both between the government bodies as well as the quarry owners. For the existing abandoned sites, the concerned department should carry out a study to identify the appropriate function that can be assigned to the degraded land and measures have to be taken to revive it.

## 5. CONCLUSION

Increasing demand for stone and aggregates had led to extensive uncontrolled stone quarrying operations in

Bangalore district causing increased environmental degradation. Although, stone quarrying contributes towards development, the negative environmental impacts, particularly when the quarrying activity is carried out haphazardly and not as per the prescribed norms and regulations cannot be ignored. With proper monitoring and introduction of post-mining programs at policy levels degradation of land can be controlled for the future quarries. For the already abandoned quarries, initiatives have to be taken by concerned departments to put the land into proper use to create lung space within the district or to create a space of public utility to help conserve the land from further dilapidation.

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