

## Teaching *Rock Heritage* in the Classroom

*Padmini B Patell*



When we think of natural resources, instantly rivers, forests and minerals come to mind - seldom do we include rocks to the list, taking for granted that they are fused with the landscape. We only seem to notice them when they are being quarried or blasted, reducing them to building material. The sight of such an irrefutable loss should prompt us into asking whether destruction is a sensible move - or if there is a way to preserve rocks and the vast ecosystem that is intricately connected with them.

Rocks are naturally-formed solid lumps made up of minerals fused together over a period of time. Geologists classify them on the basis of their formation into *Igneous*, *Sedimentary* or *Metamorphic* rocks. Rocks formed out of molten lava are *Igneous* and include **granite**, **basalt**, etc. *Sedimentary* rocks are formed from other rocks or from the remains of plants or animals, e.g., **sandstone**, **limestone**, etc. *Metamorphic* rocks are those that have been transformed by pressure, heat or fluids into forming **marble**, **quartzite**, and the like.



## IMPORTANCE OF ROCKS

When we come across huge rock formations, mountains and mountain ranges, it's easy to see how their sheer size influences the climatic conditions of a place. They directly affect the rainfall of an area by providing more rain on one side and less in the areas inside the rain shadow zone. Wind patterns too are modified vastly by rocky terrains. Water bodies are often located close to these regions, and aquifers in rocks that form natural storage raise the water table of surrounding areas. Their proximity also contributes to the mineral content in the soil and water, which in turn influences the vegetation of the area. Several medicinal plants grow in the vicinity of rocks which results in the strong therapeutic fragrance that fills the air in these parts. Rocks are home to many different types of insects, animals and birds. In fact, rock formations provided the caves that early men used as their homes or shelters.



Besides these natural advantages, rocks and mountains have always been a source of inspiration to man – be it in the form of literature, art or adventure. Early inscriptions and paintings were found on the walls of various caves and many a poetic verse has captured the beauty of the hills in all seasons. Hilly regions are sought out as getaways as they facilitate abundant options for all. While young people can enjoy treks and a range of rock sports, older people opt for rock walks and senior citizens often benefit from the unpolluted air and serene environment.

The destruction of rocks simply translates into wiping out all of these advantages resulting in an acute ecological imbalance. Can we afford to



disturb nature's rhythm? Have we, as a race, been able to find alternatives to what nature provides? Why then do we not prevent the mindless destruction of rocks for our own selfish interests? These are questions that we should all be asking now before we lose our rock heritage to careless living.

## ROCKS OF THE DECCAN PLATEAU

The Deccan Plateau comprising Andhra Pradesh, parts of Karnataka and Maharashtra are famous for the rock formations that occurred as the result of volcanic activity. These granites formed after cooling down of lava and are amongst the oldest rocks of the world, dated by geologists as 2500 years old. Chronologically they are much older than the dinosaurs and have adorned the Earth before *homo sapiens* made their appearance. In comparison to the Deccan rocks, the great Himalayas are a mere 50 million years younger! The rocks of the Deccan Plateau are collectively responsible for the rich flora and fauna in this region and are instrumental in bringing to these parts the much required monsoon rains. They have added to the aesthetics of the land and been the inspiration of literary legends like *Rabindranath Tagore* and *Sarojini Naidu*. Perhaps due to the proximity of exposure, Andhra Pradesh is the only state to have a registered **Society to Save Rocks** located at Hyderabad. The organization is singularly responsible for scientific rock surveys, spreading awareness about the Deccan's rock heritage, supporting safe rock sports and working with the government for protection of rocky areas since 1996. Because of their unrelenting effort, 24 rock sites have been declared as **Heritage Precincts** by the Government of Andhra Pradesh.

Link to check out: [www.saverocks.org](http://www.saverocks.org)

## OUR ROLE IN ROCK PRESERVATION

There is an urgent need for every individual to consciously participate in rock protection because rocks are a rich natural resource just as much as water or coal. Unfortunately, instead of treating these natural giants as treasures of the world, we indiscriminately destroy them. Ironically, much research goes into the manufacture of drilling machines, stone crushers and gigantic cranes that can pulverize rocks into stone!

Our role is crucial in demanding less modern amenities and integrating natural features of the land into our living spaces. We can build around rocks with a little imagination and use them tactfully to our advantage without causing irreparable damage to the eco-system. Studying the pros of rock preservation and chanting the mantra of '*every stone is precious*' just as every drop of water is, can make a difference. Rock excursions are an opportunity to observe rock



formations first hand and enjoy rocky environments – they provide a natural classroom where learning is limitless in an informal, fun way. Adventure sport not only teaches life skills to children, but it is also used as a corporate training tool to instill the much-needed skills of decision making and team building.

Therefore, rocks in our neighbourhood need to be enjoyed and destruction needs to be curtailed. We don't have to wait until we have no rocks to admire or for the government to ban destruction of rocks to take the first step. If each of us can be a rock activist in our own areas, many a rock can be saved for posterity. Most importantly we need to realize that the world's most advanced technology is still incapable of manufacturing a rock!



***Padmini B Patell*** is a freelance writer based in Hyderabad with a passion for holistic development and concern for the environment. She has been contributing feature articles for Hindu's Metro Plus and Young World supplements. Her interests are varied covering education, environment, innovation, heritage, art, social awareness, health and well-being.

## Lesson Plan on Teaching *Rock Heritage* in the Classroom

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### OBJECTIVES

- a. Instil a deep respect for preservation of natural resources, particularly rocks.
- b. Understand that all components of nature are interdependent and they influence sustainable human development.

### TEACHING IDEAS

*For middle school students:*



- Preparing charts on different rock-related topics and putting these up with photographs of rocks and plants on campus for easy recall and abundant viewership.
- Classifying rocks and stones in the school premises.
- Detailing of plant life that is present near the rocks.

- Locating water sources close to the rocks.
- Marking maps of regions close to the mountains and rock ranges/formations.
- Arranging a rock quiz or rock facts in a fun crossword or as jumbled words.

***For high school students:***

- Connecting rock data to other subjects – the entire class can be divided into groups to prepare a collage or powerpoint presentation and thereby illustrate the various branches related to the study of rocks, e.g.:
  - a. *geology* – study of rocks, classification and uses
  - b. *physics* – building of water reservoirs on hill tops that follows the gravitational principle for easy distribution of water
  - c. *botany* – soil nutrients derived from rocks and their advantage to plants
- Arranging rock walks to rock sites in the vicinity – a journal could be given for observations to be recorded.
- Undertaking projects on preservation of rocks in human spaces with examples of integrated architecture – students can identify offices, hotels and residences that have incorporated rocks into the civil construction for both aesthetic and conservational purposes.
- Organizing annual study tours with a focus on rock ecology and its direct effect on human life.
- Organizing essays and debates on rock-related issues such as “*Preserving rocks versus destroying rocks*”.
- Having treks and adventure sports clubbed with a guided study of flora and fauna.
- Dabbling in rock art – sketching, detailing, painting, poetry and storytelling, all on rock-related themes.



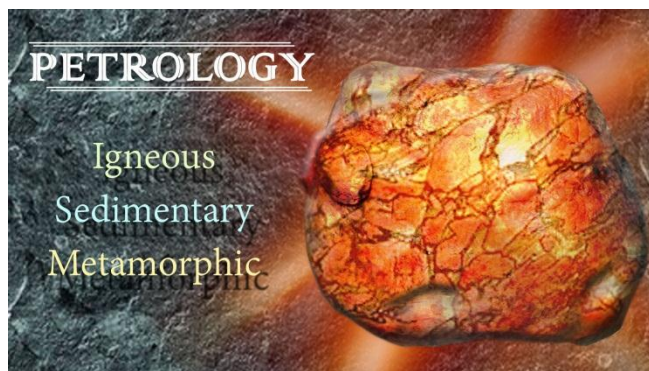
## BENEFITS OF ROCK STUDY

- ✓ Developing students who can be environmentally responsible citizens with the clear understanding of the advantages of rock preservation to human life.
- ✓ Motivating youth to pursue rock adventures, both for health and pleasure, while conserving natural resources.
- ✓ Encouraging creative minds that can envision and maintain the ecological balance of the region to man's advantage.



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## Words Section



### **Petrology (noun)**

#### **Meaning**

- The branch of science concerned with the origin, structure, distribution and composition of rocks.

(Oxforddictionaries.com)

**Origin (and additional information)**~ The term's first known use was in the 1811; from the Greek *petra*, meaning *rock* and *logos*, meaning *study*.

Petrology utilizes the classical fields of mineralogy, petrography, optical mineralogy, and chemical analyses to describe the composition and texture of rocks. Modern petrologists also include the principles of geochemistry and geophysics through the study of geochemical trends and cycles, and the use of thermodynamic data and experiments to better understand the origins of rocks.

There are three branches of petrology, corresponding to the three types of rocks: *igneous*, *metamorphic*, and *sedimentary*, and a fourth one dealing with experimental techniques:

- Igneous petrology*** focuses on the composition and texture of igneous rocks (rocks such as *granite* or *basalt* which have crystallized from molten rock or magma). Igneous rocks include volcanic and plutonic rocks.
- Sedimentary petrology*** focuses on the composition and texture of sedimentary rocks (rocks such as *sandstone*, *shale*, or *limestone* which consist of pieces or particles derived from other rocks or biological or chemical deposits, and are usually bound together in a matrix of finer material).
- Metamorphic petrology*** focuses on the composition and texture of metamorphic rocks (rocks such as *slate*, *marble*, *gneiss*, or *schist* which started out as sedimentary or igneous rocks but which have undergone chemical, mineralogical or textural changes due to extremes of pressure, temperature or both).
- Experimental petrology*** employs high-pressure, high-temperature apparatus to investigate the geochemistry, and phase relations of natural or synthetic materials at elevated pressures and temperatures. Experiments are particularly useful for investigating rocks of the lower crust and

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upper mantle that rarely survive the journey to the surface in pristine condition. They are also one of the prime sources of information about completely inaccessible rocks such as those in the Earth's lower mantle and in the mantles of the other terrestrial planets and the Moon. The work of experimental petrologists has laid a foundation on which modern understanding of igneous and metamorphic processes has been built.

### **Usage ~**

- i. *We combine field relations, structural geology, petrology and geochronology to interpret the tectonic evolution of the Himalayas.*
- ii. *Very detailed studies are done by cutting thin sections of the rocks and examining their mineral composition and small-scale structures under a petrological microscope.*
- iii. *The volume will be of general interest to geo-chronologists and metamorphic petrologists.*

**Derivatives** ~ *petrologic*, adjective; *petrological*, adjective; *petrologist*, noun