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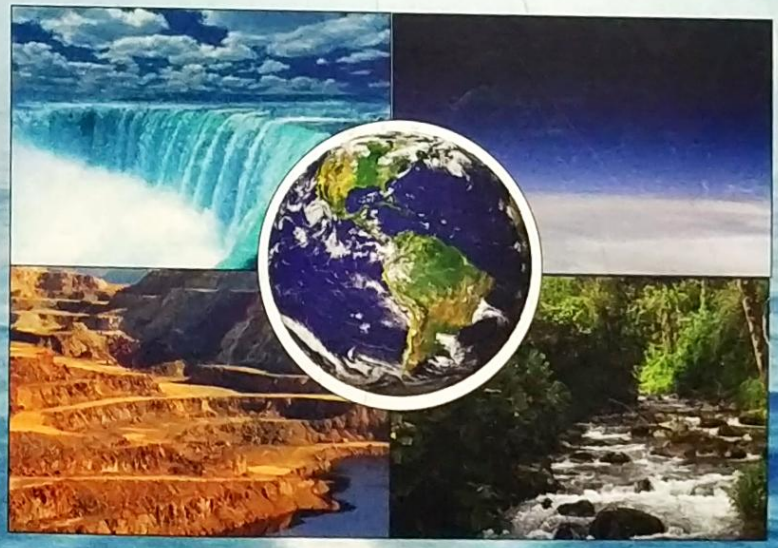

Organised by

P. G. Dept. of Geology
Govt. College Sundargarh

in association with

Alumni Association of Geology (AAG)
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to commemorate the starting of the M. Sc. course in Geology

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STUDY OF SEDIMENTARY STRUCTURES AND RECONSTRUCTION OF PALAEO-DEPOSITIONAL ENVIRONMENT OF KANIKA AREA GONDWANA BASIN, HEMIGIRI BLOCK, SUNDARGARH DISTRICT

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EXTENDED ABSTRACT

Kanika area in Sundargarh district of Odisha comes under lower Gondwana Formation. This region constitutes a major part of the Mahanadi Master Basin of Odisha. The basin itself is a museum of sedimentary structures which depict a lot about the hydrodynamic and tectonic setup of the depositional basin. Interpretation of sedimentary structures plays a crucial role in basin analysis and its reconstruction, since they provide valuable information regarding depositional environment. In the study area a variety of sedimentary structures are found, namely, cross-bedding, ripple marks, herring-bone cross-stratification, sandstone dykes and sills, convolute bedding, flame structure, loadcast and many more. The formation of a particular type or set of sedimentary structures in a basin needs a typical depositional environmental condition. Cross-bedding and lamination are unique sets of structures which are formed by the downstream migration of bed forms such as ripple or dunes in a flowing fluid. Shallow depositional environment is favourable for the formation of these structures and generally found in sandstones and have been extensively used to determine the ancient flow direction and velocities. The ripple marks found in the ancient sedimentary rocks provide extremely useful information about paleoflow conditions and paleocurrent directions of the basin. Ripple marks are excellent indicators of the distinctive depositional environments, because they can form under unidirectional currents in both shallow water regime and by stead water current. Herringbone cross-stratification is also observed in the region and signified the tidal depositional environment. Synsedimentary small scale folds are also found at many places in the sandstones and are confined to one or a few layers only. Isolated pebbles, cobbles and boulders of quartzite and granite gneiss are found embedded within fine grained sandstone. Such isolated large stones are supposed to have been dropped from the top into the finer sediments by some external agents, may be by ice sheets. Such stones are often referred to as drop stones and probably they indicate the existence of glacial environment in past.

Key words: Sedimentary structure, paleo-environment, sedimentary basin

OPENCAST IRON ORE MINING AND ITS IMPACT ON FOREST RESOURCE IN JODA-BARBIL REGION OF KENDUJHAR DISTRICT, ODISHA

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EXTENDED ABSTRACT

Forest and minerals are the most important natural resources for the existence and progress of the human society on the earth. Forest provides the necessary life support system for the biosphere and mineral resources promoted the economic growth of the nations. Coincidentally mineral resources and forest exist together in most of the places. With passing of time our need of mineral resources has so much increased that forest is getting destroyed to a large extent due to exploitation of minerals and ores. The situation has so much worsened in some areas that environmentalists are now apprehensive about the coexistence of forest and mineral resources and in fact the matter has emerged as a new challenge before the resource managers. Since the economic growth of a country is highly depending on utilization of the available mineral deposits, how to maintain a balance between exploitation of mineral resources and also protect the forests is a million dollar question. Joda- Barbil region of Keonjhar district of Odisha is blessed with huge reserve of high grade iron and manganese ores but within the area which is thickly forested. Since the economic development of Odisha is also dependent on the exploitation of existing mineral resources of this belt, mining activities have been intensified over the last one and half decade. At present mining activities are going on over an area of 1000 km^2. In order to keep pace with the demand of the iron ore in the iron and steel industry, there is demand to increase the lease area for mining more quantity of ore. Open cast mining, in particular, by which the iron and manganese ore are exploited is a complex system of operation, where exploration, excavation and mineral processing take place simultaneously. These activities directly infringe upon and affect other natural resources like land, water, soil, air, flora and fauna. As the mining activities are increasing, eventually the forest cover of the region gradually depleting. To understand the quantum of loss of the forest cover due to mining, a study was undertaken. Remote sensing and GIS methods have many advantages in such studies and hence was employed in the present study. For the purpose Landsat TM and ETM+ data have been used. For TM, the sensors have a spatial resolution of 30 meters for bands 1 to 5, and band 7, and a spatial resolution of 120 meters for band 6. The ETM+ has an additional panchromatic band with 15 meters spatial resolution. At first the Landsat satellite images were orthorectified using RPC polynomial method. Then satellite metadata based conversion was done to convert the raw DN values to reflectance value. After image calibration, landscape changes were identified in the images. Various image interpretation techniques like (MNF) transformation, RPC orthorectification, Image Classification, Spectral Angle Mapper (SAM), Image Ratio Method, Normalized difference vegetation index (NDVI) were applied to estimate the rate of forest loss. It has been ound that the dense forests and croplands have declined steadily over the past 20 years; however, the fallow lands have increased. In 1995, the forest area was 357 sq km covering almost 75 % of the study area but the forest area declined to 228 sq. km in 2010 (i. e. 47 % loss in the study area). It has also been found that the fallow land has increasing rapidly from 34.11 sq km (7.16 %) in 1995 to 160.46 sq km (33.68 %) in 2010. Basically, the mining activities have transformed a forest bio-diversity rich area to a degraded fallow land. Two types of forest cover loss, i.e., direct and indirect loss, could be known from the analysis. The direct loss is due to mining activities. In five years from 1995 to 2010 the loss is estimated to be 23.28 sq. km. In the second type, i.e., in indirect loss, is mining induced. The only solution to this problem, i.e., keeping a balance between mining of minerals and forest resources is through compensatory forest development work, which should be mandatory for the mine owner and other stake holder.

Key words: Forest resources, mining of minerals, remote sensing and GIS

EVOLUTIONARY HISTORY OF THE SUPRACRUSTAL SEQUENCE OF PAL-LAHARA AREA

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EXTENDED ABSTRACT

The supracrustal sequence of Pal-lahara area has attracted the attention on many geoscientists but the structural geology of the rocks as well as their stratigraphy has not yet been worked out properly. Systematic geological mapping was done to obtain information regarding the distribution of different rock types around Sahar-gurujang village to understand the geological history of the region.

A variety of structural features are preserved in the meta-sedimentary and meta-igneous rock of the study area. Based on the superimposition characteristics of the structural features the chronology of deformational events have been or built-up. Igneous rocks encountered belong to four broad categories: granitc rocks, basic rocks, quartz vein and volcanic. Two varieties of granitic rocks which differ in grain size, colour, mineralogical composition, texture and structure occur around Sahar-gurujang. The granitic rock exposed around Shrirampur village is medium to coarse grained, grey . with strongly developed gneissosity. The dominant constituents are quartz, plagioclase, small amount of K-feldspar (microcline) and hornblende. Iron oxide, epidote and zircon are the accessory minerals. Evidence of three phases of deformation are preserved in the rock. First phase deformation (D_1) produced gneissosity which is cut across by pegmatite veins. The pegmatite veins along with the gnissosity got folded during second phase deformation (D_2). Narrow shear zones were produced during third phase deformation (D_3). The other variety of granitic rock is pink, strongly foliated and contains strips and bands of biotite schist and amphibolite as enclaves. The major constituents are quartz, plagioclase, K-feldspar (both orthoclase and microcline) and biotite. Accessory minerals are hornblende, iron oxide and zircon.

The metasedimentary rocks occur amidst granitic rocks. They preserve a variety of cross bedding structure in different quartzite units which helped to establish the top and bottom of beds as well as building the stratigraphy (Table- 1). Based on colour, grain size and compositional variation, seven lithological units have been mapped and their sequential order from oldest to youngest have been established. A micaceous quartzite horizon expose in the nala section near Sahar-gurujang village where it is intruded by pink granite Gneiss. It is succeeded by quartz-biotite schist, pebbly quartzite and fine grained grey quartzite in succession. Another band of grey quartzite south east of the village which is succeeded by thick bedded quartzite, greenschist and garnetiferous chlorite schist. The metasediments are folded into a synform. The mineralogy suggests the rocks were metamorphosed under upper green schist to lower amphibolite facies condition. Since the contact between the metasediments and the prinl granite is an intrusive one, information about other lihic units below the micaceous quartzite could not be known. Since all the lithic units are quite thick and mappable units each one deserves the status of a member. The seven members together form a Formation, which is named as Sahar-gurujang Formation. It is one of the many Formations of Pal-lahara Grou which cover a vast area .