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CELEBRATING 60 YEARS The Indian Mining & Engineering Journal

Contents

02. The IME Journal Readers' Forum
02. Persons in the News
03. Indian Mining Industry News
07. Book Review

Technical Papers

08. Delineation of Fluoride Incidence areas in parts of Baliapur Block, District Dhanbad Jharkhand Using Geospatial Techniques
Bijay Singh, Shashank kumar & Pramod kumar Singh
16. Blasting Performance By Solid Blasting
Amit Kumar & G.K Pradhan
19. Geological and Geotechnical Investigation of Latratu Dam, Ranchi District & Its Urban Water Supply Utilization Potential
Pradeep Kr. Adhikari
25. Clean Coal Technology as a key to Solving the Problem of Energy Security in Indian Context
Vishnu Kumar Dubey & S. Das Gupta
30. Geospatial Mapping of Geotourism Hotspots in Latehar District, Jharkhand
Santosh Kumar, Dr. Bijay Singh, Dr. Sharad Tiwari & Dr. Kiran Jalem
37. Geological Aspects of Smart City Ranchi, Jharkhand
Bijay Singh & Amaresh Chandra Mishra

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Persons in the News

Sri Satya Narain Kapri is set to be the next Director (Technical) of South Eastern Coalfields Limited (SECL), a PSU under the Ministry of Coal. Presently, he is serving as General Manager in the same organisation. Sri Satya Narain Kapri is a Btech (mining) graduate from ISM Dhanbad in the year of 1987 and joined SECL in August 87 at Hasdeo Area. He worked as Jet (Mining),Asst. Manager, Colliery Manager, Subarea Manager, General Manager (opr), and Area General Manager and General Manager (production) at Hasdeo Area, Baikunthpur Area, Bhatgaon Area, Johilla Area, and SECl HQ respectively. Apart from this he also worked at ECL as an agent at Kenda sodepur Area and AM (PC&D) at Rajmahal Area.

Indian Mining Industry News

COAL NEWS

INDIA'S GENCOS SAW 92 LAKH TONNES OF COAL IMPORT DURING APRIL-JUNE, SAYS POWER MINISTER

During the April-June period, India's power generating firms imported 92.07 lakh tonnes of coal, according to the Union Power Ministry. Union Power Minister RK Singh informed the House that the Ministry had advised all gencos to complete placement of awards for import of coal before May 31, 2022, to avoid trouble before the onset of the monsoon season. "Ministry of Power (in April) advised Central Gencos, State Gencos and Independent Power Producers (IPPs) to import coal for blending purpose during 2022-23," Singh's reply said.

Of the 92.07 lakh tonnes of coal imported during the April-June period, 57.17 lakh tonnes were imported by central gencos, 28.85 lakh tonnes were imported by IPPs and 6.05 lakh tonnes were imported by state gencos. State-owned power giant NTPC and the NTPC-JV (joint venture) imported 49.3 lakh tonnes of coal. As of July 14, India's domestic stock is at 23.126 million tonnes - 40% of the stock requirement for July 2022 - down from 24.18 million tonnes on March 31.

According to Singh, the all India average gap between energy requirement and supply for April-June was 1%. In another reply, the Power Minister informed the House that state gencos have been sanction a Rs 3,700 crore loan for the purchase of coal. Of that amount, Rs 1,800 crore is destined for the Maharashtra State Power Generation Company Ltd.

COAL INDIA TO ENGAGE MDOS IN 14 MINES

In a bid to ramp up its production, Coal India is implementing a plan for operationalising 14 mines through the engagement of mine developer and operators (MDOs), a top official said. These mines have a combined capacity of 165.58 million tonne per annum. Addressing its shareholders in the company's latest annual report, Coal India Chairman and Managing Director Pramod Agrawal said, "These mines would contribute in sizable quantities towards production in the coming years. Of these, 10 are opencast projects with a total projected capacity of 161.50 million tonne per annum and four underground projects with a total capacity of 4.08 million tonne a year." Elaborating on the plan, he said a letter of acceptance has been issued to six of the successful bidders for these MDO projects, having a total capacity of 96.74 million tonne per annum. Tenders for seven more projects (five opencast and two underground) with a combined capacity of 58.84 million tonne per annum have been floated, Shri Agrawal said.

Coal India has set a target of 700 million tonne production in the 2022-23 fiscal and proposed a capital expenditure of Rs 16,500 crore. The miner also informed its shareholders that 42 projects are running behind schedule due to delays in statutory clearances and related issues. It had undertaken 117 coal projects with a sanctioned capacity of 918.86 million tonne and a capital of Rs 1,32,634 crore. These are in various stages of implementation. Out of which, 75 projects are on schedule and 42 are delayed, the company said in its annual report for 2021-22 (FY'22).

The largest coal producer in the world completed five projects with a sanctioned capacity of 12.60 million tonne and a capital investment of Rs 1,769 crore during FY22. Agrawal stated that Coal India has remained committed to provide energy security to the country by attaining environmentally and socially sustainable growth through best practices from mine to market and will emerge as one of the global players in the primary energy sector.

MINING NEWS

CLOSURE OF VEDANTA'S COPPER UNIT AT THOOTHUKUDI RESULTS IN RS 14,749 CRORE LOSS TO ECONOMY: REPORT

The shutting down of Vedanta's copper smelter plant at Thoothukudi, Tamil Nadu since May 2018 has resulted in a consolidated loss of around Rs 14,749 crore to the economy, according to a report. The report comes a month after Vedanta putting on sale its copper unit which was shut four years ago after 13 people were killed in a police firing on protestors agitating against alleged pollution by the unit. According to a synthesis report by CUTS International, "Through the data collected and analysed for the purpose of this report, the consolidated loss to the economy owing to closure of the copper plant on all stakeholders is estimated to be around Rs 14,749 crore since its closure in May 2018." The cumulative loss for the entire period of plant closure is roughly around 0.72 per cent of the State Gross Domestic Product (SGDP) of Tamil Nadu.

The report further said that closure of plant has amounted to a loss of around Rs 4,777 crore to the company. The government is also losing considerable revenue in the form of taxes and duties, said the report which was carried out with the financial support of NITI Aayog and conducted by Consumer Unity & Trust Society, Jaipur. These grave economic impacts on the varied stakeholders offers a pressing need to find better alternate remedies to balance matters concerning the development-environment conflict in the instant matter, it said.

The Tamil Nadu government had ordered the permanent closure of the unit in the port city of Thoothukudi in May 2018 following violent protests. The company had in past repeatedly denied allegations of its plant polluting the local environment and had moved the Supreme Court for the opening of the unit. But the apex court had so far not given a clear go-ahead. A company spokesperson had said the Tuticorin plant is a national asset that has been catering to 40 per cent of the domestic demand for copper and has played an integral role in the country's self-sufficiency in copper.

NLC INDIA BOARD APPROVES INVESTMENT PROPOSALS WORTH RS 14,945 CRORE

NLC India Ltd on Thursday said its board has approved investment proposals worth Rs 14,944.91 crore for setting up power and mining projects in Tamil Nadu. The company, which comes under the coal ministry, plans to invest over Rs 43,000 crore in various power and mining projects. According to a regulatory filing, the company's board of directors has approved the investment proposal for establishing Mine III (peak Capacity-11.50 MTPA & Normative capacity- 8.71 MTPA) at Neyveli, Tamil Nadu at an estimated cost of Rs 3,755.71 crore. The board has also given its go-ahead to the investment proposal to set up "TPS II 2nd Expansion Thermal Power Station (2 X 660 MW) at Neyveli, Tamil Nadu at an estimated cost of Rs 11,189.20 crore".

NLC India has presence in TamilNadu, Rajasthan, Uttar Pradesh, Odisha, Jharkhand and Andaman and Nicobar Islands. The company operates three opencast lignite mines of total installed capacity 28.50 Million Tonnes Per Annum (MTPA) at Neyveli, one opencast lignite mine at Barsingsar in Rajasthan with an installed capacity of 2.10 MTPA and an open cast coal mine at Talabira in Odisha with an installed capacity of 20 MTPA. It also operates four lignite based pit-head thermal power stations with an aggregate capacity of 3,390 MW at Neyveli and one 250 MW lignite based thermal power station at Barsingsar, Rajasthan. A 1,000 MW coal-based thermal power station is also in operation at Thoothukudi, Tamil Nadu through its subsidiary company, NLC Tamilnadu Power Ltd (NTPL), a joint venture between NLCIL and TANGEDCO.

FORMATION OF LARGE MINING CONGLOMERATE TO ENHANCE CAPACITY, BOOST GDP: HINDUSTAN COPPER CMD

Hindustan Copper CMD Arun Kumar Shukla has pitched for the formation of a large mining conglomerate with a basket of minerals to ensure the country's self-reliance in strategic minerals. Shukla suggested this to the government at a round-table discussion held during the 6th National Conclave on Mines and Minerals.

"I, from my 37 years of mining experience, recommend formation of a large Indian mining conglomerate having multi-mineral portfolio, which will enhance the capability of the country in respect of geostrategic reach, sustainability, socio-economic development of the backward mining areas" he said. He said with the setting up of a large company, the sector will be able to ensure "ESG compliance, smooth transition to climate-neutral economy, profitability and resilience to withstand the ever-changing dynamic global market situation".

Besides, "more virgin mines will come into production and will give a huge boost to India's GDP," he added. Shukla is of the view that the key to success of global multinational mining firms like Rio-Tinto and BHP is having a basket of minerals under one company. He said the formula has been working successfully world over and is time-tested. In the proposed concept, he explained, the existing domestic mining PSUs (Public Sector Undertakings) like MOIL, HCL, KIOCL and NMDC, which own mines and operate in only certain minerals having a large pool of expertise of human resources in the field of mining and exploration, can be further strengthened through amalgamation.

This, he said, would maintain sustainable sourcing of important minerals from within the country as well as from overseas through acquisition of foreign mining assests. PSUs like SAIL and Nalco, which have their processing plants, can be given mines for their captive use. On the other hand, the proposed mineral conglomerate will supply raw materails to the efficient manufacturing units that do not have sufficient mining rights or captive mines, he suggested. According to Shukla, the setting up of a large Indian mining conglomerate will give a boost to exploration and mining sector's contribution to the country's gross domestic product.

INDIA'S STEEL OUTPUT GROWS 6 PC TO 10 MT IN JUNE: WORLDSTEEL

India's crude steel production rose over 6 per cent year-

on-year to 10 million tonnes in June 2022, according World Steel Association. As per the World Steel Association (worldsteel) data, India is the only country which has registered a positive growth in its steel output during June. The country had produced 9.4 million tonnes (MT) crude steel during the same month last year, the global industry body said in its latest report.

India is world's second largest producer of crude steel after China which produced 90.7 MT in June 2022, down 3.3 per cent over its 93.9 MT production in June 2021. The production in the United States fell by 4.2 per cent to 6.9 MT last month from 7.1 MT in the same month of 2021. Russia -- which has been engaged in a conflict with Ukraine is estimated to have produced 5 MT, down 22.2 per cent over 6.4 MT a year ago.

Russia has registered the highest fall among top 10 steel producers. While South Korea registered a 6 per cent fall to 5.6 MT, Germany produced 3.2 MT, down 7 per cent year-on-year. In June 2022, Turkey produced 2.9 MT crude steel, down 13.1 per cent, and Brazil is estimated to have produced 2.9 MT, registering a fall of 6.1 per cent. Iran is estimated to have produced 2.2 MT, down 10.8 per cent.

Brussels-headquartered worldsteel having members in every major steel-producing country, represents steel producers, national and regional steel industry associations, and steel research institutes. worldsteel members represent around 85 per cent of global steel production.

INDIA'S FINISHED STEEL EXPORTS GROW 25% TO 13.49 MT IN FY22; IMPORTS FELL 1.68% TO 4.67 MT

The exports of finished steel from India jumped over 25 per cent to 13.49 million tonne (MT) in 2021-22, Union Minister Faggan Singh Kulaste said Wednesday. During the preceding 2020-21 fiscal, the exports stood at 10.78 MT, the Minister of State for Steel said in a reply to the Lok Sabha. The imports fell to 4.67 MT in 2021-22 from 4.75 MT a year ago, a fall of 1.68 per cent, according to Kulaste. "Government has taken various steps to increase the availability of iron ore and make them available at reasonable prices, which, inter-alia, including Mining and Mineral Policy reforms to enhance production/availability of iron ore," he said. In the Union Budget 2022-23, the basic customs duty (BCD) on steel scrap has been exempted up to March 31, 2023. The government also made modifications in tariffs on raw materials of steel and other steel products vide notification dated May 21, 2022, wherein import duty on anthracite/pulverised coal injection (PCI) coal, coke and semicoke and ferronickel has been reduced to zero. Export duty on iron ores/concentrates and iron ore pellets has been raised to 50 per cent and 45 per cent, respectively, and a 15 per cent export duty has been imposed on pig iron.

EESL TO INVEST RS 150 CRORE FOR UPSCALING ENERGY EFFICIENCY PROJECTS

Energy Efficiency Services Ltd (EESL) will invest Rs 150 crore for upscaling 100 energy efficiency projects in different industrial units of various sectors. "With the aim to augment the use of energy efficiency solutions in the industry sector, Energy Efficiency Services Limited (EESL), a joint venture under the administration of ministry of power, will invest 150 crore for upscaling 100 energy efficiency projects in different industrial units of various sectors, notified under the PAT (Perform Achieve and Trade) scheme of Bureau of Energy Efficiency (BEE)," a statement said. This investment will be part of the EESL's Demonstration of Energy Efficiency Project (DEEP). The project is aimed at implementing innovative energy efficiency technologies and deploy large scale energy efficiency measures in the industries covered under PAT scheme. Together with EESL, BEE plans to bolster industries by creating an ecosystem, which not only provides support in meeting their allocated Specific Energy Consumption (SEC) reduction targets under the PAT scheme, but also supports market transformation for innovative technologies and bring substantial investment in this endeavour.

Under the project, BEE and EESL with their collaborative approach and expertise, aim to deploy eight innovative energy efficiency technologies in PAT industries. For this, 27 demonstrations will be held across the country. In a bid to create awareness around this project, EESL and BEE also organised a workshop in association with Gujarat Energy Development Agency (GEDA) and State Designated Agencies of Rajasthan, Maharashtra, Madhya Pradesh and Goa. During the DEEP consultation workshop, key dignitaries from BEE, EESL, GEDA, Climate Change Department (CCD), government of Gujarat, shared insights about the importance of energy efficient technologies. Girja Shankar, head (CDP), said, "EESL's programmes have made a significant contribution in upscaling India's energy efficiency portfolio. Through DEEP, we will continue our concerted efforts to help the country meet its climate action goals with widespread adoption of innovative technologies. EESL will also organise a similar workshop on 20th July 2022."

Ravi Shankar Prajapati- Joint Director (BEE), said, "Perform, Achieve and Trade (PAT) Scheme is the one of the flagship programmes of BEE to enable a reduction in carbon footprint from industrial sectors. The successful demonstration of these projects will enhance profitability for industries and support them in achieving the PAT

targets."

Inaugurating the first workshop on DEEP project and speaking about the leadership quality of industries from Gujarat, Shivani Goyal - Director (GEDA), said, "Gujarat Energy Development Agency will provide full support and showcase the successful implementation of innovative technologies through the DEEP project. GEDA has demonstrated key accomplishments in renewable energy and energy efficiency programmes of BEE and EESL." During the workshop, EESL explained the details of approved innovative technologies and presented a live demo for submission of expression of interest. The workshop also saw technology solution providers presenting case studies, cost economics and advancement of these technologies during a panel discussion.

JINDAL STAINLESS TO SUPPLY 3,500 TONNES STAINLESS STEEL FOR UDHAMPUR-SRINAGAR-BARAMULLA RAILWAY LINK TUNNEL PROJECT

Jindal Stainless will supply 3,500 tonnes stainless steel for the Indian Railway's Udhampur-Srinagar-Baramulla Railway Link (USBRL) tunnel project coming up in Jammu and Kashmir. In a statement, the company said the project is a 272 km-long railway link between Jammu and Kashmir. This will be the first-ever application of stainless steel cable trays in an Indian railway project, the company said.

"USBRL will be a milestone in improving the economic landscape of J&K. We congratulate Railways on executing the engineering marvel by overcoming various topographical challenges, and appreciate its decision to choose stainless steel for developing a sustainable railway infrastructure," JSL Managing Director, Jindal Stainless, Abhyuday Jindal, said. According to the statement, company's arm Jindal Stainless Steelway Ltd will supply "EN 1.4404/316L (dual certification) stainless steel grade in 2B finish" for the project owing to its high corrosion resistance, high strength-to-weight ratio, and a lower life cycle cost. USBRL has been declared a project of national importance and is the biggest one in the construction of a mountain railway since independence. It is also the highest altitude railway network and the most challenging railway project undertaken by the Indian Railways. The newly constructed railway line will provide an all-weather and reliable connectivity to Jammu and Kashmir.

ULTRATECH TO LEVERAGE COOLBROOK'S ELECTRIC TECH TO REDUCE CO2 EMISSIONS AT PLANTS

Leading cement maker UltraTech on Thursday announced the signing of an agreement with transformational technology firm Coolbrook to explore possibilities to cut CO2 emissions from its cement manufacturing operations. The Aditya Birla group firm has signed a memorandum of understanding (MoU) with Coolbrook to explore electrification of cement kiln heating process, said a joint statement. "UltraTech and Coolbrook shall jointly explore the use of Coolbrook's Roto Dynamic Heater (RDH), an innovative application based on its revolutionary roto dynamic technology, to electrify the cement kiln heating process. Both the companies will collaborate to develop optimal electric process heating solutions for cement manufacturing process replacing fossil fuels," it added.

Helsinki-based Coolbrook's RDH technology can achieve process temperatures of up to around 1700oC with high energy efficiency and can thereby be used in processes that have been considered impossible to electrify. "When powered by electricity from renewable sources, the technology can eliminate CO2 emissions from fossil fuel burning across all major industries. It is the only electric process heating technology in the world with the capability to cut more than 25 per cent of industrial CO2 emissions and over 7 per cent of global CO2 emissions annually," it said.

UltraTech Cement Managing Director Kailash Jhanwar said being a founding member of the Global Cement and Concrete Association, the company has committed to GCCA's '2050 Climate Ambition' to deliver carbon-neutral concrete by 2050. "As part of our RE100 commitment, we aim to meet 100 per cent of our electricity requirement through renewable sources by 2050. Our MoU with Coolbrook is a step to further accelerate our efforts to decarbonise our operations and deliver our sustainability targets," he noted.

Coolbrook Executive Chairman Ilpo Kuokkanen said: "India is one of the most important potential markets for Coolbrook as we want to make a global impact on CO2 emission reductions. Cooperation with India's leading cement producer UltraTech is a significant step in our strategy to decarbonise heavy industry processes globally". UltraTech has taken ambitious targets for reducing GHG emissions (greenhouse gas). It is leveraging green energy as a key enabler for decarbonisation. The company is aiming to scale up its green energy mix to 34 per cent of its total power requirement by 2024. It is doing this by continuously improving energy productivity, scaling up the use of renewable energy and reusing heat from its own operations through Waste Heat Recovery Systems (WHRS). UltraTech currently has 436 MW of green energy capacity, which includes 167 MW of WHRS installed capacity and 269 MW of contracted renewable energy.

Book Review

Mining Techniques: Past, Present and Future
(Year of publication February 17, 2021

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Published by Intechopen, UK (February 17, 2021), Hardcover Edition : 178 pages, ISBN-10 : 1839623683, ISBN-13 : 978-1839623684, Dimensions : 6.69 x 0.44 x 9.61 inches, Pricve : $ 155:-

This publication contains selected papers from experts who have been associated with mining industry. The list of papers include - OPEN ACCESS CHAPTERS include - Open Pit Mining By Awwad H. Altiti, Rami O. Alrawashdeh and Hani M. Alnawafleh; Developments Made for Mechanised Extraction of Locked-Up Coal Pillars in Indian Geomining Conditions By Ashok Kumar, Dheeraj Kumar, Arun Kumar Singh, Sahendra Ram, Rakesh Kumar, Mudassar Raja and Amit Kumar Singh; Ecofriendly Hill Mining by Tunneling Method By Rama Dhar Dwivedi and Abhay Kumar Soni; Reclamation of Soils Degraded by Surface Coal Mining - By Luiz Fernando Spinelli Pinto, Lizete Stumpf, Pablo Miguel, Leonir Aldrighi Dutra Junior, Jeferson Diego Leidemer, Lucas da Silva Barbosa and Mauricio Silva e Oliveira; Polish Experience in Shaft Deepening and Mining Shaft Hoist Elongation, By Pawe³ Kamiñski; Polish Experiences in Handling Water Hazards during Mine Shaft Sinking By Piotr Czaja, Pawe³ Kamiñski and Artur Dyczko; Anchorage Pile Strengthening of Shale Slopes and Cementing Falling Stone Blocks by Mixture of Melted Waste Plastics/Asphalt and Fly Ash for Slope Stability in Asphaltite Open Pit Mining Site in Avgamasya, Þýrnak By Yildýrým Ýsmail Tosun; Specific Solution of Deformation Vector in Land Subsidence for GIS Applications to Reclaiming the Abandoned Magnesite Mine in the East of Slovakia, By Vladimír Sedlák; Coal Burst: A State of the Art on Mechanism and Prevention from Energy Aspect By Xiaohan Yang.

An appreciable effort by Dr Soni who brings with him several years of experience and works at CIMFR.

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Delineation of Fluoride Incidence areas in parts of Baliapur Block, District Dhanbad Jharkhand Using Geospatial Techniques

Bijay Singh* Shashank kumar** Pramod kumar Singh***

ABSTRACT

Geospatial techniques is an important application for creating hydrogeological map and obtaining information of groundwater zones, there quality and groundwater contamination in more accurate and cost-effective manner. Fluoride contamination is a matter of serious concern all over the world, Fluoride is such an ion which is essential, in low concentration that is 0.6ppm to 1.5ppm for healthy development of Tooth and Bones. More than 1.5ppm in water is responsible for large scale dental fluorosis, osteoporosis, Bone deformation and crippling of bones. Baliapur is a town in Dhanbad District which is most densely populated out of 24 districts in the Jharkhand state of India. To be more specific, the objective of this study was to create Geospatial map of Fluoride potential area in part of Baliapur block, Dhanbad District Jharkhand, by using Geospatial techniques.

Keywords:Baliapur, RS-GIS, Fluoride, Dental fluorosis,Groundwater, Satellite Data, Cartosat-1

INTRODUCTION

The value of satellite remote-sensing data in groundwater assessment over the last three decades is obvious (Hoffman et al. 2006). Today's RS-GIS is the essential factor in hydrogeology in any areas of the world where the coverage of detailed geological maps and field data is insufficient. By using RS-GIS in an area a more improved understanding of hydrogeological mapping system can be generated that was earlier difficult. Groundwater is a limited natural resource on the earth and is connected directly to the prosperity of any country (Thapa et al. 2017).

Baliapur comes under District Dhanbad which is one of 24 Districts in Jharkhand state of India.

As of census 2011, Dhanbad is the second-most populated city in the state of Jharkhand. And the population density of dhanbad is 1284 persons per square km which is most densely populated out of 24 districts in Jharkhand. With densely populated district demand of water is also increasing. The quality of water depends on the physical and chemical constituent present in it due to weathering of rocks through which it passes and rock water interaction in which it is being stored. In addition to the geogenic factor and the anthropological activities also controls the quality of water. To be more specific, the objective of this study was to create Geospatial map of Fluoride potential area in part of Baliapur block, Dhanbad District Jharkhand, by using Geospatial techniques.

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THE STUDY AREA

The area for the present study, Baliapur is a town in Dhanbad District, which is located some 17 km from main Dhanbad City, The total area of Baliapur block is 153 km2, having total population of 10,097 of which 5267 were males and 4830 were females. It is bounded by latitudinal extent and longitudinal extent between 23.72150 N, 86.52740 E. The Damodar

river, the most important river of the chotanagpur Plateau flows along the southern border. The area is encircle by coal mines, fertilizer plant, cement plant, coal washeries and stone crushers. The average annual rainfall in the area is about 1250mm, as reported by Indian Meteorological Department Dhanbad. The study area experiences subtropical monsoonal climate characterized by very hot summer from March to May, evenly distributed rainy season from June to September and dry and cool winter from December to February (CGWB 2013).

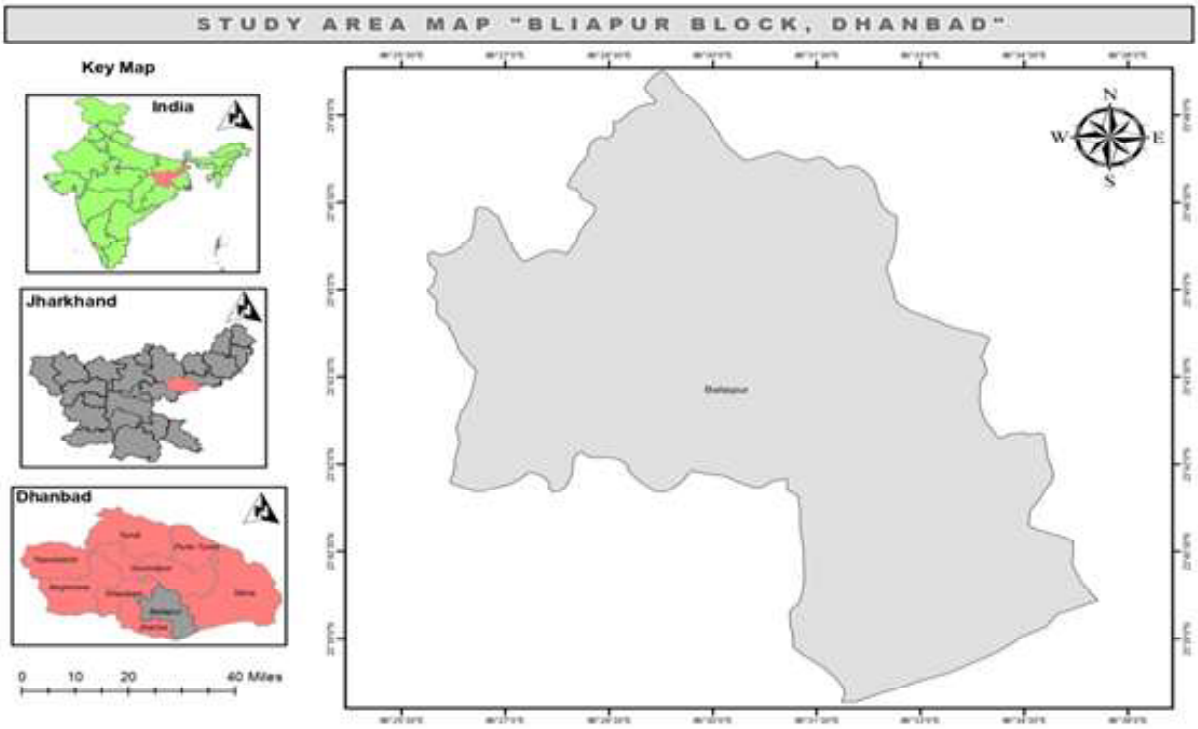


Fig :1 Base Map of the study area

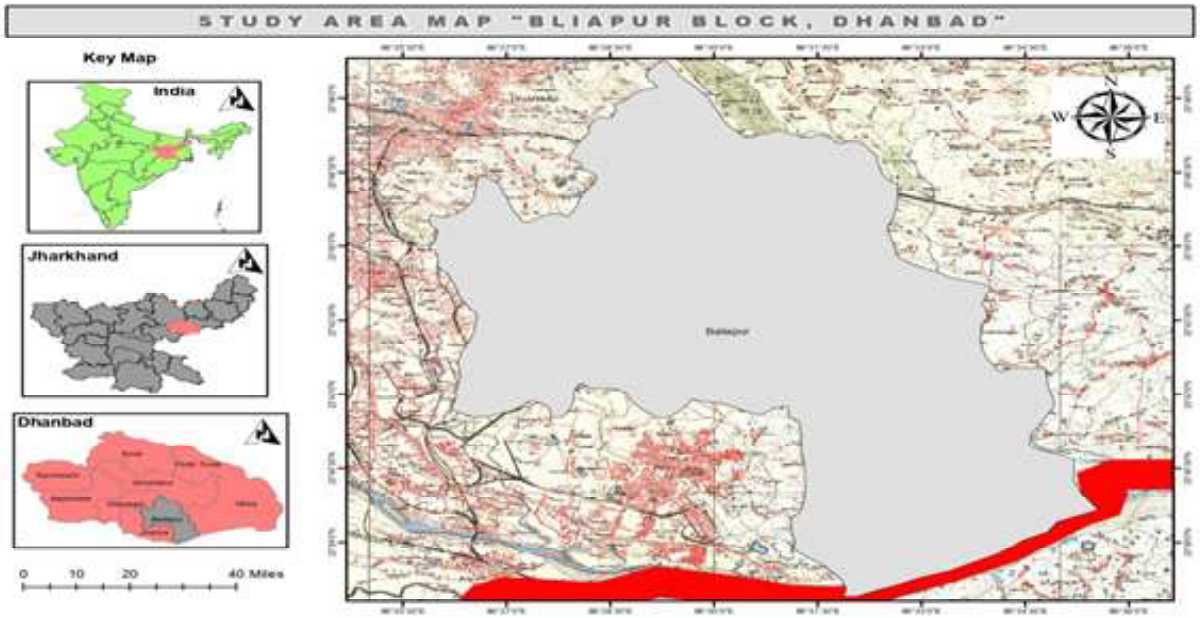


Fig 2: Map of the study area superimposed on toposheet by using RS-GIS

GEOLOGY OF THE STUDY AREA

Geologically, the study area is a part of Chotanagpur Granite Gneissic Complex (CGC), which is overlain by quaternary alluvium. The CGC is a Precambrian granite gneiss primarily composed of feldspathic gneiss, amphibolites, hornblende gneiss, and quartzites. The feldspathic gneiss are widely distributed and are found in association with hornblende gneiss, these have been formed by medium to high grade metamorphism of pre existing rocks at some places. Epidote gneisses are also reported from these rocks which contain mainly hornblende and biotite minerals which are Fluorine bearing (Brindha et al. 2011). These rocks are highly weathered and fractured in the area. Ground water occurs under unconfined conditions in the weathered zone at shallow depths. Under deep seated condition the groundwater occur under confined to semi confined condition but what is significant is that they are unconnected with the top weathered zone.

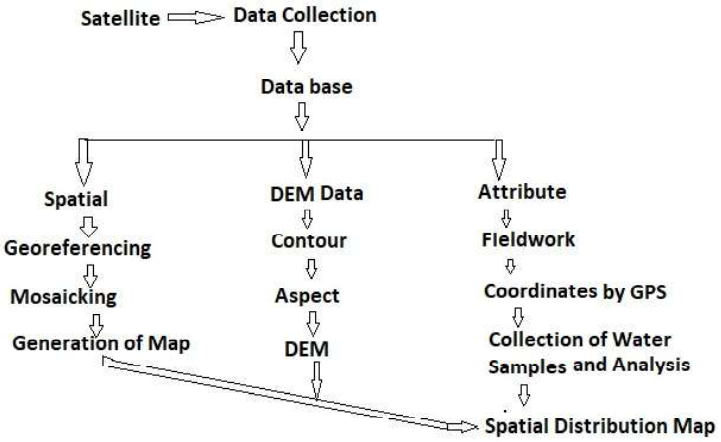
MATERIALS AND METHOD

Satellite images were taken from Cartosat-1 DEM data, Multispectral satellite image data were also taken. GPS device is used for coordinates and the Software's used are ArcGis, ERDAS, MS office, The data related to groundwater quality were taken from paper Kumar *et al* (2021).

Table 3: Shows different tools used

MAP LAYER	DATA USED
Base Map	Toposheet, Satellite Data etc
3D Model/Aspect/ Contour/	Cartosat-1, LISS III, DEM etc
Maps of Fluoride affected areas	GPS Survey and analysis etc,
Software Used	ArcGIS, ArcCatslog, etc.

Table 4: Flowchart work



RESULT AND DISCUSSION

Contour Map is created from Cartosat-1, the distance between the two contours line is 30m. In this contour map Green colour shows the Range between 60 -90m , Light green colour shows the range between 90.1- 120m, yellow colour shows range between 120.1- 140m, Orange colour shows range between 140.1-

160m, and Red colour range between 160.1-240m. Aspect Map is also generated from Cartosat-1 satellite image DEM data, which shows direction in the area, in this Aspect map Green colour shows Direction between 56.929 – 117.684, light green colour shows aspect between 117.685 – 175.614, yellow colour shows aspect between 175.615 – 230.717, Orange colour shows aspect between 230.718 – 291.472, Red Colour shows aspect between 291.473 – 359.293. False Colour Composite Satellite image LIS III Map were created by Multiple Band Satellite Data which constitutes Three Bands, Red colour Band shows Band3Satellite Sensor, Green colour Band shows Band2 Sensor, Blue colour Band shows Band1 Sensor, one more Sensor is used that is near infrared(NIR) Sensor.

Digital Elevation Model(DEM) Map were generated in which Brown colour shows lowest elevation of 52 and Blue colour shows highest elevation which is 245. Fluoride affected area Map were created by Superimposing the data on the Digital Elevation Model(DEM) in which sampling point coordinates and chemical analysis data were plotted. Red colour star marks shows high fluoride concentration beyond the permissible limit (1.5mg/L as per WHO and IS 10500-2012). Where as Black colour marks shows Deficient/ Normal fluoride concentration

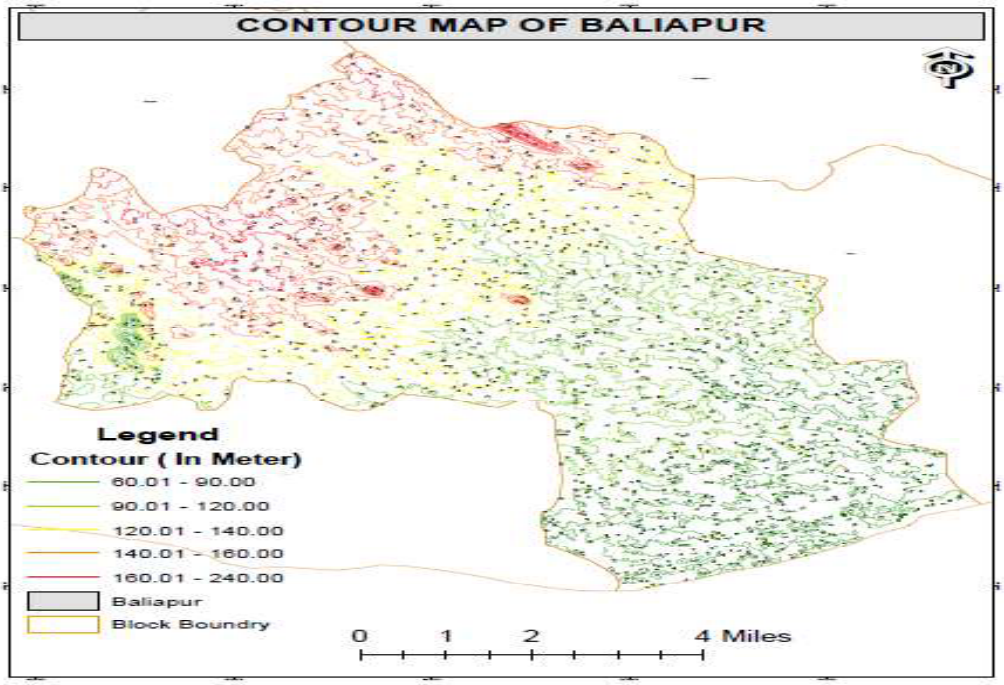


Fig 3: Contour Map of the Area

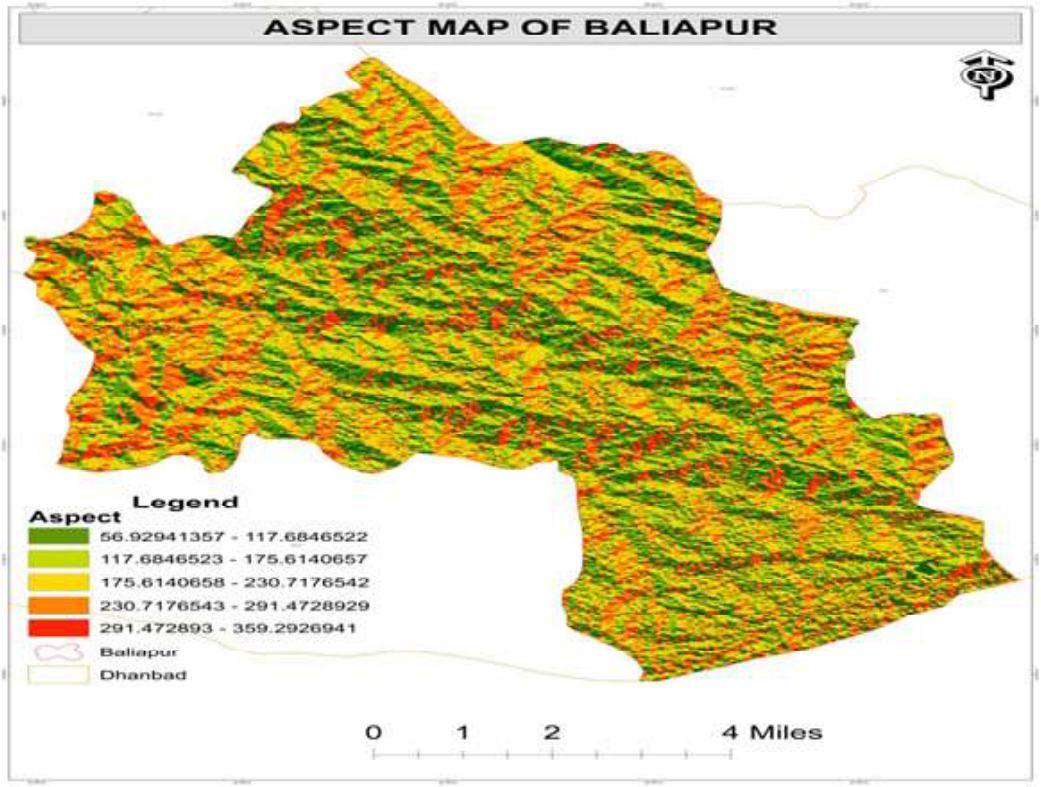


Fig 4: Aspect map of the area

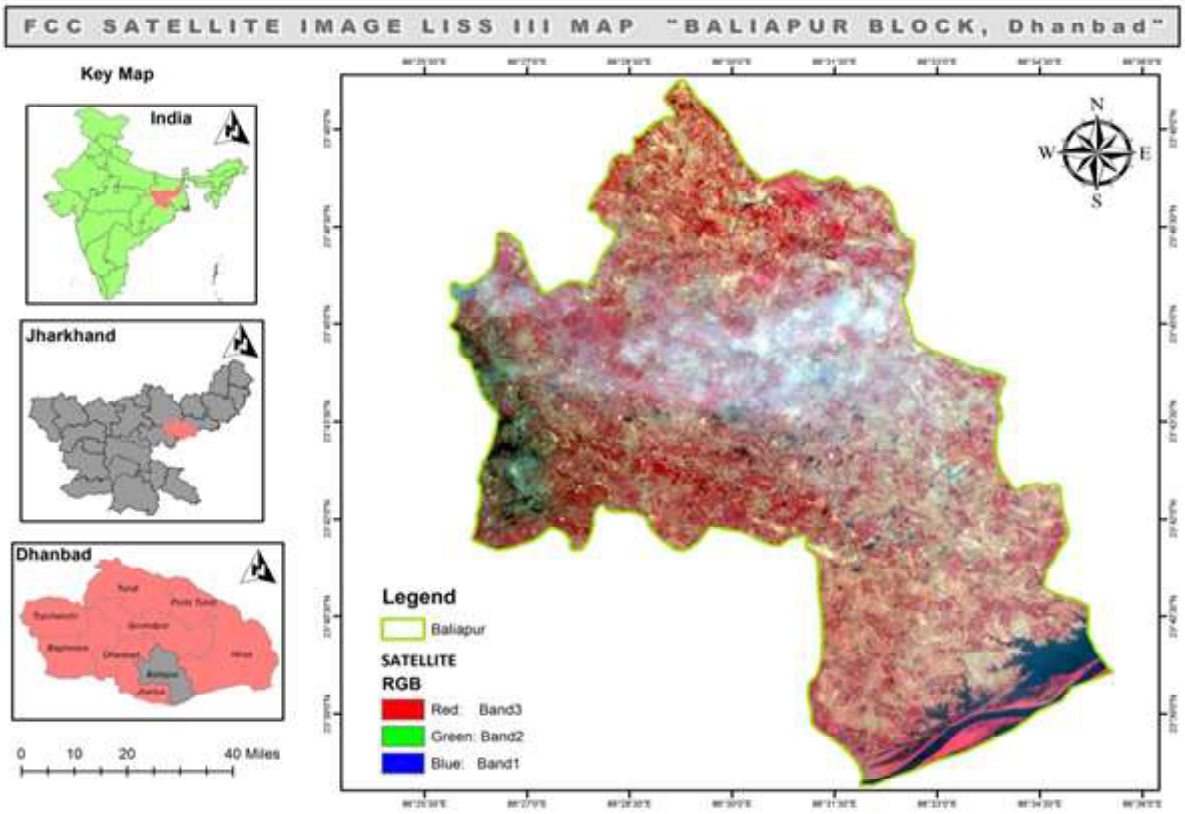


Fig 5: False Colour Copmposite Satellite image LISS III

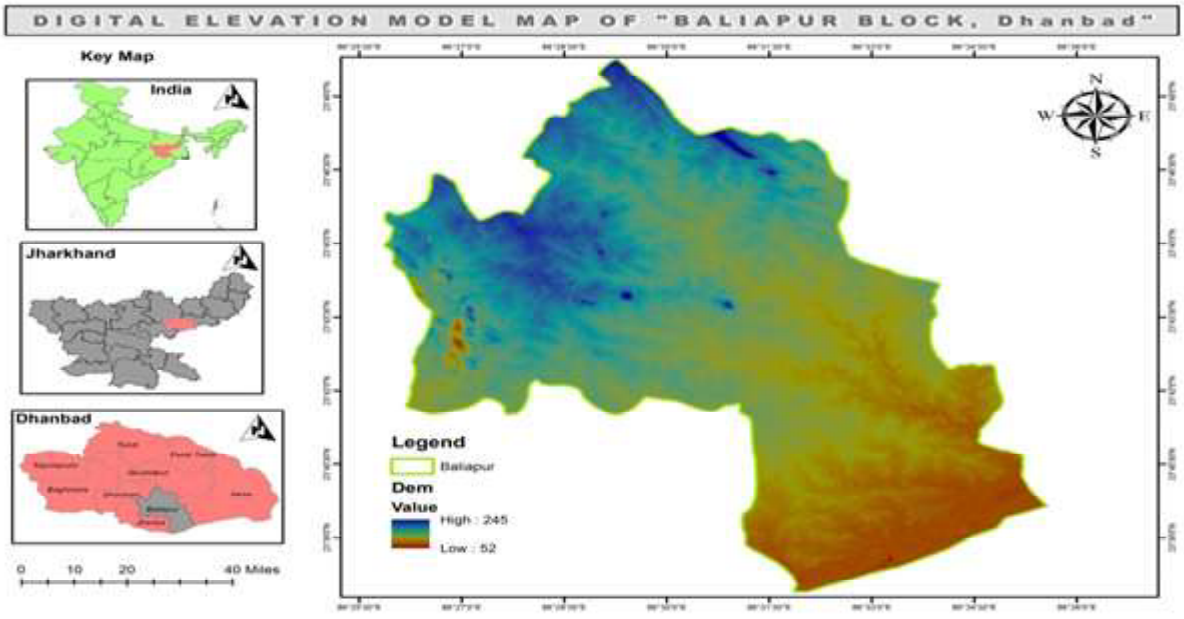


Fig 6: Digital Elevation Model Map of the Area

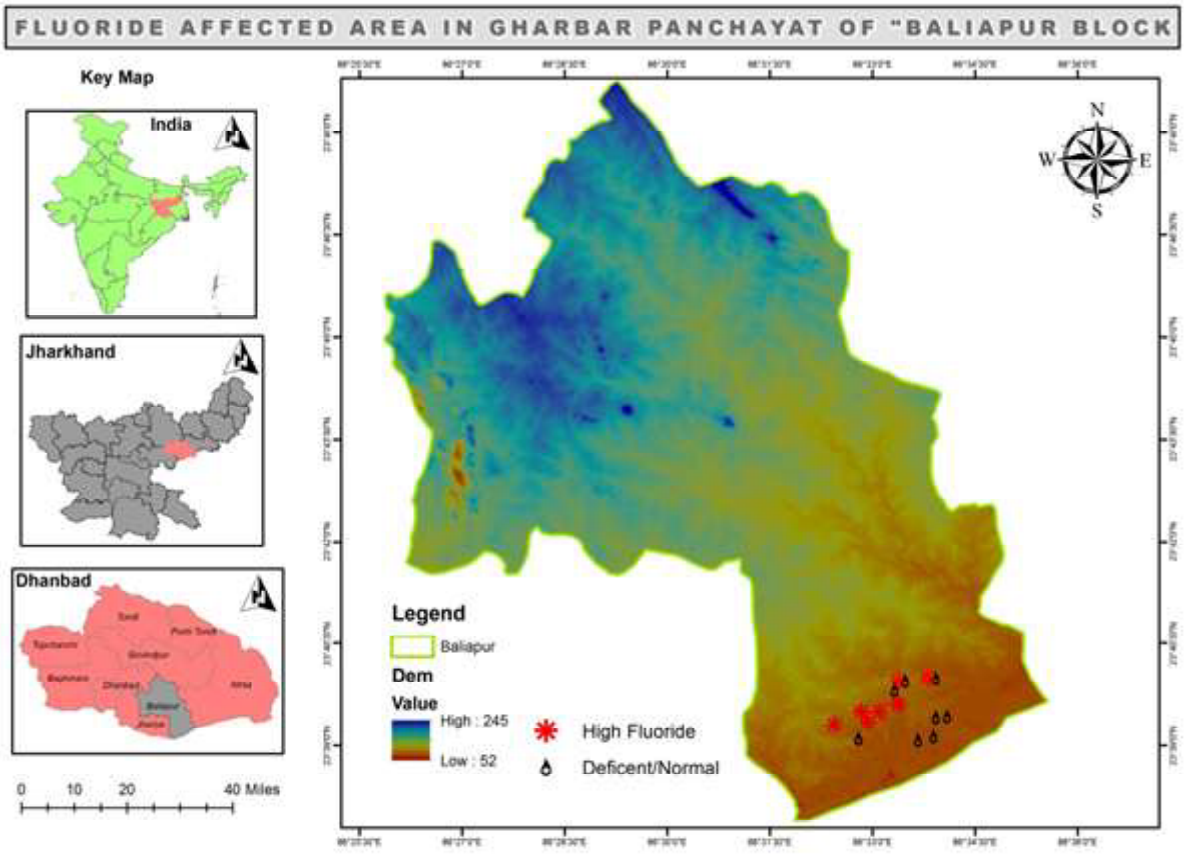


Fig 7: Fluoride affected area Superimposed on DEM Map in Gharbar panchayat of Baliapur block

Table1: Physico- chemical analysis results of parameters of water samples of the study area

Sample Id	pH	EC	TDS	Na+	K+	Mg^{2+}	Ca^{2+}	F^-	Cl^-	HCO_3^-	SO_4^{2-}	NO_3^-	PO42-
L1	6.4	620	970	363.3	12.9	19.6	112.6	1.58	395.3	368.2	113.6	116.4	5.7
L2	6.5	680	1070	568.7	13.3	28.7	156.6	1.18	380.4	185.2	196.9	314.1	4.1
L3	6.8	530	590	202.8	13.4	8.2	24.7	0.8	61.3	380.4	33.8	56.1	1.9
L4	6.6	630	890	361.7	12.2	22.5	103	1.68	325	343.8	173.9	197.3	5.6
L5	6.8	450	490	154.7	13.3	8.9	50	1.08	76.5	331.6	31.1	52.4	2.1
L6	7	400	430	121.6	11.5	8.5	19.5	1.28	78	282.8	27.8	37.6	1.3
L7	8.4	510	460	160.2	9.7	2.3	11.2	15.5	167.3	343.8	48.4	44.7	6.2
L8	8.3	450	390	336.9	28.3	1.5	24.8	17.3	39.1	87.6	19.3	29.1	1.1
L9	6.8	600	780	236.2	13	16.2	44.3	0.5	90.4	478	32.4	112.2	4
L10	7.6	710	680	713	11.8	3.4	21.2	10.4	241.3	209.6	72.2	40.2	1
L11	6.7	610	700	291.4	10.9	9.1	29.7	0.7	53.6	343.8	55	72.4	3.1
L12	6.7	470	550	122.6	12.7	8.1	35.1	0.5	36.7	307.2	25.2	51.5	3.1
L13	7.1	530	650	203.2	13.5	12.3	33.8	0.6	60.4	417	27.9	102.7	1.1
L14	6.9	560	670	473.6	14.9	8.4	20.8	2.28	156.4	356	45.9	43.6	6.5
L15	7.2	755	850	638.7	10.6	2.9	17.9	11.8	132	124.2	53	32.6	3.9
Avg.	***7.06***	***567***	***678***	***329.91***	***13.47***	***10.71***	***47.01***	***4.48***	***152.91***	***303.95***	***63.76***	***86.86***	***3.38***
Max.	***8.4***	***755***	***1070***	***713***	***28.3***	***28.7***	***156.6***	***17.3***	***395.3***	***478***	***196.9***	***314.1***	***6.5***
Min.	***6.4***	***400***	***390***	***121.6***	***9.7***	***1.5***	***11.2***	***0.5***	***36.7***	***87.6***	***19.3***	***29.1***	***1***

(Kumar et al 2021)

Table 2: Shows permissible limit of WHO and IS 10500:2012

	Parameters	Drinking water as per IS 10500 :2012		Maximum WHO
		Permissible Limit	Maximum limit	Permissible limit
1	pH	6.5 to 8.5	No relaxation	6.5 to 8
2	TDS	500	2000	1000 mg/L
3	Nitrate	45	No relaxation	50 mg/L
4	Sulphate	200	400	400 mg/L
5	Fluoride	1	1.5 mg/L	1.5mg/L
6	Chloride	250	1000	1000mg/L
7	Magnesium	30	100	50 mg/L
8	Calcium	75	200	75 mg/L

(Kumar et al 2021)

CONCLUSIONS

RS-GIS is becoming more suitable as a technology for determining the groundwater resource especially for remotely areas where it is difficult otherwise, RS-GIS is an application for obtaining information of groundwater zones, quality and contamination mapping in more accurate and cost-effective manner. Contour Map was created from Cartosat-1, the distance between the two contours line is 30m, Aspect Map is also generated from Cartosat-1 satellite image DEM data, which shows direction in the area which is 56.929 for Green colour to 359.293 for Red colour. False Colour Composite Satellite image LIS III Map were created in which Red colour Band shows Band3 Sensor, Green colour Band shows Band2 Sensor and Blue colour Band shows Band1 Sensor. Digital Elevation Model(DEM) Map were generated in which Brown colour shows lowest elevation of 52 and Blue colour shows highest elevation which is 245. Fluoride Map were created by Superimposing the data on the Digital Elevation Model(DEM) map, The water samples of the site L-1, L-4, L-7, L-8, L-10, L-14 and L-15 contains fluoride concentration beyond the permissible limit (1.5mg/L as per WHO and IS 10500-2012) in the area which is responsible for dental fluorosis, skeletal fluorosis in the people inhabiting in the area of study. The alkaline aquifer condition of the study area is favouring dissolution of hornblende (Ca,Na)2(Mg,Fe,Al)5(Al,Si)8O22 (OH)2 and biotite K(Mg,Fe) 3(AlSi 3O 10)(F,OH) 2, the main fluoride(F-) bearing minerals in the area. The major problem of dental and skeletal fluorosis is found in the Brahman tola of Gharbar panchayat.

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Blasting Performance By Solid Blasting

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ABSTRACT

Though in India coal produced from under-ground coal is very low and blasting practices in underground mines has limited flexibility due to many safety criteria, statutory and field constraints. This has narrowed the scope of major modifications in the solid blasting design vis-à-vis the efficiency and yield per round. However, it is high time to balance the opencast and underground mine production, in view of the exhausting reserves in shallow depth and socio-environmental problems due to opencast mining. The conventionally available resources are used in this technique without violating the statutory guidelines. The trial blast results indicated improvements in all the parameters like pull, yield per round, powder factor and detonator factor.

The technique was also applied in both soft and medium hard coal formations while exploiting the thin coal seams. The trial blast results indicated improvements in pull, yield per round and powder factor.

INTRODUCTION

India has a large resources of coal in existing coal mines with ideal conditions for extraction by solid blasting. Although the productivity is generally 14 to 16 T in one round of blasting with solid blasting technology. Under Ground coal mining in Belgaon coal Mine working is done by Bord and Pillar working. The production of coal is being done by solid blasting. On an average daily production of shift is 300 T and daily production 900 T per day. Currently working is going in B-6 panel workings with 6 headings. Table 1, explains the explosive consumption and production trend of last year.

Table 1 : Explosive consumption and production trend of last years

Year	Production	Manshift	Detonator (in nos.)	Detonator Factor	Explosive (in kgs)	Powder Factor (Avg.)
2020-21	2,97,000	2,47,500	1,10,880	1.508	1,67,032.8	1.77

Objective

The objective of the project is to enhance the pull per round of blast, powder factor, and productivity.

The project focus for improving production, productivity and techno-economic parameters by introducing the Solid Blasting in Bord and Pillar working in Sunflag Iron & Steel Co. Ltd. Warora (Maharashtra)

Study Areas

Measuring the blasting performance in the different locations of B-6 Panels. The details of one of the experimental blast is presented below.

1. Location – 19LS/8DS
2. Location – 8RS/18LS
3. Location – 20LS/8DS

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Blasting Practice

In solid blasing P5 explosive is used along with Copper Delay Detonator with wedge cut pattern.Table -2 explains the major operations associated with blasting.

In order to optimize blast up parameters, keeping in view of D.G.M.S. Permission, trials were conducted at three faces varying the blast design parameters. Table - 3, presents the details of the one of the trials which was conducted and monitored.

SAFETY PROCEDURES WHILE USE OF EXPLOSIVES

A. Parting faces

i. When the faces approach together in parting, the face is stopped from one side and is insured to carry out blasting in other face.
ii. Portable boards and fencing are provided for the parting faces.

Site Description

Sr. No.	Features	Details
1.	Location	
	Coal Field	Wardha Valley Coalfield
	Latitude	$20^{o}18^{'}10^{"}$ N & $20^{o}19^{'}45^{"}$ N
	Longitude	$78^{o}58^{'}40^{"}$ E & $79^{o}0^{'}39^{"}$ E
	Villages	Belgaon, Kondhala, Yensa
	Tehsil/ Taluka	Warora
	District	Nagpur
	State	Maharashtra
2.	Area	
	Geological Block Area	3.724 Sq.km (As per Mining Plan)
	Project Area	383.56 Hectare as per EC
	Mining Lease Area	383.56 hectares
	Forest Area	55.91 hectares
	Non Forest Area	329.56 Hectare(agriculture land)
3.	Exploration	
	Total Number of Boreholes	63
4.	Amount of Coal (as per mining plan)	
	Total Geological Reserves	18.89 MT(+1.5m), 20.72 MT(+0.9m)
	Total Mineable Reserves	14.18 MT
5.	Coal Seams	Less than 1
	Dip of Seam	2.8^{o} to 9^{o}
	Direction of Strike	NW-SE to NNW-SSE in the Northern part and N-S in the Southern part
6.	Grade	G-8
7.	Parting	1.33-5.53

Figure 1: Map of Belgaon Coal Mine Project, Warora (Maharastra)

Table 3 : Details of Trial blasts which were observed by changing pattern of holes

Sl.No	Date	Location	B/G Pattern	Avg Depths Of holes	No. of holes	Charging Pattern	Total Expl. Used (gms)	Delay sequence	Coal Produced (T)	Pull (m)	P.F T /Kg
1.	5/3/22	19LS/85D	Wedge	1.2	14	10-(185*3) 4-(185*2)	38*185= 7030	25 mill sec	14	1.0	1.91
2.	7/3/22	8RS/18LS	Wedge	1.2	12	10-(185*3) 2-(185*2)	34*185 = 6290	25 mill sec	13	1.0	2.06
3.	8/3/22	20LS/8DS	Wedge	1.2	15	12-(185*3) 3-(185*2)	38*185 = 9990	25 mill sec	16	1.0	1.61

Table 2 : Face details of one of the soild blasting face

Size of Gallery	4.2*3m
No. of Holes	14 Nos
Charge per hole (3) No	555 gms
Charge per hole (2) No	370 gms
Total Charge	7.030Kg
Blasting Ratio	1.91 Te/Kg
Yield Per Detonator	0.502 to 1 tonnes
Pull	1 m

iii. Parting faces are clearly shown in field book at district.
iv. Parting faces are also shown in face measurement book at the Sirdar, shot firer, overman room.
v. Chairman gets undersigned in field book by all of them.

B. Before Drilling operation

i. Mining Sirdar of the preceding shift informs the sirdar of the present shif of any misfires to be dealt from the previous shift.
ii. Proper cleaning and dressing is ensured at face so that any misfires at floor level can be dealt easily.
iii. Face is then checked for any misfire or socket by the shotfirer.
iv. Methanometers are issued to shotfirer to test for inflammable gas within a radius of 20 m from the face and instructions given as per statute to not carry out the blasting operation if the presence of inflammable gas is 0.5% or more.
v. Blasting permitted only after face is up to date with support.
vi. UDM'S are used in districts for roof bolting work to place up the bolting work along with production.
vii. Shotfirers are provided with tools required for detecting cracks in shot holes and sufficient shotfiring cable is provided for shotfirers to always ensure two right angles distance from the place of firing.
viii. Shotfirers ensures the drilling of blast holes is done as per approved drilling pattern.

CONCLUSION

Blasting in underground coal mines involves adequate care in explosive selection, use of proper delays, and also a full proof system of particles during pre and post blast operations. By using Solid Blasting in different locations the Powder Factor is increased by charging less number of holes.

While the maximum charge per shot hole allowed in BOS is 1000 g in Degree-I gassy mines and 565 g in Degree II and III gassy mines, the explosive charge lengths are approximately 1.05 m and 0.65 m respectively. In most coal mines, the explosive charge length limits the advancement of face or 'pull' achieved in a blast. In order to follow the safety norms, and achieve better powder factor, IDL & CIMFR had conducted several studies by introducing spacers in blast holes (Sarathy, et el 2013).

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Geological and Geotechnical Investigation of Latratu Dam, Ranchi District & Its Urban Water Supply Utilization Potential

Pradeep Kr. Adhikari*

ABSTRACT

A dam is a hydraulic or engineering structure built across a river to create a reservoir on its upstream side for impounding water for various purposes. There are different sizes, shapes and types.

Latratu dam and its adjacent reservoir is basically meant for agriculture use, but now the Mega City Ranchi, is upgrading rapidly, water would be its top most need. Essential study, Geological & Geotechnical investigations should be carried out for its optimum use.In this study existing Latratu Dam which has been constructed and completed in the year 1998, its adequate and geoenvironmental information is the need of time.

Maps, Statistics, Geology and Hydrogeological Facts collected in present study are useful for further planning, monitoring and management of the dam in the present scenario of urbanization going around the city.

Keywords: Latratu Dam, Geological Investigation, Geotechnical Investigations, Hydrogeological Studies, Aquifer, Boreholes, Geological Mapping etc.

INTRODUCTION

A dam is a hydraulic Structure or Engineering Structure of Fairly Impervious material built across a river to create a reservoir on its upstream side for impounding water for various purposes. They are of different sizes, shapes and types. Reservoirs like lakes & ponds meet the requirement of drinking water, agriculture, Industries, Fisheries, Tourism, recreational activities, religious activities, ground water recharge and sustenance of biodiversity. Our concentration here on Latratu reservoir situated in Lapung Block of Ranchi district is an Earthen Dam.

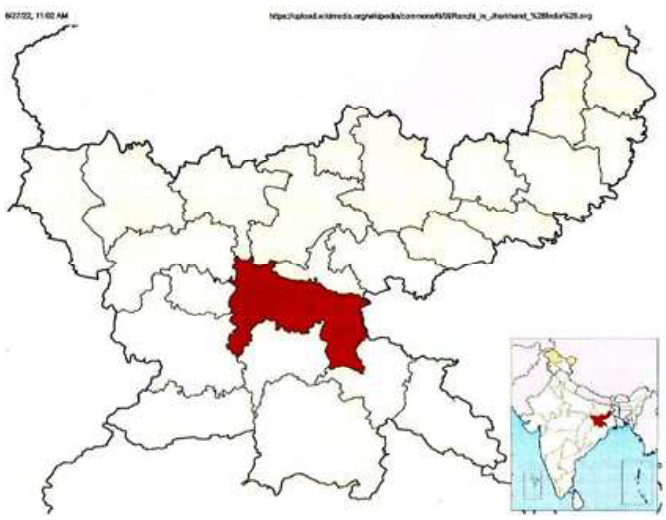
An earth dam is made of earth (or soil) built up by compacting successive Layers of earth using most imperious materials to form a core and placing more permeable substances on the upstream and downstream sides.

A facing of crushed stone prevents erosion, wind or rain and the spillway protects against catastrophic washout. Earth dam resists forces exerted upon it mainly due to shear strength of the soil. Although the weight of this structure also helps in resisting the forces. The structural behavior of an earth dam is entirely different from that of Gravity Dam. They can be built on all types of foundations. However the height of the dam will depend upon the strength of foundation materials.

Study Area

Latratu dam & its reservoir comes under Ranchi district, State Capital of Jharkhand State, Ranchi now comes under list of mega city or smart city. Basically the project was therefore to irrigate and fishing purposes only in and around Latratu Dam.

The Dam was constructed on the North Karo River. It is located 2.5 KMS North East of Popular Sai Temple of Sarsa Village under Lapung Block.



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One can reach the site by Road from Ranchi via Bero Block in about 2 hrs as it is 45 Kms from Ranchi town.

Research Area

Area of research or evaluation exist between the Latitude 23°11’00N to 23°18’00"N and East Longitude 85°1’00E - 85°5’00"E) falls in Ranchi district of Survey of India topo sheet No.- 73E/3, E/4.

OBJECTIVE

Presently Dam is being used for irrigation & fishing purposes only. The main aim of this article is to shed light on the present Scenario, when Ranchi Capitals population is increasing day by day with unexpected Urbanization.

As the dam is not away from the City its Geological & Geotechnical aspect need study and investigations to collect Latest Data and its proper interpretation for making the dam for multipurpose uses especially for Urban Water Supply.

Facts & Data Related to Existing Dam

Name of Dam - Latratu, District - Ranchi, Nearest District - Lohardaga, River Name - North Karo, Basin- Brahmani & Baitarani, Type of Dam - Earthen, Purpose of dam - Irrigation, Year of Completion - 1988, Catchment Area - 11.55 Hectare, Length of Dam - 1219.5 meter, Maximum Height - 39.32 meter, (Alone foundation), Maximum Water Level - 629.34 (M), Full Reservoir Level - 626.9 (In meter), Name of families affected SC, No. of Village affected - 2, No. of families affected ST (overall) - 14

Minimum Drawdown Level - 609.75 mcm, Gross Storage Capacity - 46.89 mcm, Live Storage Capacity - 41.46, Design Flood (Cumec) - 980.17 mcm, Type of Spillway - ogee, Length of Spillway (Meter), Type of Spillway Gates - Ungated, Land Affected - Forest (thousand hectare) - 160.81, Land affected (other) - 3257.81 thousand hectare

Geology

Ranchi district is Centrally Located in Chotanagpur Plateau. It is a part of the ancient Gondwana LandMass of Peninsular India within the heterogeneous Geological Characteristics of the Chota Nagpur plateau, Ranchi has major parts are homogeneous Geological formation. The area comprises the Chotanagpur Granite formed during the Dharwar times. The Geological succession of area is given under below table :-

Stratigraphic Sequences

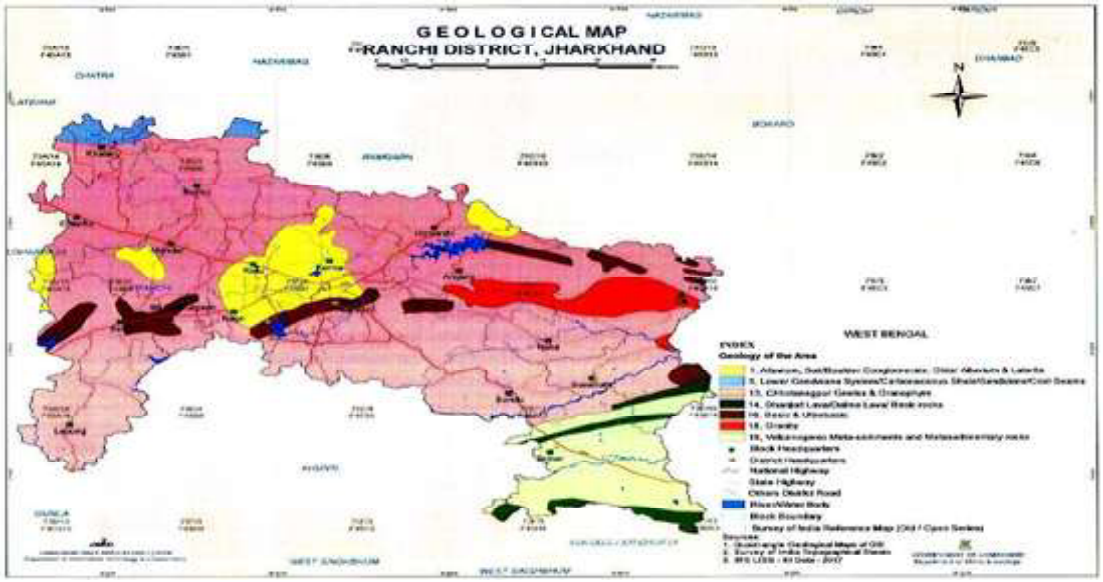
Recent	-	Alluvium
Tertiary to Recent	-	Lateriates
Post Gondowana	-	Dykes of Basic & Ultrabasic Igneous rocks.

----------Unconformity----------

Gondwana	Raniganj	
	Barren Measures	
	Barakar	
	Karharbari	
	Talchir	
Cuddapah and Earlier	-	New Dolerites

Archean

- Chotanagpur Granite Gneiss
  - Vein rocks Pegmatites
  - Cr Graphic Granite, Qtz Veins, and Quartz
  - tourmaline veins rocks
  - Granite Gneiss
  - Diorites and Ultrabasic Igneous rocks
- Dharwar
  - Iraon ore
  - Series or Older
  - Metamorphics
    - Phyllite
    - Micaschirt
    - Quartzites
    - Lime Silicates works & Basic rocks



METHODOLOGY

The Geological investigation should include four main topics :-

(1) Geology of the reservoir or dam site

The Geology of the existing dam site would be the prime work. Present foundations of the dam itself and the site of other related structures such as spillway, diversion of tunnel and other outlet works.

Whether the Foundation has sufficient strength and durability of the existing reservoir must be there in study.

(2) Geology of the Catchment area. Whether the storage area is water tight or the area is having Limestone

and / or Gypsum, which might Lead to the dam not retaining water.

(3) Stability of the slopes in the dam site and reservoir area whether land slides into the reservoir area may be possible which might cause a wave of water to be pushed over the top of the dam.

(4) Finding further area for its development, sources of the construction materials which will be needed to build the next dam in near areas of the existing dam site.

Planning which has been done about 35 years back has become old now. New research & findings including areas structural facts (Fold, fault, Joint) under grand water potential, its quality, recharge zone etc. will provide adequate data for its best conclusion.

Materials and Methods

To fulfill the aims of the current study related relevant published articles were reviewed in order to present the most necessary steps which should be followed during performing Geological Investigations to see how for the present dam site is compatible and safe and what would be the further scope.(Al Ansari ETAL-2015)

Necessary Steps in Geological Investigation

The necessary steps which should be followed during Geological investigation of the dam site - briefly mentioned hereinafter.

However, it is strongly recommended to perform the Geological mapping within the investigation by the national geological survey office with contribution of University and other related specialists. Because the Geologists in a national Geological office have more regional data which can be used in the interpretation of acquired data, specially the surface data.

1. Geological Maps

Latest Geological map of the site required to repair. Here in our case the site is already of an existing dam.

2. Geological Mapping

Geological Mapping at a scale of 1:5000 should be performed by well experienced Geologists having excellent Engineering Geological background. The Geological Maps should be present.

(a) Type of exposed rock & its thickness in and around the dam site.

(b) Mechanical and Geotechnical properties of the exposed rocks in the dam site and at should be deeper than foundations (more than cut-off depth).

(c) To keep in mind, if there are Karstified rocks (Gypsum and LimeStone) and/or expansive clays. Although in the Latratu Dam area, no such rocks are found.

(d) Presenting all existing and other structural elements which shed light on the existence of active faults.

(e) Presenting all Neotectonic evidence.

3. DRILLING OPERATIONS

Borehole should be drilled in the dam site and reservoir area, the Number, depth and spacing of the bore hoes depend on :

(a) Type of dam

(b) Height of dam

(c) Geological complexity of the dam site and reservoir area. However, the following aspects should be considered.

(i) All boreholes should be drilled by full core recovery type.

(ii) The core recovery should not be Less than 85%.

(iii) RQD should be calculated.

(iv) Depth of the boreholes should not be less. It must be deeper than the cutoff depth of the foundations. In such cases the depth should be at least 1.5 H, where(H) is the maximum hydraulic head acting on the foundation as a rule of thumb.

(v) The site geologists should be well experienced in core description.

(vi) Systematic sampling of extracted core in order to apply required geotechnical tests which will provide the mechanical properties of the penetrated rocks.

(vii) Applying chemical analysis for the cored rocks and unconsolidated materials, especially those which will be used in construction of different parts of the dam.

(viii) Applying coloured photography of the extracted core before sampling but after its cleaning from Mad & Clays. It is used during construction.

(ix) Applying Geophysical logging for the all drilled boreholes to indicate -

(a) To correct the drilling depths of the penetrated rocks.
(b) To indicate the mechanical properties of penetrated

(c) To indicate cavities, voids, fractured and / or sheared zones in the borehole.
(x) Full scale Lugeon field permeability test may be necessary to know the same.

4. Karstification : In the concerned area no such study is required.

5. Slope Stability Analysis :

All slopes (Natural and man-made) in the dam site and reservoir area should be studied and analyzed to recognize their activity and all other slope stability problems.

6. Hydrogeological studies :- The groundwater in the dam site and reservoir area should be studied and mapped including :-
(a) Depth of Groundwater
(b) Type of Groundwater
(c) Type of aquifers
(d) Corrosiveness of the Ground water and salts contents.
(e) Seepages of groundwater, their locations and quantity.
(f) Checking new seepage, if there is any.

Similarly

Geophysical studies are also required of the existing area. Seismicity Study, Burrow Areas Study must be taken into consideration.

DISCUSSION

In the current study, I have emphasized the role of Geological investigation in existing dam sites, with latest & modern equipment which has not been done adequately in the past. This means, It may be possible that sufficient instructions and necessary works were not performed, either the quantity or quality. We have concentrated in discussion on Karstification, which is surely not a problem in the particular area.

CONCLUSION

The discussion makes us informed that building of dams in various time and space has helped human civilization flourish with diverse benefits of which supply of irrigation water for agriculture and control of floods have been most important. With the development of technology and demand on water, dams have been used to fulfill other benefits like generation of hydroelectricity which served the towns and gradually emerged in different locations along with the extension of agriculture. Modern society is now dependent on the dams and reservoirs both for agricultural as well as industrial economy. Both the Developed and the Developing nations of the world are concerned with construction of dams on rivers, some of which are in the way of modernization and renovation of old dams constructed with technology available in old times. It can be noted that building dams and reservoirs is a kind of intervention to nature.

Modern management system must pay attention to the fact that taming of rivers for construction of dams should consider the natural ecology for their sustainable utility.

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Clean Coal Technology as a key to Solving the Problem of Energy Security in Indian Context

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ABSTRACT

Coal is an important source of primary energy for the world and demand is growing rapidly in many developing countries as they enjoy a period of long-overdue economic growth. Over the 50 years from 2000 to 2050, demand might double to exceed 7000 million tons of coal equivalent and so account for 28% of the world's primary energy supply, up from today's 25%.The study reviews the status and recent developments in the field of clean coal technologies which is objected at addressing the current issue of Global Warming across the world in India. It presents a brief information on cleaner and more efficient coal technologies, their current status and development prospects, with a specific focus on fuel combustion and power generation.

The study focuses in India because of its significant use of coal and the various efforts made for transferring clean coal equipment and technologies to the country. The clean coal technologies considered in this study basically includes both cleaner and more efficient technologies for coal combustion, including supercritical coal plants, more efficient industrial boilers, fluidized bed combustion, coal gasification and various "end of pipe" pollution abatement technologies including carbon dioxide capture and storage.

In India, the strong growth in power demands is not necessarily conductive to the introduction of advance technologies. Since economic growth provides opportunities to introduce new more efficient technologies, in the particular case of power generation in India, it creates a concern about power shortage. Generators are therefore discouraged from discarding outdated, inefficient and dirty infrastructure. This suggest that technology transfer on the generation side may benefit from efforts to limit too rapid a growth in electricity demand, and may be crucial for the success of an international effort to encourage the transfer of clean coal technologies in the make of efforts objected at contaminating Global Warming.

INTRODUCTION

Coal is a direct form of fuel. We burn 8 Billion tons of it a year, with growing consequences. Coal produce 40% of the world's electricity, it produces 39% of Global CO2 emission which kills thousands with polluted air in a year. Coal is a sedimentary organic rock with a high concentration of carbon (40-90)% by weight, is most widely used as a fuel for generation of electricity in India and rest of the world. Electricity production in India is projected to expand dramatically in the near term to energize new industrial development, while also easing the energy shortage throughout the country. Much of the new growth in electricity production will be fuelled by domestic coal resources, however there is a worldwide concerned about increased coal use as greater carbon dioxide emission from coal combustion will exacerbate the climate change. This study reviews coal utilization in India and examines current and emerging coal power technologies with their near and long potential for reducing greenhouse gas emission for coal power generation.

Objective of the Study

From the discussion made about, it can be seen that for the situation prevailing in India, it is crucial not only to consider and implement technologies that meet the near term needs of the country but also to set the coal-based power sector on a path that would allow it to better respond to future challenges, including the challenges of reducing GHG emission. It will be necessary for India to undertake a systematic analysis of the various technical options best suited for the country's unique characteristics and an analysis of the best approaches for the deployment to improve the following:

1. To improve the assay value of coal.
2. To improve the industrial economy as well as country economy.
3. It led to more efficient combustion of coal with reduced emission of Sulphur dioxide (SO2) and Nitrogen

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Oxide (NO2)
4. Reducing the harmful gases due to burning of coal because it removes the impurities associated with coal by coal washeries.
5. It helps to extract the coal seam which does not permit us by conventional method for extracting the underground coal gasification (UGC) is applied.

Problem Identified

1. World over the emphasis is on protecting and maintaining the environment flora and fauna.
2. Conventional mining method must undergo changes in order to improve the quantity and quality of coal.
3. Indian coal is of inferior quality that is low grade coal there by causing problems of environment and reduction inefficiency of Thermal Power Plant.
4. India is coal importing nation, current production in 2021-22 is 777.31 MT. Therefore high mass volume devices technology is the needed.
5. Supercritical boilers can be a good upgrade for Indian power plants in case of new builds, as they require supercritical turbines that can accept the same high temperature and pressure as supplied by the boilers. Supercritical boilers operate at a higher temperature compared to subcritical boilers thus allowing less fuel to be used and less fuel to be used and less greenhouse gasses being produced.

Technologies

1. Coal Washing.
2. Coal Liquefaction.
3. Underground coal gasification (UCG).
4. Coal Bed Methane (CBM).

Coal Washing Techniques

The main purpose of coal washing is to reduce the ash percentage in coal. This process is known as coal washing. In India the coal washeries which are established mostly in Jharia, Raniganj, Bokaro and Karnpura coal fields for treating prime and medium coking coals. As a matter of fact, coal won't float on water. Coal has a specific gravity of 1.28 to 1.3 against 1.0 for water. The fact that coal with a specific gravity of 1.28 to 1.3 sinks in water at one speed and its impurities with higher specific gravity sinks faster, provides the basic principles for coal washing. There are two technique used for coal washing are as follows:

A. Alkali Treatment Technique

A process for stepwise Alkali Treatment of coal under mild conditions using phenol as a solvent has been developed. About 70% of Assam coal was rendered extractable through three alkali treatment steps in hot phenol followed by quinolone extraction at each step.

The step wise alkali treatment of Assam coal alternatively in tetral in followed by that in phenol rendered 56% coal extractable. Alkali treatment also breaks disrupts, and reforms various associative forces and entanglements between the coal macromolecule to render these extractable in quinolone. In this technique phenol plays an essential role for cleaning the coal.

B. Chlorinolysis and hydrothermal technique

It is one of the most important coal cleaning technique which are used in Assam. The Assam coal samples containing (2.8,3.23,5.5)% of sulphur which are desulphurized by Chlorinolysis and hydrothermal techniques.

Chlorinolysis carried out in the absence of water followed by hydrolysis with water at 80 degree centigrade for 2 hrs, resulted in less removal of organic sulphur. The role of water during Chlorinolysis is explained by a modified mechanism.

Coal Liquefaction

It is the process of turning coal into liquid products resembling crude oil. It was developed at the beginning of the 20th century. The best-known CTL process is Fischer–Tropsch synthesis. South Africa developed its own CTL technology in the 1950s. There are 4 plants currently operational in USA and South Africa for coal liquefaction. The two procedures that have been most extensively evaluated are carbonization heating coal in the absence of air and hydrogenation causing coal to react with hydrogen at high pressures, usually in the presence of a catalyst. DCL is termed direct because the coal is transformed into liquid without first being gasified to form syngas (which can then in turn be transformed into liquid products). The latter two-step approach, i.e. the coal to syngas to liquids route is termed indirect coal liquefaction (ICL).

1. Direct Coal Liquefaction

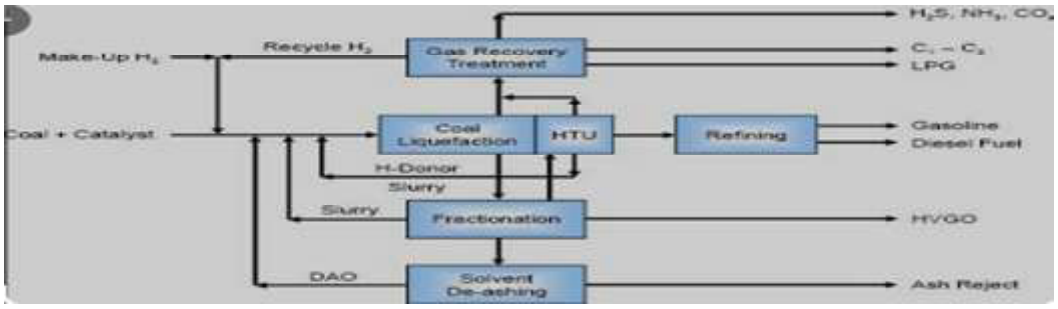

Fig 1: Showing the process of Direct Coal Liquefaction

1. In - Direct Coal Liquefaction

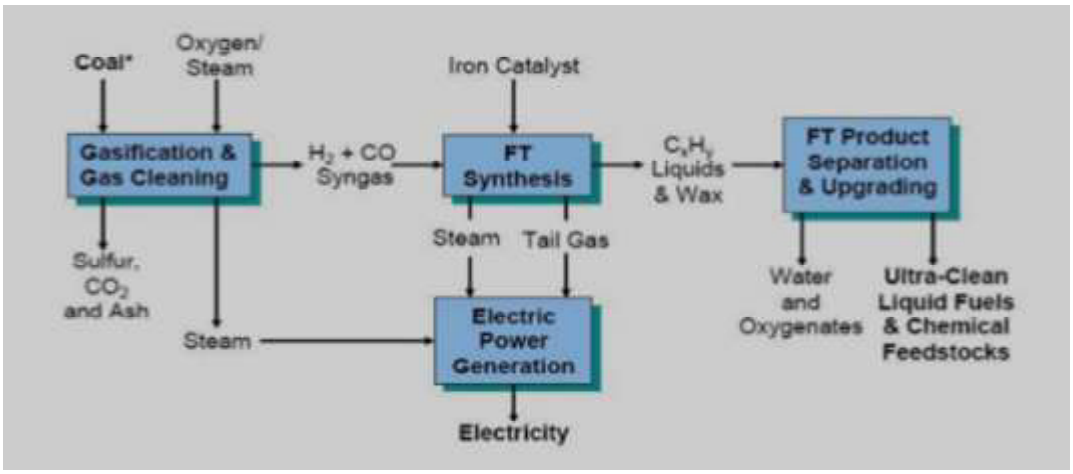

Fig 2: Showing the process of In - Direct Coal Liquefaction

UNDERGROUND COAL GASIFICATION (UCG)

Underground gasification involves the partial combustion of coal in place, generally through boreholes, with the collection of gaseous by products at the surface. The objective is to extract the thermal energy from the coal seams in the form of fuel gases to avoid conventional mining. Underground coal gasification involves the three basic stages:

1. Drilling of vertical or inclined access holes from the surface through the coal seams, in pairs, one hole serving as the inlet for air and the other as the outlet for the gases products.
2. Formation of reaction channels in the coal seams (linkages) between the injection and the production holes, permitting the coal to interact with the air in a moving combustion front after ignition.
3. Gasification coal by supplying an air blast through the inlet hole and removing the gaseous product through the outlet hole. The two bore holes and the interconnecting channel constitute an underground gasifier.

India has relatively large reserves of coal compared to crude oil and natural gas. Therefore there is a need for technologies for utilization of coals efficiently and cleanly. UGC is a well proven technology. Due to the site specific nature of the process, possibility of land subsidence and surrounding aquifer water contamination is reduced.

In India the first ever pilot project of **Underground Coal Gasification** was carried out in Vastan mine block, Surat, Gujarat in collaboration with Gujarat Industries Power Company Ltd. ONGC has now taken up Vastan Mine block site belonging to GIPCL in Naninaroli, Surat district, Gujarat as an R&D Pilot Project to establish UCG technology in collaboration with M/s National Mining

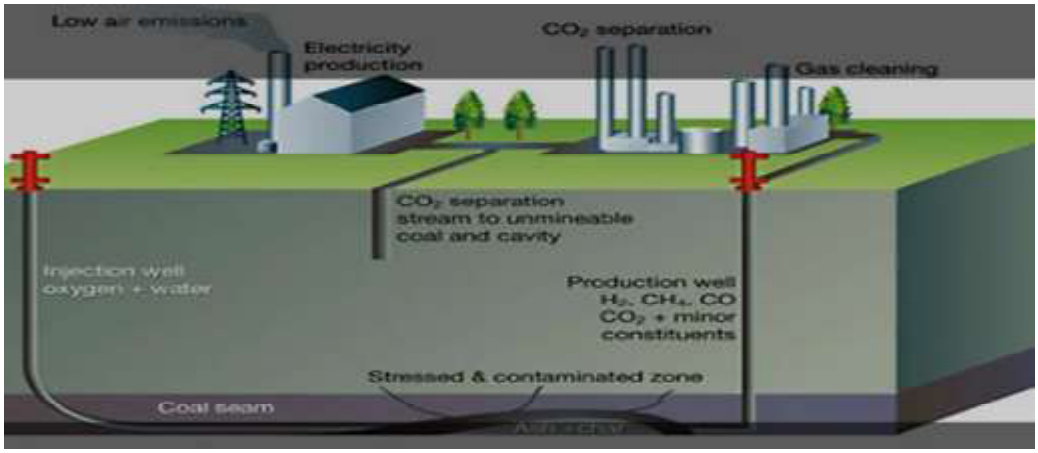

Fig 3: Showing the process of Unger ground Coal Gasification

Research Center-Skochinsky Institute of Mining (NMRC-SIM), Russia.

Coal Bed Methane (CBM)

Coal Bed Methane is a generic term, for the methane rich gas originating in coal seams. Now a days in Industry CBM is classified in three main categories:

1. Coal Mine Methane (CMM)
2. Abandoned Mine Methane (AMM)

Coal Mine Methane (CMM)

CMM refers to the methane released from coal and the surrounding rock strata from mining activities. CMM is released by different types of mines:

1. Active Underground Mine - which release methane through degasification systems (drainage system methane) and ventilation systems.
2. Abandoned or closed Mine - release abandoned mine methane (AMM) from diffuse vents, ventilation pipes, boreholes, or fissures in the ground.

Abandoned Mine Methane (AMM)

Abandoned mine methane (AMM) can be recovered from disused coal mines. Sealed abandoned mines offer an excellent opportunity for methane extraction, especially if recovery takes place quickly after the mines closure. Abandoned mine methane provides a good source of medium to high quality methane. Mine gas from abandoned mines typically contains no oxygen, and its composition changes very slowly. The methane content can range from 60-80%.

India has the fifth largest proven coal reserves in the world and thus holds significant prospects for exploration and exploitation of CBM. The prognosticated CBM resources in the country are about 92 TCF (2600 BCM) in 12 states of India. CBM blocks were carved out by DGH in close interaction with Ministry of Coal (MoC) &Central Mine Planning and Design Institute (CMPDI), Ranchi. With the advent of CBM Policy in 2001, ONGC bid for Blocks and also secured the Raniganj and Jharia blocks on nomination basis. To date, most CBM exploration and production activities in India is pursued by domestic Indian companies. Total prognosticated CBM resource for awarded 33 CBM blocks, is about 62.4 TCF (1767 BCM), of which, so far, 9.9 TCF (280.34 BCM) has been established as Gas in Place (GIP).

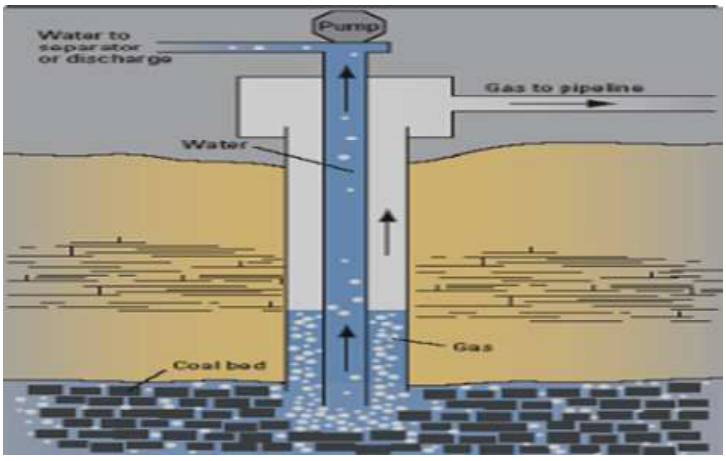

Fig 4: Showing the extraction of Methane from coal bed

TECHNOLOGY ROAD MAPPING IN INDIA

Technology road mapping is a needs – driven iterative planning process that brings together teams of experts and stakeholders to develop a framework for organizing and presenting critical information about needs, performance targets and time-frames, technology characteristics and tradeoffs among different alternatives to help decision makers make appropriate technology decisions and to effectively leverage their investments. The end results of the process is a document which identifies the path to meet the envisioned goals.

The first step in developing a strategic roadmap is to build consensus on a vision for the future that takes into account the various challenges and constraints, and the perspective of various stakeholders on how to prioritize and reconcile these challenges with given constraints. It is important that government be inclusive and that the stakeholders are involved early in the process, so that the consensus driven vision can be a common for the country. DGMS which is also entrusted with ensuring safety in gas fields has revised Coal Mines Regulation and in CMR 2017 a special chapter has been added. Refer to - CHAPTER XVI EXTRACTION OF METHANE FROM WORKING COAL MINE OR ABANDONED COAL MINE).

CONCLUSION

1. Coal is the main source of energy in India and well remain so in the near future as well. With India economy growing at a decent rate, energy demand is expected to increase sharply in the decade to come. So, implementing the Clean Coal Technologies can solve the problem of power generation.
2. It is desirable to have continuing improvements in its environmental performance, thermal efficiency technologies in the field of energy conversion can lead to reduction in energy intensity of the economy.
3. The inferior quality that is low grade coal there by causing problems of environment and reduction inefficiency of Thermal Power Plant can be solved by using Underground Coal Gasification.
4. By using the Clean Coal Technology the energy policy for climate change can be achieved.

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Geospatial Mapping of Geotourism Hotspots in Latehar District, Jharkhand

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ABSTRACT

Mapping of Geotourism Hotspots are relatively new concept in the tourism industry. This paper, based primarily on a literature review by the author, who assisted for Geotourism Hotspots and tourism sectors in the district, detects some of the geotourism resources and assesses the geotourism potential of Latehar district, Jharkhand. The district of Jharkhand "Latehar" has outstanding geotourism Hotspots e.g. waterfall sites, heritage sites, Geological valleys, Cave, Dam, Hills, and associated geomorphological features, and wonderful terrestrial and natural & Geological landscapes, including rivers, Ponds, Forests and tall mountains, and beautiful picnic spot, which together constitute important geotourism assets. The geospatial mapping of geotourism Hotspots as a section of this overall nature tourism which are explored in this paper. The main objective of this paper is to review of the potential of geospatial technique mapping of geotourism Hotspots in Latehar district, Jharkhand. Geospatial mapping to offer boundless Opportunity for the development of geological tourism applications using geospatial maps. This technique integrates with spatial and non-spatial database and provides the facility of query, analysis to visualization through digital maps to the users. Geospatial mapping of geotourism mapping through extensive field survey using Global Position Systems (GPS) for spatial information. Base map for the study area is developed by using IRS Cartosat-1 satellite data. Various attractive thematic maps of geotourism Hotspots etc. have been developed. "Latehar District" has a high degree of geodiversity and density of sites of great geomorphological and landscape interest whose salient characteristics are described in paper e.g. (geotourism Hotspots, parks and nature reserves) and heritage (archaeological sites, industrial sites, sites of architectural, Geological sites, historic and traditional interest) classified and georeferenced within their landscape units.

Key words:- Geospatial, Geotourism, Hotspots, Satellite data, Geological site.

INTRODUCTION

According to Hose (1996, 2000), the term of geology and geomorphological sites and importance of preserving them for their use in educational and tourist sites. "the provision of interpretative facilities and services to promote the value and social benefit of geologic and geomorphologic sites and their materials and to ensure their conservation, for the use of student, tourists and other casual recreationalist".

Geotourism Hotspots means, such type of place where not all tourist/people have the chance to see but specially people when some of the money paid by the people is used to protect the local environment & geological Hotspots.

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According to the World Travel & Tourism Council, India received 6.4 trillion or 6.6% (In Indian Rupees) of the country's GDP in 2012 by tourism sector. It helped create 39.5 million employments which is 7.7% of this total employment. The tourism industries is expected to grow at an average yearly rate of 7.9% from 2013 to 2023 due to India has 3rd place among nations with the fastest developing tourism sector across the next period. India has 11% of the global GDP by tourism industry. The sector in fact is anticipated to receive around 42.8 billion American dollar (INR 1,897.7 billion) by 2017, according to an industry research.

Geospatial technology and tourism share generic features, both across the limitations of study and using areas. Geospatial technology has been used in various study area e.g., urban planning, forestry, environmental science, geography, geology, rural development, banking etc. Similarly, tourism is best subject which is interests to environmental planners, geographers, economists,

business, Mining and archaeologists (Giles, 2003).

It is one of those places which are extremely rich in geotourism Hotspots in Jharkhand are pondered by many as an attractive and gorgeous place because it has melodramatic landscape and pleasurable climate.

Study area:

Location: - Latehar is one of the districts in Jharkhand with 3659.59 sq. km geographical area.

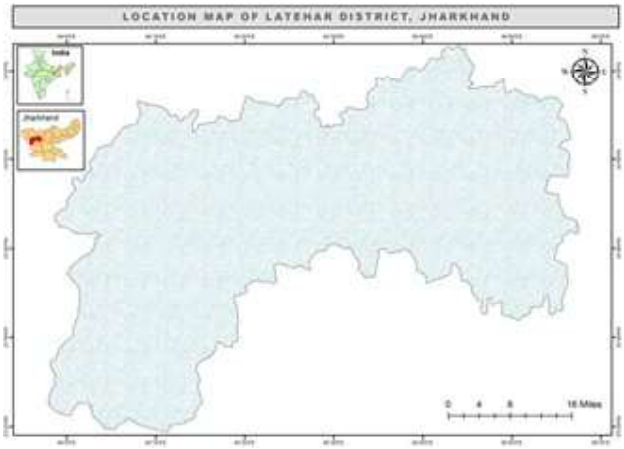


Fig.:- 01

Latehar district is predominantly a tribal population about 45.54% of population and 66% of total population including schedule tribes and schedule castes. As per an official Census 2011, the population of the study area is about 726978. The rural and urban populations are 675120 and 51858 respectively. The study area is circumscribed in the north by Palamu and Chatra districts, in the south by Gumla and Lohardaga districts, in the east by Chatra and Ranchi districts and in the west by Garhwa district and Chhatisgarh state. There are 9 developments Block, namely Latehar, Chandwa, Balumath, Manika, Barwadih, Garu, Mahuda, Bartiyatu and Hehanj. The study area existing between 20°43'N - 21°49'N latitudes and 82°39''E to 83°55'E longitudes and average elevation is 400 m above MSL.

Geotourism Hotspotss : - The majority tribes and tribal people depended on tourism, forest, agriculture, Hills, river, Ponds, waterfalls etc. Their livelihood by selling fruits, flowers, vegetables, etc. obtained from the forest & agriculture to tourist. Tribal/rural people has unique identity in itself and do not destroy the forests and natural recourses. Lots of geotourism Hotspots attraction in the study area which is local people dependent on tourism like Mongolia Sunset point, Upper Ghaghri & Lower Ghaghri Falls, Kamaldah lake, palamu Fort, Kechki Sangam, Lodh Water fall, Sugga bandh waterfall, Surkai ghaghri fall, Sarju valley, Tubed Cave, Indra fall, Tathapani, Narayanpur Fort, Tataha hot water spring, kanti Waterfall etc due to geotourism has enough impact on their socio economic.

Environment: - The average yearly rainfall is about 1300mm. Maximum rainfall has been observed from June to October months. It has hot/warm climate in April to Mid-June, Mid June to October is rainy and Mid October to March is winter. Major flowing river are North Koel and Auranga.

Geomorphology:- Study area comes under chhotanagpur plateau. The topography of the study area is characterized by a hilly rugged landscape with green forest all over the area. The southern portion of the study area is covered with forests and hillocks elevation varies from 300m to 1100m above MSL. East West trending hill ranges consisting of metamorphic rocks in the southern part. Flat type hill in the south eastern parts and the narrow valleys along the course of the rivers in south west of the study area.

The district is characterized by great heterogeneity in soil development. High relief plateau of Netrahat, Chadwa and Garu are mature stage. Soil of Netrahat region are laterite derived from basalt and granite rocks. Major part of the study area is occupied by red sandy soil and red & yellow soil are occupying the northern part of the study area.

OBJECTIVES

The main objective of this paper is:-

- Delineation of the geotourism Hotspots including physical resourses using geospatial technology.
- Assessment of potential livelihood opportunity nearby geotourism Hotspots
- To generate tourist influx in domestic as well as foreign

LITERATURE REVIEW

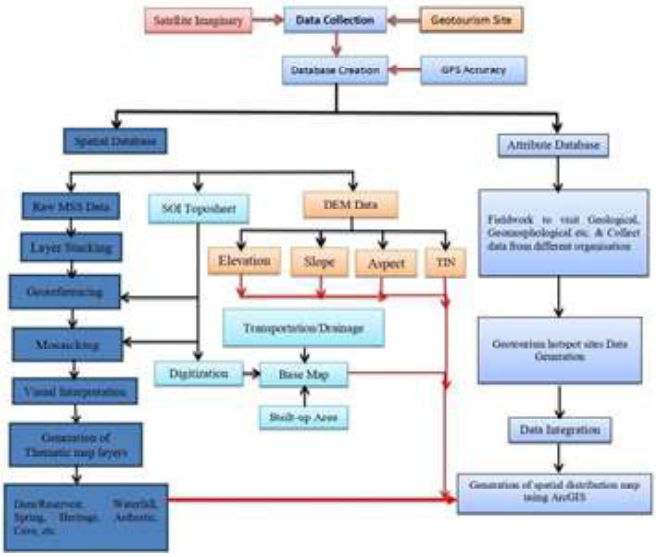
According to overall review of literature will help me to detect variables relevant for decide tools, research and techniques to be acceptable delineate and relate with the

present area of study and the previous ones. **E. Charou1 *et al.* (2010)** presented in a paper combination of manual GIS along with multimedia, remotely sensed and GPS derivative data is realised combination result and valuable information related to geotourism. As per paper special feature of the multimedia GIS that was developed is that it contains information about the environmental challenges and sustainable development issues for geotourism Hotspots & focuses on the assimilation of this multimedia GIS has been assimilated for geotourism. **I. G. GAVRILA *et al.* (2011)** studied the assessment and analysed geomorphological heritage & structure of the Macin Mountains for geotourism Hotspots development. And got a digital map and created a GIS databases comprising topographic map sheets and satellite images and delineative elements of the topography and realized a digital map of landforms with geotouristic Hotspotss potential. **J.T. Fadahunsi (2011)** scanned the map based on the research area, georeferenced and digitized every topographies layer by layer using ILIWIS 3.2 Software type and maps layers exported to ArcView 3.2 software. **Bederiana Shyti & Evis Kushi (2012)** with the help of GIS geo-referenced data of Elbasan region developed thematic layers and stated that these GIS map layers are helpful in the development of tourism industry. **T. Turk & M. U. Gumusay (2012)** created the smallest ways to the historic places and naturalistic splendours from their habitation will be both timesaving and inexpensive. **N. Gilll & B.D. Bharath (2013)** explored the analysis of geospatial technology based networks for rout optimization of tourist and administration destinations. **Kanga S. *et al.* (2014)** to prepared hospitality and management with the awareness of the antique growth of topographical facts with the support of GIS tools, To deliberate and inspect the base line data to develop a database and execute critical geospatial analysis. The geospatial technology make it easier for tourist, administration to detect their technique about their destination which how to find the finest way, how to set up sites to visit, what are the nearest service place and facility centre, how to customize directions, and how to evaluate approachability across destinations. **Sana Rahmani *et al* (2015)** to identified the geotourism Hotspots potentials in the seaside areas of the northern part of Iran and as a case study, the cities of Noashahr and Chalous. GIS software was used to analyse the spatial-location features of geo-tourism in the study area. **L'ubomír Strba *et al.* (2020),** Geoconservation or the protection of geodiversity is being applied to specific places known as geosites, where significant earth elements (geological, paleontological, geomorphological, hydrological and pedological) are protected, preserved and managed and also discussed suitable spatial models to support a sustainable study area. The spatial model of geotourism destinations contributes to geopark development to support the realization of sustainable regional development.

DATA & METHODOLOGY

Data collection methods will be achieving the research objectives; the current study included quantitative and qualitative methods. Methodology will categorise in three parts:-

Pre Field Work: In this section carried out through detailed Literature Review of the paper, Journal, Article etc and field work for primary and secondary data collection and generation and interpretation of maps using Survey of India Topographical maps and satellite imagery and created the base map for filed survey.



Flow Chart:- 01

Field Work: The study was carried out by direct inspection and aerial photo interpretation at different scales to map geotourism Hotspots, geomorphological, geological and physical features of landscape in latehar district. The primary data collected through direct field survey using Questionnaire form, Interview, GPS with coordinate, photographs of Hotspots etc. At the same time collected the demography and forest & tourist based livelihood data, attribute data likes geotourism Hotspots, Physical feature,

Landscape etc. The secondary data collected from published sources e.g. books, journals and newspapers, as well as from unpublished sources e.g. Latehar DC office, Jharkhand Tourism office, DDC, DTO etc.

Post Field Work: The collected information digitised/ ploted, georeferenced and processed in GIS software e.g. geotourism Hotspots, Physical Features Landscape etc. and generated the Geodatabase after it was used to draw up a specific thematic map of latehar district following classification, assessment and adoption of specific legends. Exported the different thematic maps.

Map Layer	Data Used
Base Map	Toposheet, Satellite Data etc
3D Model / Slope / Aspect / Elevation	Cart-1, Sentinel, ASTER DEM etc
Various Thematic Mapsof geotourism Hotspots etc	GPS Survey
Software Used	ArcGIS 10.1, ArcCatalog 10.5 and ERDAS etc

RESULT AND DISCUSSION

After processing the of satellite image and using spatial technology we found about the Age of Lithological structurte map of the lithology in latehar district which are shows in the above fig. no. 02 map with legend. We got about the lithological structure of the latehar district, Jharkhand.

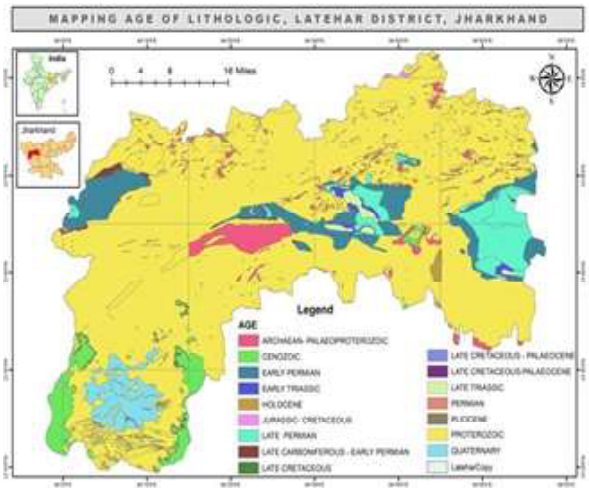


Fig:- 02

This map shows about the contour of the latehar which are creat the contour 20meter difference between two contour line which shows in the above fig. no. 03 map.

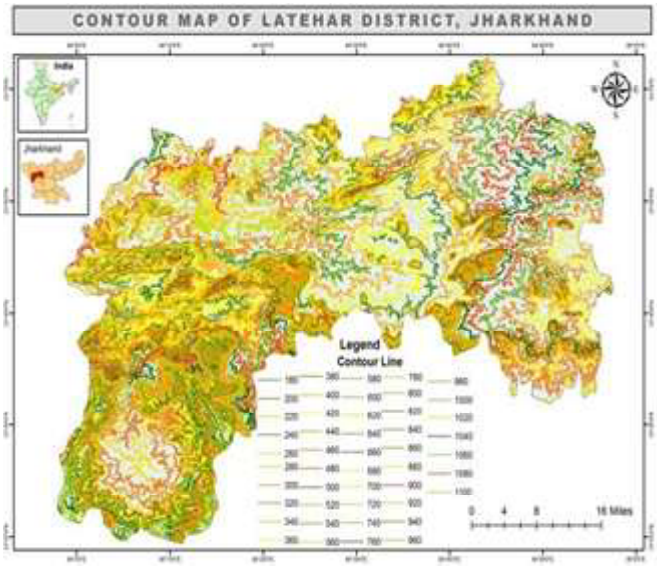


Fig.:- 03

In this map, After processing the of satellite image and using spatial technology we found about the Lithological map of the lithology in latehar district which are shows in the above fig. no. 04 map and legend shows below. We got about the lithological structure of the latehar district, Jharkhand.

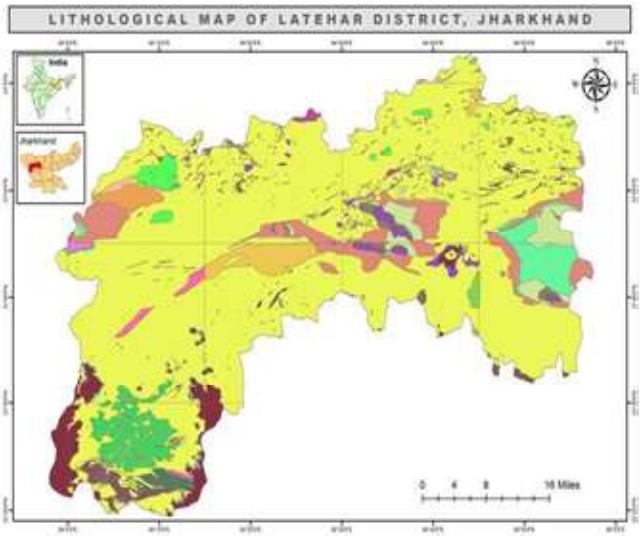


Fig.:- 04

Geotourism map shows about the geotourists hotspots using geospatial technology with geo coordinate it means latitude and longitude. It is beneficial for tourist as well as administration. This map shows about the different types of hotspots as for example cave, Hotspring, Geoheritage, Waterfall, Dam, Wildlife etc. Which shows in the fig. no. 05.

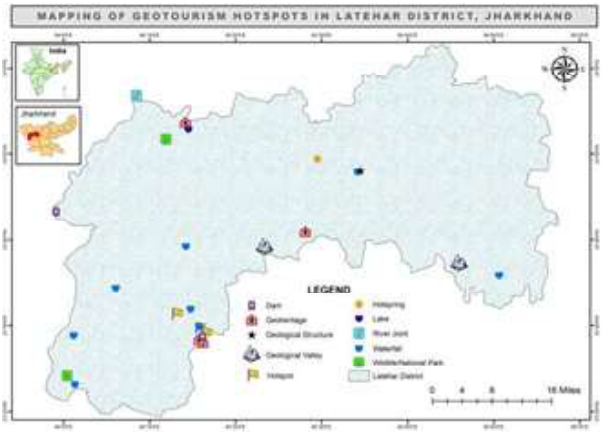


Fig.:- 05

Hotspring: The Tataha hot water spring is located about90 kms from Latehar. The spring is situated in the midst of the dense forest near Morwai. The spring is a perennial source of hot water. The spot becomes a major tourist attraction in winters.

Kechki Sangam:- At about 17kms from Daltonganj, is the confluence of the rivers Koel and Auranga. There is a divisional forest rest house available for tourists who wish tostay here. The scenic beauty of the place makes it's a very favourable picnic destination.

Palamau forts:- **The Palamu Forts** are two ruined forts located around 75 kilometres south west ofthe city of Latehar in the Indian state of Jharkhand. There are many mountains and deep forest all around as well as nearby the river Auranga also flows. These are two large forts located deep in the forests of Betla near Betla National Park .The original fort in the plains and the other on an adjoining hill are attributed to the Vanvasi kings of a Chero dynasty. The fort in the plains had defences on three sides and three main gates. The fort was constructed by Raja Medini Ray.

Kamaldah lake:- The Kamaldah Lake is situated at about 35kms from Daltonganj. This construction of this artificial lake took place during the rule of Raja Medini Rai. The presence of lotus in the lake lends it its name. Elephant herds of the Palamau Tiger Reserve are often seen bathing in the lake. Siberian migratory birds arrive here in the winters.

Lodh Falls:- The Lodh Falls, also known as Budhaghagh falls ,are located at 10 km North-west from the head quarter of mahuadanr block in Latehar district. It is the highest waterfall in Jharkhand and the 21st highest waterfall in India. The falls are located on the Budha River within the Chhota Nagpur Plateau forests. The falls measure a whopping 143 meters (469 ft) and make a thundering sound that could be heard from over 10 KM away. This is a reason enough to visit the falls during the peak of monsoon. Due to its deep location, you must have private transport at ionor hire the vehicle to visit the falls.

Sugga Bandh Waterfall:- It is located on the route of Betla to Netarhat. Suggha band is surrounded by hills which makes it different from other tourist destinations. The cascade falls from the height of 80 feet on the rock. Sugga bandh is approximately 57 kms away from Betla National Park. You can come here by your personal vehicle also.

Kanti Waterfalls:- It is located around 47 km from Latehar and 66 km from Ranchi. It is surrounded by dense forests which enhance its natural beauty. It is nearby Kuru block. Tourists can reach this site by a four Wheeler 7 km from the Ranchi Daltongunj main road (NH39).

Tubed cave:- Tubed cave is a natural cave located at Tubed Hills in the dense forest which is 14kilometers away from Latehar. Itis said that long time ago tigersused to live in this cave.

Mahuadanr Wolf Sanctuary:- Mahuadanr sanctuary is situated in the picturesque Chechari Vally (Mahuadanr) Distt. Latehar.

BETLA:- Almost 170 kms from Ranchi and surrounded by lush green forests, hills, valleys and waterfalls, Betla is a serene tribal village located in the Latehar District of Jharkhand bordering the jungle.

Sarju valley:- It is situated 20km away from sub-district headquarter Garu and 25km away from district headquarter Latehar, If you are planning to drive to Netarhat via Latehar, you might come across Latehar - Sarju Road, which is an alternate route

Chalet House Netarhat:-"Chalet" is a French word which means a wooden dwelling .This is a historical building of Netarhat is made up of logs of wood. it was established during the period of Sir Edward Gate, L.G of Bihar and Orissa in early20th Century. initially, it was used as summer exodus by British Officer for discussion with local influential village chiefs. Now it is being used as the camp office of D.C Latehar.

CONCLUSION

This study can also help in rural development and urban development.

- The Study proposes to develop a model to geotourism Hotspots.
- Based on the nature of geotourism site activities for generation of employments.
- The research results analysed and presented through appropriate cartographic and remote sensing & GIS techniques.
- Geodatabase will be generating for geotourism Hotspots information system and Administration to tourist influx in domestic as well as foreign.
- The study will play an important role in strengthening applied research using latest techniques and will highlight about the studies for geotourism management. This will provide most of the up-to-date geospatial information which will in the assessment, mitigation and management of the geotourism etc.
- It may guide the implementing agencies/ Government/ Tourism Department to apply the model for sustainable utilisation of natural resources as well as geotourism Hotspots and geodatabase.
- To map of tourist site, landscape, forest covers etc using geospatial technology which helps to tourist & administration. The study area may or will be able to preserve its radiant natural beauty.

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Geological Aspects of Smart City Ranchi, Jharkhand

Bijay Singh* Amaresh Chandra Mishra**

ABSTRACT

A Smart City is one that harmonizes with the geology of its territory and uses technology to develop sustainably. Due to rapid urbanization in our country, it is estimated that by 2050, 70% of the population will be living in cities. The capital city of Jharkhand, Ranchi was exposed to more geological hazards and access to natural resources. The sustainable development of Ranchi is of paramount importance to cope with the impacts of climate change, population growth, and congestion of resource demands. The purpose of the paper is to clarify the relationship between geologically oriented innovation and Smart City development in Jharkhand. The rapid built-up growth in and around Ranchi Urban Agglomeration (RUA), since its formation as the state capital in the year 2000, has appeared haphazard and unplanned (Kumar et al., 2011a, Kumar et al., 2011b; Fig. 1). Mushrooming of impervious surface (high-rise buildings, roads), together with overexploitation of groundwater resources, discharge of municipal (untreated) wastewater into major rivers in the city regime not only substantially affected groundwater recharge and augmented runoff but also deteriorated the water quality and urban environment in RUA (Gorai and Kumar, 2013, Kumar and Pandey, 2013, Pandey and Kumar, 2015). Safe water availability is one of the major challenges for Ranchi under the recently initiated 'Smart City' project by the Government of India. The high rate of built-up growth (39.0%) as well as population growth (32.6%) from 2001 to 2010 due to the formation of Ranchi as the state capital in the year 2000

Keywords: Smart, Sustainability-oriented innovation, Development, Systematic literature review

INTRODUCTION

The study area (317.6 km^2) comprising of Ranchi Municipal Corporation (RMC) and its surrounding areas is situated on the Chotanagpur plateau at 645 m above sea level and located between 85° 132 to 85° 252 E longitude and 23° 132 to 23° 262 N latitude. The study area taken is the capital city of Jharkhand namely known as 'Ranchi', which is located between 23° 25'N and 23° 27'N latitude and the longitudinal extension is 85° 20' E to 85° 29'E, with a height of 643.6M above sea level. It has an area of 5,097km^2. The concept of a Smart City.

is nothing but sophisticating the existing cities and renewal of urban space. The essence of Smart Cities lies in the capturing of real-time data as well as its intelligent processing that enables various application areas ranging from managing environment quality and the built environment to land use and transportation planning. Smart Cities are the future of sustainability to support population growth and urban expansion. In India, 34cr. population living in urban areas and their share in GDP is about 60% in 2008, which over a period increased by 82% share in GDP by 37.71cr. for middle class and migrated population from rural to urban. This smart city will play a very crucial role in the emerging neo-middle-class population. In Ranchi, the share of the urban population total.

SOCIAL PROBLEMS

Slum growth, poor sewage, diseases, poverty. The objective of the paper attempted to analyze how viable and effective Ranchi Smart City would be to resolve problems arising in the urban space of Ranchi like congestion, traffic environment population in the flow of migration, slums, and rehabilitation of displaced people. To analyze the paper, we used the secondary data obtained from various sources like data from the official website of the Smart City Government and the official website of the Urban Development and Housing Department of Jharkhand. Also referred and Journal, Handbook of Ranchi, 2011. International Journal of Trend in Scientific Research and Development (IJTSRD) ISSN: 2456 www.ijtsrd.com | Volume – 2 | Issue – 6 | Sep-Oct 2018. Migration in flow causes informal employment or unemployment causes Crime. Municipal in sufficient fund results into poor civic people to live in the peripheral area and increase public transportation. Energy crisis results into the compulsion of diesel generator use in shopping malls causing slum growth, poor sewage and diseases,

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The paper attempted to analyze how viable and effective Ranchi Smart City would be to resolve the problem arising in urban space of Ranchi like population in flow slum and Rehabilitation of displaced people. Traffic control through information communication technology (ICT). It will provide a digital platform for integrating public transport management, parking management, and corridor management, management along with integration with transport and traffic need.

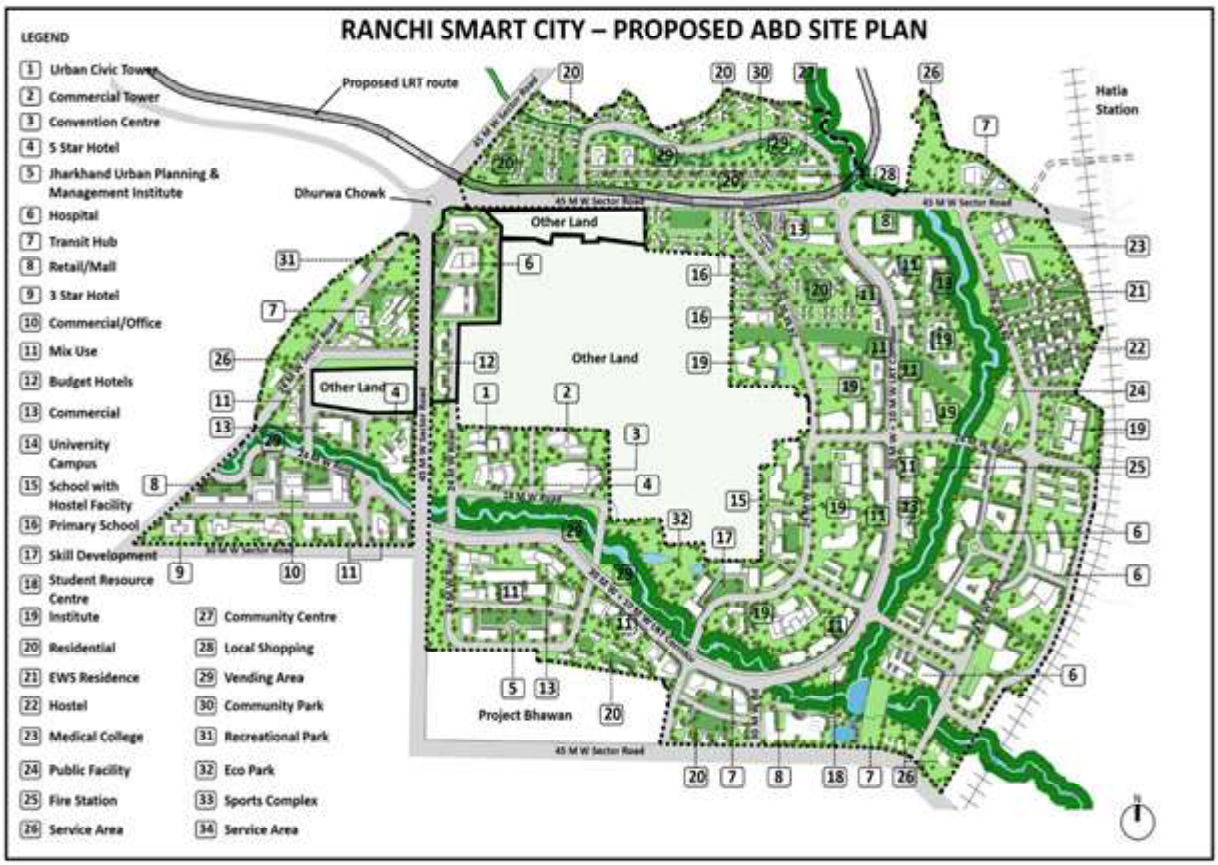

Figure 1: Ranchi Smart City – Proposed ABD Site Plan

Major Aspects of Smart City Ranchi

A. It will work as a knowledge hub for educational excellence.

B. Information communication technology-based traffic systems will efficiently manage the traffic.

C. Offers opportunities to the investors in areas of real estate, health education, and hospitality.

D. It will be designed to cater to all the basic amenities like good quality drinking solid-based management system, supply, scientific sewerage, and drainage system, IT connectivity, digitization, e-governance, and participation.

E. Smart city ensures physical infrastructure like intelligent public transport, 24×7 smart water supply, zero-emission, and connectivity commercial hubs, convention centers, and hotels.

F. It ensures social infrastructures like housing development, educational infrastructure, fitness centers park, and riverfront development.

The geological and geomorphological character of the Earth's shallow geosphere. It is important to know the character and geometries of the geological deposits so that infrastructure is planned sensibly and sustainably, and urban areas (including peri-urban and brownfield sites) can be reused responsibly to ensure that they help

facilitate economic and social development. This brings major challenges for our cities and surrounding resources where there is increased pressure on resources, space, and services. The geosciences have an important, but often underappreciated part to play in securing sustainable global cities - they can support urban innovation and city performance, reduce our environmental footprint, and ensure Several thematic geological maps at a national scale, using the national superficial and bedrock maps in combination with engineering geology technical data and information.

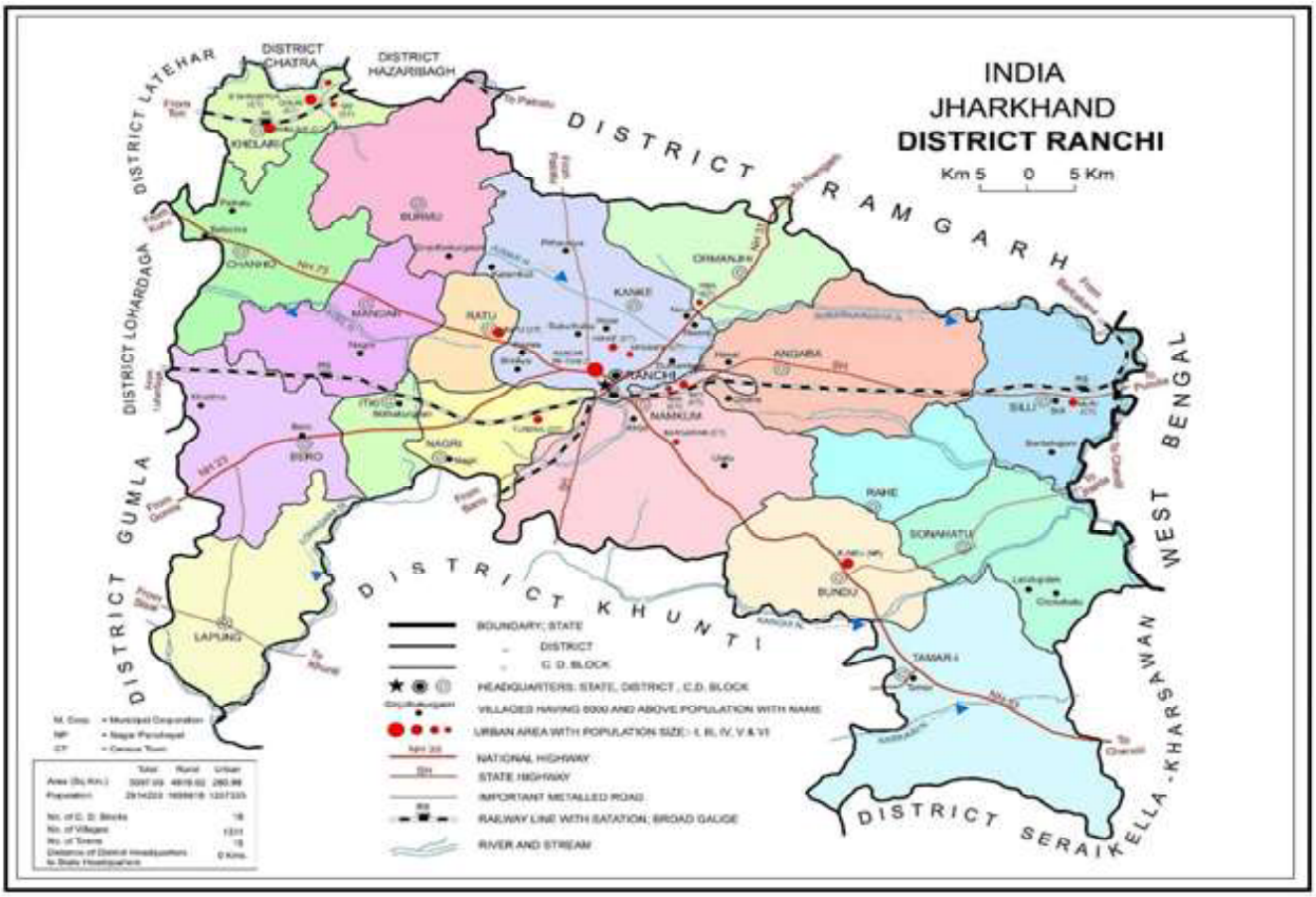

Figure 2: Map of Ranchi

These comprise the following engineering property information:

• excitability • strength • discontinuities • bulking of soils and rocks • sulfate and sulfide potential • corrosivity (ferrous) • use for filling They demonstrate the spatial distribution of geological unit properties, weathering of material is to be expected, and, therefore, the effects of weathering are considered. The classifications are indicative of the characteristics expected. This might cover most of the range of the characteristics, or alternatively may describe the characteristics as a minimum, typical, and maximum expected values for each geological unit. The foundation conditions of rocks and soils are an important consideration for determining how surface construction loads are transmitted into the ground safely and for the lifespan of the project. The foundation is the interface of some form of construction and the ground. The design of the foundations takes into consideration several factors including the response of the ground to the stresses produced by the construction. The behavior, or 'condition', of the ground may be assessed by in situ and/or laboratory tests during a typical site investigation. This dataset highlights common factors to consider when

planning for a site investigation or land-suitability assessment.

The main considerations are:
• strength or bearing capacity
• settlement (compressibility) and differential settlement
• volume change of the ground due to climatic conditions
• subsidence due to natural voids beneath the foundation, leading to ground failure Other considerations include:
• weathering and alteration • aggressive ground conditions of soluble sulfate, sulfide, low pH or high chloride content
• foundation excavations protection

The Foundation Conditions theme has been utilized in the Translucent Cities project with University of Cambridge for future land viability assessment. These were produced as a series of digital maps, combining the types of geology at the surface, with other information such as the geomorphological character of the land (slope and gradient) and water level in the slope. or where excavated and exposed, which may affect many foundations.

CONCLUSION

This study of the Smart City project of Ranchi that it is possible to bring together disparate but physically linked data to harness the value of the subsurface for future planning and ground investigation. This will be increasingly important as urban space is pressurized and reduced to ensure that the potential value of the subsurface is not lost for future generations.

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