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A review on vegetation of Pench-Kanhan-Tawa and Satpura valley Coalfield

Gulam Sabri Ahmed and M.K. Bhatnagar
Department of Chemistry Pandit. S. N. Shukla University, Shahdol (M.P.

Abstract

The southern and eastern piece of Pench-Kanhan Tawa valley is lopsided and harsh with thick woods cover however the western. North-western parts are generally level. Pench-Kanhan Tawa stream gushing westward and south is controlling the waste of Tawa repository. Scarcely any occasional nallahs (Latiya Nala, Dagdaga Nala and so forth) starting from Kilandev Pahad, Bagdev Pahad, Shri Phar and other raised locales release in to Pench-Kanhan Tawa Waterway which streams in westerly course. Satpura dam has been worked across Tawa Stream to store water for nuclear energy Plant at Sarni as well as to manage the progression of water in the downstream of Tawa Stream. Pench-Kanhan region shows a rough geography covered with Deccan Trap. The territory contains many slopes and valleys-primary slopes, covered by Gondwanas, are found in northern part; denudational slopes in southern part and took apart Deccan level in eastern and northeastern parts. The region is depleted by two significant waterways - Pench and Kanhan stream (streaming towards south east) and their feeders to be specific Gonur, Magrahi, Ghatamai, Sukri stream, Bor Nala, Rakhi Nala, Tambiya Nadi, Bardhar Nadi and so on. The new alluvium stores are found at places along these waterways.

Keywords: Vegetation , Pench and Kanhan stream, tawa dam, sarni plant

Introduction

The rising interest for minerals compressing the mining specialists to remove poor quality metal outcomes in additional mining waste and debasement of the climate. The principal point of survey was to figure out the job of climatic elements (temperature, wind, and precipitation) in dispersal and versatility of Heavy metals in soil, water, and vegetation in Cu mining area. The significant wellspring of tainting in the mining area is tailings, overburden shakes, and deserted mines. The debases or fine particles of sulfide-rich mining waste follow two significant pathways for the dispersal: flying and draining. Sulfides on openness to oxygen and water create corrosive mine waste which brings about draining of Heavy metals. The pit water of deserted mines is likewise a reason for concern which pollutes the groundwater assets. Climatic factors like temperature, precipitation, and twist essentially impact the ways of pollute dispersal. In dry/semi-bone-dry locales, high temperature frames fine-grained blossoming salts on tailings or uncovered surficial mines which are moved areas of strength for by/water and defiles the environmental factors. In wet districts, the draining of Heavy metals from the two tailings and overburden rocks sulfides brings about natural pollution. The utilization of impermeable layers is strongly suggested. The climatic elements (temperature, wind, and precipitation) essentially control the dispersal and versatility of Heavy metals in Cu mining area. The execution of waste administration arrangements and contamination control advances is suggested in the wake of thinking about the climatic elements. (Punia, A, 2020)

Soil heavy metals harm ecological biodiversity and human health, and quantifying the risks more accurately is still obscure. In this study, a network environ analysis was applied to quantify risks between ecological communities based on control allocation and human health risk models to calculate human health exposure risks from soil heavy metals around Greenside coal mining in South Africa. Ecological and human health risks were apportioned using PMF model. Results showed assessed heavy metals (mean) exceeded local background content with a cumulative of moderately polluted using pollution load index (PLI). Total initial risk (R_i), the risk to biological organisms from direct soil exposure, was 0.656 to vegetation and 1.093 to soil microorganisms. Risk enters the food web via vegetation and harms the whole system. Integrated risks (initial, direct, and indirect) to vegetation, herbivores, soil microorganisms, and carnivores were 0.656, 0.125, 1.750, and 0.081, respectively, revealing that soil microorganisms are the most risk receptors. Total Hazard Index (HI_T) was <1 for adults (0.574) whereas >1 for children (4.690), signifying severe non-cancer effects to children. Total cancer risk (TCR) to children and adults surpassed the unacceptable limit (1.00E-04). Comparatively, Cr is a high-risk metal accounted for 63.24% (adults) and 65.88% (children) of the HI_T and 92.98% (adults) and 91.31% (children) of the TCR. Four sources were apportioned. Contributions to R_i (soil microorganisms and vegetation) from F3 (industrial), F4 (atmospheric), F2 (coal mining), and F1 (natural) were 42.20%, 24.56%, 23.55%, and 9.68%, respectively. The non-cancer risk from F3 (37.67% to adults and 38.40% to children) was dominant, and TCR to children from the sources except F1 surpassed the unacceptable limit. An integrated approach of risk quantification is helpful in managing risks and reducing high-risk pollution sources to better protect the environment and human health. (Qingjun Guo et al., 2022)

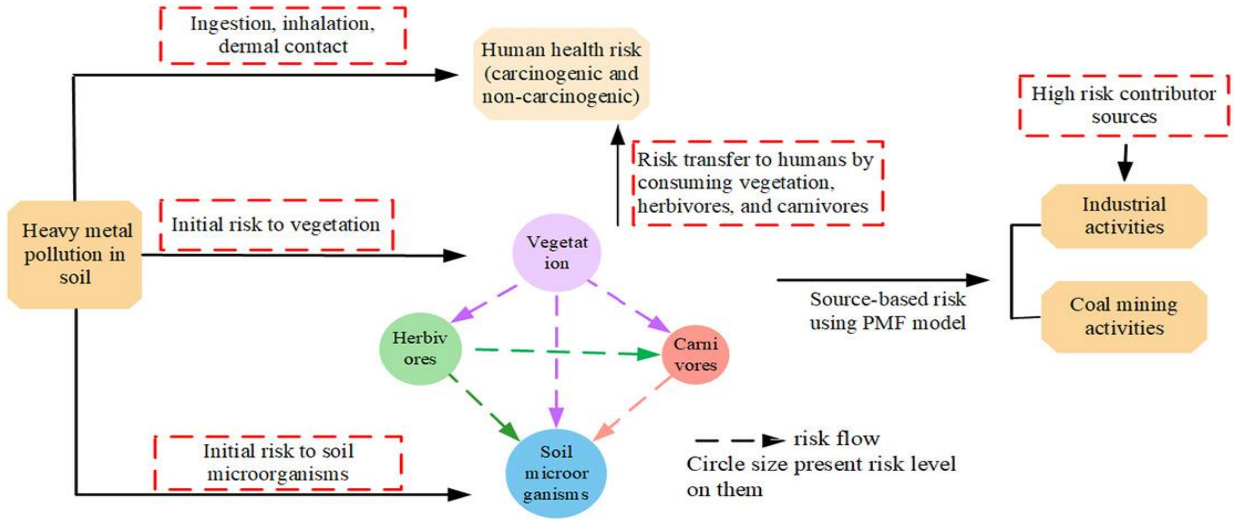

Figure 1. Coal Mine activity

Different formative tasks and financial activities like mining, ventures, metropolitan development, and rural exercises contribute harmful Heavy metals into the dirts and it unfavorably influences to human wellbeing and comprehensively the climate. For the logical review (coal mining district of Eastern India) around 120 soil tests were gathered from top (0 - 20 cm) and subsurface soil (20 - 50 cm) of coal mining, semi mining and non-mining sort of land use locales to survey ten Heavy metals applying standard techniques and files for the evaluation of contamination burden and human wellbeing risk. Measurable examination obviously demonstrated that Fe, Mn, Zr are the most predominantly conveyed in the review district. Coefficient of change (CV)showed that there was exceptionally less variety in the metal qualities among tests of a specific landuse site. Connection coefficient (0.05% degree of importance) portrays those metals were unequivocally corresponded with one another in each site of Neturia block. Igeo (Geo-gathering file) upsides of Fe and As demonstrated moderate to low contamination in the dirt of study region. It is a result of their territorial foundation esteem. Advancement Element (EF) additionally showed that tainting of Fe is basically provided by normal variables (EF < 2)i.e., enduring of parent rock in all around the review region. Any remaining Heavy metals showed their anthropogenic sources (EF > 2)on top and subsurface soil both of three land use destinations. Level of defilement (Cdeg), adjusted level of tainting (mCdeg), defilement factor (CF) and contamination load record (PLI) obviously propose that dirt of coal mining destinations is generally dirtied than two different locales. Subsurface soil of mining locales likewise showed nearly higher contamination load than earth of semi mining or non-mining destinations. PLI values have been arranged into four gatherings i.e., high contamination (> 6), medium contamination (6 - 3), low contamination (3 - 1) and no contamination (< 1) zone. There was no PLI esteem < 1 in dirt of the review region. Yet, subsurface soil of non-mining site demonstrated no contamination to the dirt. Spatial planning utilizing Reverse Distance Weightage (IDW) on Bend GIS 10.4 programming showed clear variety of metal focus and contamination burden to the top and earth of the review region. Human wellbeing hazard of non - cancer-causing type is due to Heavy metals admission of dirt through three openness pathway which demonstrates the wellbeing hazard of Hello dermal> Howdy ingestion> Hey inward breath for both the grown-up and kids. Mean upsides of all out Hello showed that kids are more inclined to wellbeing risk in examination with grown-up. There was no dirt example that surpasses its Greetings values > 1 for grown-ups and subsequently no undeniable wellbeing risk was found from soil Heavy metals for grown-ups. Then again, dirt of mining locales demonstrated Hello values >1;therefore, kids are inclined to wellbeing risk here. The current examination recommends that coal mining district is profoundly contaminated by their Heavy metal weight on soil. Modern and semi metropolitan areas of semi mining district are additionally impacted by Heavy metal residue to its dirt. Farming exercises in non-mining locale demonstrated lower contamination than other landuse destinations. Medicinal measures are exceptionally expected to control Heavy metal contamination of various landuse destinations at colliery district to support natural quality and human wellbeing also. Current logical innovations and public mindfulness ought to be extremely valuable on along these lines. (Parvat Kumar Poop et al., 2021)

This study means to examine the contamination attributes and wellsprings of Heavy metal components without precedent for the Zhundong mining region in Xinjiang utilizing the straight relapse model. Additionaly, the wellbeing takes a chance with their likelihood and infleuencing factors on various gatherings' were likewise assessed utilizing Monte Carlo (MC) recreation approach. The outcomes shows that 89.28% of Hg was from coal ignition, 40.28% of Pb was from transportation, and 19.54% of As was from air dust. The principal wellspring of Cu and Cr was coal dust, Hg greatestly affects expected natural dangers. which represented 60.2% and 81.46% of the Cu and Cr content in soil, separately. The all examples taken from Pb have been Incredibly dirtied (100 percent). 93.3% examples taken from As have been Very dirtied. The general potential environmental gamble was moderate. Grown-ups experienced higher non-cancer-causing dangers of Heavy metals from their eating regimens than youngsters. Curiously, body weight was the principal factor influencing the grown-up's wellbeing chances. This exploration gives more extensive data to all the more likely soil the executives, soil remediation, and soil contamination control in the Xinjiang mining regions. (Fei Zang et al., 2021)

There is an absence of recorded logical examinations on Heavy metal contamination and generally speaking nature of water as for Heavy metal convergences of water bodies around dese rted mine objections in Namibia. The place of this study was to review and translate spatial and periodic profound metal pollution load and the overall idea of water with respect to significant metal groupings of different water bodies in a dormant mining settlement, Klein Aub. An evaluation of profound metal contamination was done on water tests gathered from the dam, borehole, stream, mine pit and funneled treated homegrown water (house) in Klein Aub Settlement utilizing the Heavy Metal Contamination Record (HPI) technique. The water tests were broke down for As, Mn, Fe, Ni, Cu, Zn, Pb and Hg utilizing the Inductively Coupled Plasma Nuclear Outflow Spectrometry (ICP-OES). In general, the most noteworthy normal fixations (mg/l) recorded per component were 0.059 ± 0.070 (Mn), 1.054 ± 2.176 (Fe), 0.010 ± 0.002 (Ni), 0.014 ± 0.006 (Cu), 0.137 ± 0.014 (Zn), 0.026 ± 0.006 (As), 0.005 ± 0.002 (Pb) and 0.002 ± 0.001 (Hg). All water tests recorded Heavy metal qualities (with the exception of Iron) underneath Gathering B levels of the Namibian Water Quality Guidelines, which is delegated "great water quality". Notwithstanding, different components recorded fixation levels above WHO limits, with high Arsenic focuses saw in all examples besides from the upstream example. The generally HPI worth of 115. 53 for borehole water showed high gamble water that isn't appropriate for human utilization. Treated water likewise recorded high Arsenic focuses surpassing as far as possible for drinking water, delivering it not reasonable for human utilization. The discoveries of this study might help the water supply experts in Namibia in navigation with respect to the contamination level and suitable treatment techniques for water in Klein Aub. (Martha Ndeapo et al., 2021)

Heavy metal contamination is a significant ecological issue confronting mankind. Finding the source and dissemination of Heavy metal toxins around mines can give a logical premise to natural control. The construction impact and irregular impact of a semivariogram can be utilized to decide the justification for spatial contrasts in the Heavy metal substance in surface soil, and the coefficient of variety and relapse examination can be utilized to affirm that the confirmation precision meets the geostatistical necessities. As per the most extreme distinction technique, the substance of Heavy metals in the surface soil of the mining region is higher than that of the environmental factors, and Cu and Zn levels are higher than the foundation values for Inward Mongolia. In the current case, Zn, Mn, Pb, Cr, Ni, and Cu levels surpassed the foundation values for the environmental elements of the review region by 65.10%, 53.72%, 52.17%, 46.24%, 33.08%, and 29.49%, separately. The outcomes show that human exercises assume a definitive part in the spatial conveyance of Heavy metals, prompting their spatial dispersion as "center outskirts". This dispersion design was essentially impacted by the slant, NDVI esteem, and the separation from the mining region, however the spatial conveyance of Pb was fundamentally connected with high-level streets. The examination techniques and ends have reference importance for the sources and spatial dispersion qualities of Heavy metal contamination in comparative mining regions and give an objective to the counteraction and control of natural contamination in the review region.(Chen G et al., 2021)

Pench and Kanhan Coal mineshaft Chindwara

Vegetation cover planning of Pench-Kanhan-Tawa and Satpura valley Coalfield taken up in view of satellite information of the year 2020 following three years taken up to make the geo-ecological information base of the coalfield utilizing remote detecting method and GIS.

Mining

The mining area was primarily categorized as. Coal Quarry, Barren OB Dump To make the study more relevant and to give thrust on land reclamation, in the current study some more classes have been added as follows: Barren Backfilled Area, Coal Dumps, Water filled Quarry Total mining area covers 10.89 km2 (0.14%) in the year 2020 , out of which quarry covers 1.85 km2 (0.02%), barren OB dump covers 2.02 km2 (0.03%), backfill covers 1.33 km2 (0.02%), coal dump covers 3.38 km2 (0.04%), and water filled quarry covers 2.31 km2 (0.03%). Mining area has increased to 10.89 Sq.Km (0.14%) in the year 2020 as compared to 6.84 Sq.Km (0.08%) in the year 2017.This increase of 4.05 Sq.Km (0.05 %) in mining area during span of three year is due to opening of new sethia Opencast mine and expansion in another opencast mine also. Increase in Coal dump area is due to increase in production of coal.

Surface Water bodies

It is the area of seized water incorporates regular lakes, waterways/streams and man made channel, repositories, tanks and so forth. The water bodies in the review region had been assessed to be 253.07Sq Km in the year 2017, which was 3.14% of the coalfield region. While in the year 2020, it has diminished to 195.08 Sq km which is 2.42% of the absolute Coalfield region. So there is a reduction of region 57.99sq. km.(0.72%) in water bodies. This decline in water body is because of occasional nallah and less rainstorm when contrasted with the year 2017.

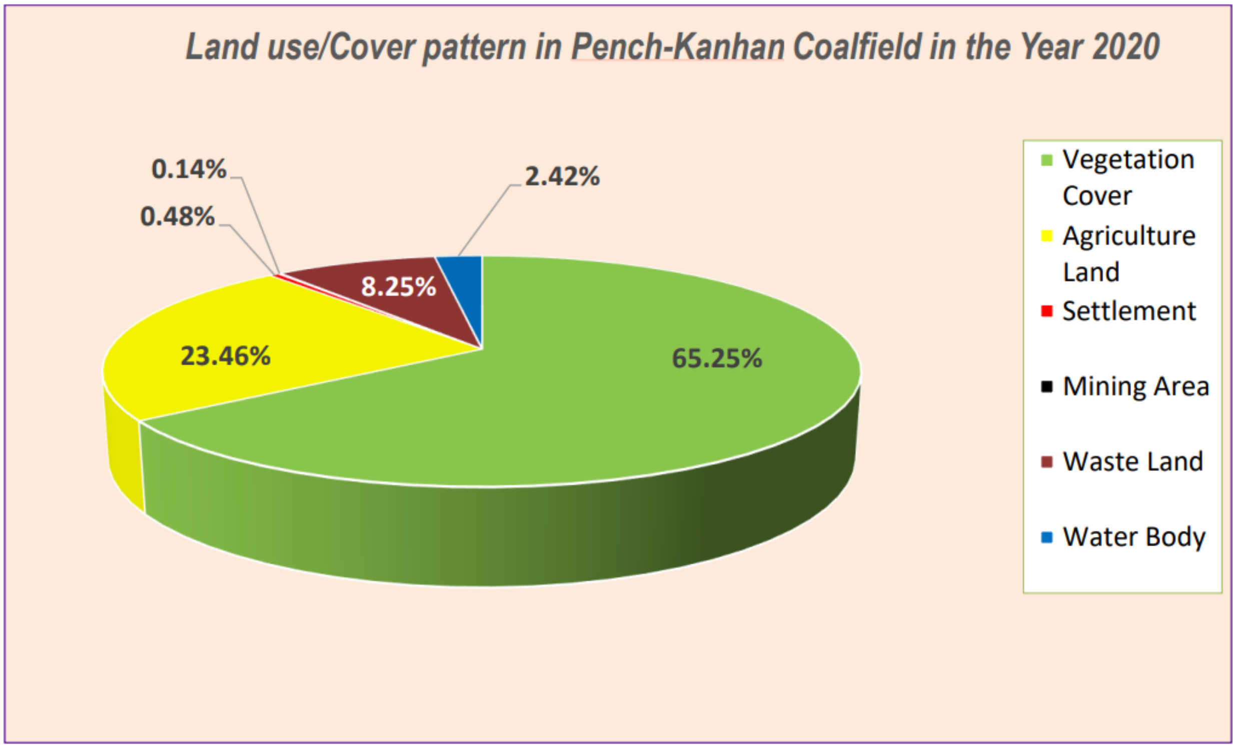

Figure 2. Land Use/Cover Pattern in Study Sites in year 2020

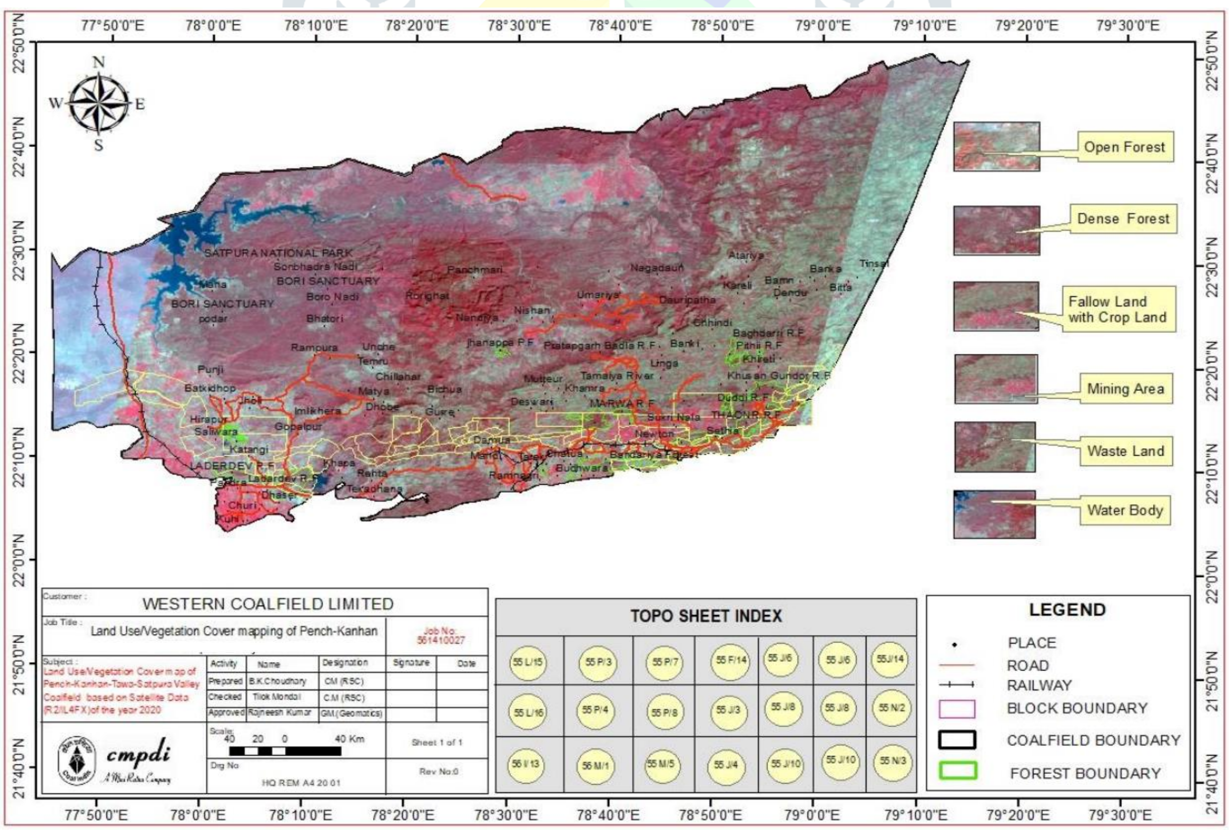

Figure 3. Toposheet of study sites with various legends

In the current review, land use/vegetation cover planning has been completed, in light of R2,L4-FX satellite information of 2020 to create the geo-ecological data set ashore use/vegetation cover in Pench-Kanhan valley Coalfield for observing the effect of coal mining ashore climate. Change examination in land use example might help in planning the relief measures required, if any. Study uncovers that the settlements in the Pench-Kanhan Valley Coalfields are a blend of metropolitan, rustic and modern which covers an area of 38.12 km2 (0.48%). Woods cover involves 4828.51 km2 (59.92%) and absolute vegetation cover including thick timberlands, open backwoods and cleans possesses an area of 5257.53 km2 (65.23%). The concentrate further demonstrates that all out agrarian land which incorporates yield and decrepit land covers an area of 1890.09 km2 (23.46%). Squander land covered an area of 664.90 km2 (8.25%). Surface water bodies, mostly streams, repository and lakes covered an area of 195.08 km2 (2.42%).

Because of various mining exercises, poisonous material like Sulfur, arsenic, mercury and cyanide , lead, filter into ground and defiled ground water and soil quality, or in blustery season immense measure of downpour water blended in with mines squander join with streams, lakes and springs. Mine water much of the time happens with coal and metals mines, dirtying streams and obliterating earthbound environments in extremely enormous regions encompassing the mines locale (Raymond A. Wuana and Felix E. Okieimen, 2011). Water assumes vital part because of its utility of many purposes likes, homegrown, modern, farming and natural. Because of following serious impact mine water required reasonable treatment. Mine water has low pH (Sharma, S., Bhattacharya, A, 2017) and risky harmful metals which disturbed the development and propagation life-pattern of oceanic plants and creatures. Because of low pH, the solvency of harmful Heavy metals, for example, As, Fe, Mn, Zn, Cu, Pb and so on expansions in water assets. This harmful Heavy metal drinks the accessible oxygen in water for their oxidation cycle. Mine water upset the physical, compound and organic qualities of the normal water assets because of harmful metal focus, which direct partner influences on soil and vegetation.

M. Farhad Howlader et al., (2014) surveyed the water assets around Barapukuria Coal mineshaft and modern region. They broke down issues of water quality are more extreme in regions where the mining and mineral cycle ventures are available. In mining process, a few classes of squanders are created which might go in to eventually the wellsprings of water quality. Examination show that the attributes and grouping of the relative multitude of boundaries like pH, EC, TDS, Na^+ , K^+ , Ca^{2+} are shifted from one example to other.

Abhay Kumar singh et al., (2010) assessed the Nature of mine water in the raniganj coalfield region. They broke down 77 mine water test were dissected to survey water quality and reasonableness for homegrown, modern, and water system utilize the pH of the mine water went from 171 to 1626 mgL-1 , spatial contrasts between the TDS values reflect variety in lithology, exercises and winning hydrological system. The restricted furthest reaches of WHO (1997) and Indian drinking water principles were utilized to evaluate appropriateness for drinking and general wellbeing reason.

Mukesh Kumar Mahato et al., (2014) concentrated on the metals of mine water and Heavy metal contamination east Bakaro coalfield region. They dissected for eleven Heavy metal and the convergence of Fe, Mn, Cu, pb, Zn, Ni, As, Al, Cd, and Cr ran 130.6-566.5, 2.02-23.6, 1.12-8.8, 0.01-0.99, 3.2-84.2, 2.13-10.4, 0.12-0.43, 2.43-6.3, 3.4-52.6, 0.04-1.17 and 1.09-12.1 individually. In this manner, the Heavy metals are examined from the mine water of east Bakaro coal field.

Marcin pietrzykowski, (2014) explored the Heavy metal and soil properties of recovered mine regions. They dissected Bioaccumulation of Zn, Pb, Cu, and Compact disc in foliage of scots pine, developed on mine dirts. An exemption was on account of Album in soils on sand quarry and hard coal ruin stack situated in the upper Silesia district. The consequence of mine dirts on semolina stack that created on carboniferous rocks had not just a moderately high happy of sediment (34%) and mud (23%) yet in addition a high rate (70%) of rocks section (2mm) got from sandstone and shale.

Md. H. Bhuiyan et al., (2010) assessed the area of a coal mineshaft area of north western Bangladesh. They made to evaluate Body, COD, Fe, Mn, Co, Ni, Cu, Pb levels in a large portion of the water test surpass the Bangladesh. The Physico Compound outcomes Temp, Body, COD, were very higher than the Bangladesh and FAO water system water quality norms.

Arvind Kumar Rai et al., (2011) Examined physico-substance properties of coal mining areas of Jharia coalfield Jharkhand, India. They assessed the physicchemical attributes, for example, mass thickness grain size appropriation, pH, EC, natural carbon, accessible nitrogen and accessible not set in stone in the dirt mechanics lab, ISM, Dhanbad. The consequence of physico-compound examination of overburden tests least worth (1.51gm/cc) of mass thickness 8 was seen at Nudkhurkee site. What's more, the greatest worth (1.68gm/cc) of mass thickness was found in akshkinaree site.

Idris Basher Imneis et al., (2016) surveyed the WQI for Fundamental wellspring of savoring water Kastamonu City, Turkey. They dissected water quality which offers a solitary benefit to communicate water quality in light of 13 factors not set in stone during the period between sep 2015, until July 2016. The inspecting focuses picked as depicted by first station at admission point of the drinking water supply for kastamonu city, The factual investigation of the surface water of Karacomak Dam was finished to decide the Substance boundary that are digressing structure WHO drinking water standard and water contamination.

H Movahedian et al., (2005) concentrated on Poisonousness of Wastewater Treatment Plant effluents Utilizing Daphnia Magna. They assessed the intense harmfulness of effluents from various unit of Isfahan wastewater therapy plant. The intense poisonousness tests were resolved utilizing daphnia magna. The outcome got for the influent to and emanating from every unit, showing 48h - LC50 and ATU in the crude wastewater and treatment effluents.

Amarjeet K. Singh and D. C. Gupta analyzed the situation with broke down Iron in surface and subsurface waters of Rawanwara Colliery region Pechvelli coalfield, Area Chindwara and saw that as the 66% of water tests were tracked down above reasonable cutoff.

D.C. Gupta et al., 2016 concentrated on ecological defilement of Lead in the normal waters of Pench valley Coalfield Region, and revealed that the Pb fixation goes from 0.014 ppm to 0.681 ppm against the admissible furthest reaches of 0.1 mg/lit, as per the drinking water principles of IS 10500. The review uncovers that Pb pollution in normal waters is higher where dynamic mining is underway while the area found away from mining movement have Pb fixation underneath distinguishing limit (BDL). In this manner, mining movement has come about the Pb tainting in piece of Pench Vallye region.

D.C. Gupta analyzed minor components related with coal and normal waters of Pench Valley coalfield of India and their effect on Human wellbeing. For a natural risk study, composite examples of coals from Eklehra, Rawanwara Khas, and Shivpuri open cast collieries were ready for spectrographic investigation of Co, Cu, Cr, Mn, Ni and Pb. The convergences of these components territory from 17-36.5 ppm, 66-105 ppm, 55-58.5 ppm, 745-935 ppm, 59-78 ppm, and 18.5-22 ppm, individually. These components become portable with the double-dealing of coal and on burning taint homesteads, backwoods, and soils, and influence the nature of surface and ground waters, lastly, human wellbeing. The investigation of minor components in normal waters recommends that centralization of the above components is over as far as possible in a greater part of tests and are perilous to human wellbeing.

A. K. Singh 2015 concentrated on status of disintegrated mercury in surface and sub-surface waters of Rawanwara colliery area of Penchvalley Coalfield. He announced the mercury content of waters from various sources in the review region changes from underneath .002 to 2.50 ppm.

Conclusion

The examination recommends that the mining exercises have brought about scattering of mercury in pieces of this significant non-coking coal delivering region of the satpura-Gondwana bowl. Thus, for a little work has been finished in the chosen concentrate on region in setting of Heavy metal examination. Writing study uncovers that main three Heavy metals specifically Fe, Pb, and Hg has been accounted for. We have wanted to decide the presence of Mn, Cu, Zn, Ni, As, Se, Album and Cr alongside Fe, Pb and Hg. Also 10 Heavy metal Contamination status has not been at this point announced for Kanhan colliery field, significant work has been done exclusively in Pench colliery region, this study will be the first endeavor to examine Heavy metals in quite a while of this area.

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