KAZI NAZRUL UNIVERSITY

RANIGANJ GIRLS' COLLEGE

1st Year

Name :- Anuska Chatterjee.

Roll No. :- 102

Category :- Honours in zoology

Semester :- 1st sem

Session :- 2021 - 2022

Raniganj Girls' College

Course Name: Environment Studies

Course Code: AEE101

Topic of the project: Different aspects of Air, Soil, Water, Noise pollution

A Project Report

Submitted by Semester-I students (Academic Year 2021-22)

Name of the student	Registration Number
SUBHALAXMI YADAV	KNU113211210067
NIDHI TURI	KNU113211210046
MOUMITA BANERJEE	KNU113211220028
SHALU KUMARI	KNU113211210045
SANDHYARANI DAS	KNU113211210063
SNEHA KUMARI SHAW	KNU113211210233
PRITI KUMARI	KNU113211210184
NIDHU KUMARI SINGH	KNU113211210089
ANU KUMARI RABIDAS	KNU113211210042
PINKI KUMARI	KNU113211210039
NILAM KUMARI	KNU113211210195
SONALI THAKUR	KNU113211210266
ANJALI KUMARI SHAW	KNU113211210108
KHUSHI SINGH	KNU113211210202
PAYEL SINGH	KNU113211210288
BHARTI KUMARI PASI	KNU113211210170
SULTANA KHATUN	KNU113211210181
HENA PARWEEN	KNU113211220012
ANUSKA CHATTERJEE	KNU113211220003
SARASWATI SINGH	KNU113211210168
SHIDDMI PANDEY	KNU113211210240
SUDESHNA LAYEK	KNU113211220017
ASMITA SINGH	KNU113211210271
SHATTIKI SARKAR	KNU113211220035
RITUPARNA GHOSH	KNU113211220051
KAJAL JHA	KNU113211210092
PUNAM YADAV	KNU113211210090

CERTIFICATE

This is to certify that this project titled "Different aspects of Air, Soil, Water, Noise pollution" submitted by the students for the award of degree of B.A. Honours/ Program is a bonafide record of work carried out under my guidance and supervision.

Name of the student	Registration Number
SUBHALAXMI YADAV	KNU113211210067
NIDHI TURI	KNU113211210046
MOUMITA BANERJEE	KNU113211220028
SHALU KUMARI	KNU113211210045
SANDHYARANI DAS	KNU113211210063
SNEHA KUMARI SHAW	KNU113211210233
PRITI KUMARI	KNU113211210184
NIDHU KUMARI SINGH	KNU113211210089
ANU KUMARI RABIDAS	KNU113211210042
PINKI KUMARI	KNU113211210039
NILAM KUMARI	KNU113211210195
SONALI THAKUR	KNU113211210266
ANJALI KUMARI SHAW	KNU113211210108
KHUSHI SINGH	KNU113211210202
PAYEL SINGH	KNU113211210288
BHARTI KUMARI PASI	KNU113211210170
SULTANA KHATUN	KNU113211210181
HENA PARWEEN	KNU113211220012
ANUSKA CHATTERJEE	KNU113211220003
SARASWATI SINGH	KNU113211210168
SHIDDMI PANDEY	KNU113211210240
SUDESHNA LAYEK	KNU113211220017
ASMITA SINGH	KNU113211210271
SHATTIKI SARKAR	KNU113211220035
RITUPARNA GHOSH	KNU113211220051
KAJAL JHA	KNU113211210092
PUNAM YADAV	KNU113211210090

Place: Raniganj

Date: 18.03.2022

Jishin Subhra Ghosh

Assistant Professor, Department of Zoology

Signature of the supervisor with designation and department

Effect of Coal mining on Vegetation

Introduction

Mining : Effects of mining continue years even after shut down of mine. Green House gases, death of flora and fauna, erosion of land and habitat are common ill effects of mining.

Burning of coal : Dangerous to environment and human health.

Acid rain drainage : Hazardous as H_2SO_4 and dissolved Fe washes in to nearby rivers and streams, commonly used by human beings.

Air pollution : SO_2 and NO_2 produced by coal fired power plants causes respiratory and cardio-vascular diseases.

Heavy metal content : Lead, mercury, nickel, tin, cadmium, antimony and arsenic metals are some of the toxic metals which are released in mining and burning of coals.

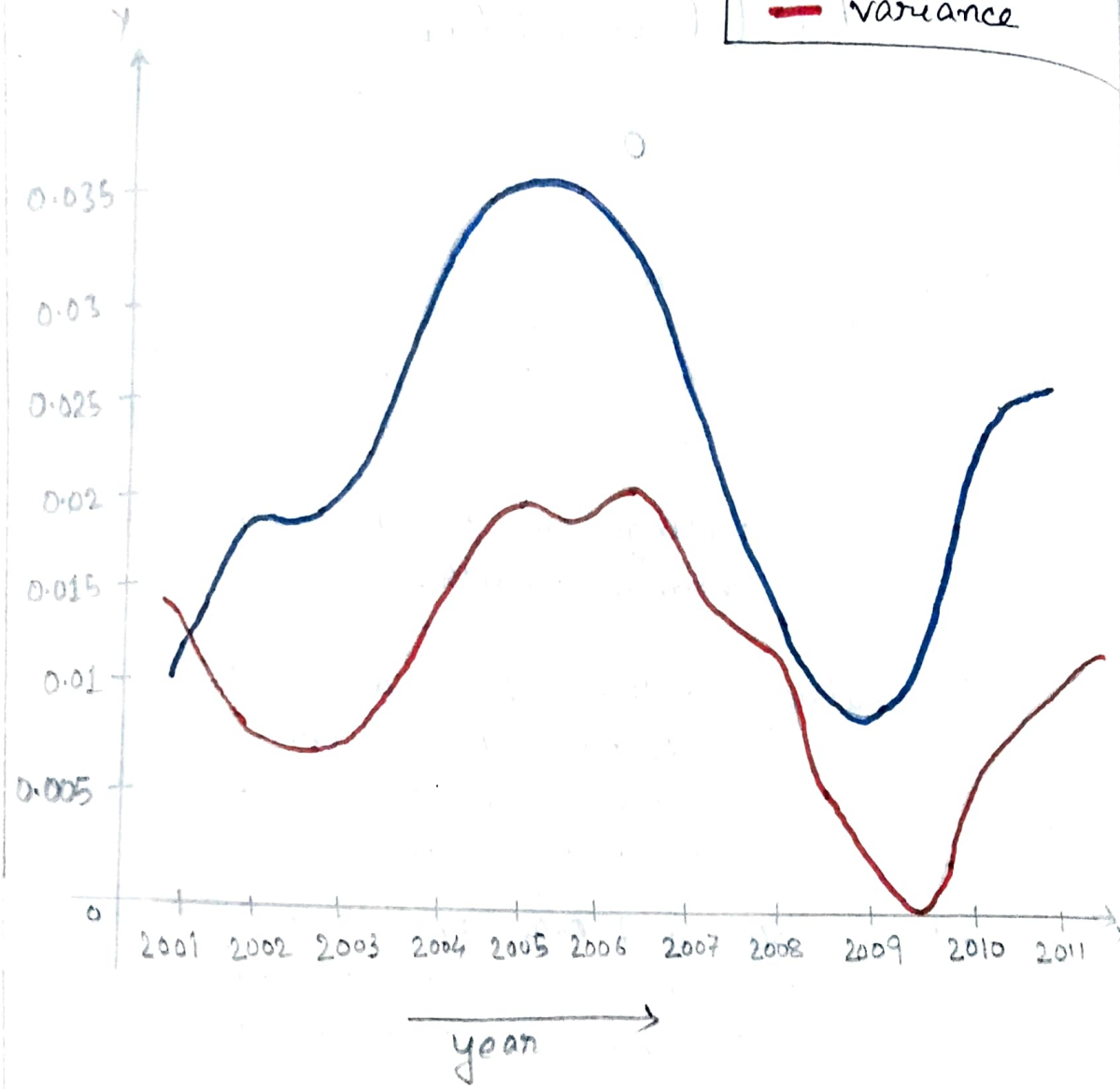


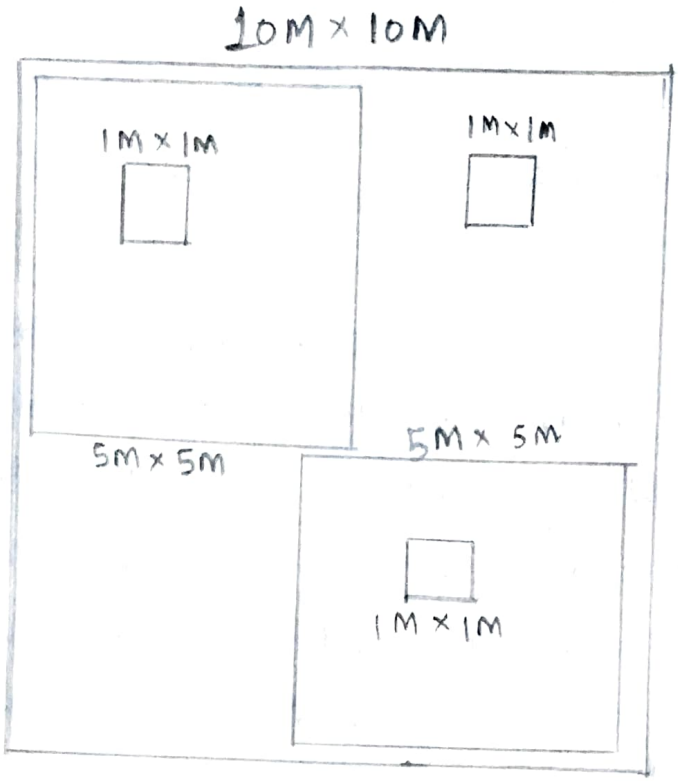
Fig.- From 2001 to 2010 loss of vegetation cause to coal mining.

Mining affect the vegetation

Coal mining leads to loss of biomass and decreas the ability of vegetation to absorb atmospheric CO_2. From 2001 to 2010, loss of vegetation biomass owing to coal mining was 2,60.48t with annual rates of biomass loss of 93.48 gC/m^2 year.

Phosphate - bearing rocks are mined to produce phosphorous, an essential element used in industry and agriculture. The process of extraction includes removal of surface vegetation, thereby exposing phosphorous rocks to the terrestrial ecosystem, damaging the land area with exposed phosphorus, resulting in ground erosion.

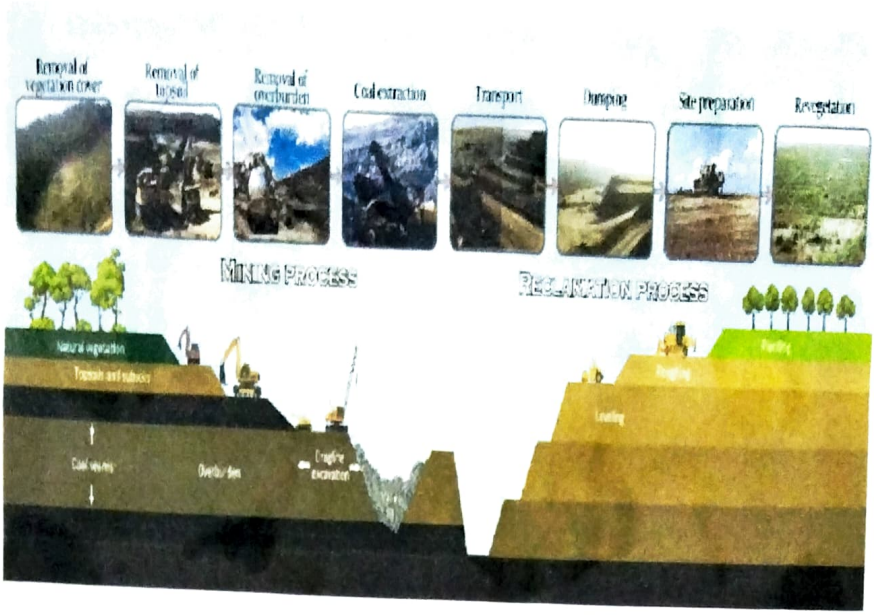
Acids can lower the PH of the soil, Preventing plants ~~can~~ ~~lower~~ and soil microorganisms from thriving, and can also react with various minerals in the soil that are required by plants, such as calcium and Magnesium.



Quadrant diagram

Methodology

- Two areas were selected
- vegetation growing on over burden coal dumping area
- vegetation within the adjacent site 5 km away.
- Five plot of 10M x 10M were demarcated.
- Sub plots of size 5M x 5M were further demarcated within each of these plots.
- Smaller quadrant of 1M x 1M was demarcated both in 5M x 5M plot and one outside it.
- Such demarcation of quadrant was done in both over burden dump area and the adjacent site 5 km away.



Mining Process

Acid mine drainage

Environmental impact of disposal of coal mining wastes on soils and plants in Rostov oblast, Russia —

□ Highlights :-

- A soil cover has not yet finally self-formed on the spoil tips that are aged more than 50-70 years and burnt-out decades ago.
- The aerial and water migration of material from the spoil tips alters the properties of steppe soils within a 1 km radius.
- The contents of Mn, Cu, V, Cr, Zn, Pb, Mo and Ba in the impacted topsoils are raised as compared with the background soils.
- The fraction 0.07 - 1.00 mm of the impacted soils contains oxidized minerals not typical of the areas beyond the mining sites.

□ Acid mine drainage (AMD) refers to outflow of acidic water from coal mines or metal mines, often abandoned mines where ore- or coal mining activities have exposed rocks containing the sulphur-bearing mineral pyrite. Pyrite reacts with air and water to form sulphuric acid and dissolved iron, and as water washes through mines, this compound

forms a dilute acid, which can wash into nearby rivers and streams.

- Air pollution from coal-fired power plants include SO_2, NO_2, particular matter and heavy metals, leading to smog, acid rain, toxins in the environment, and numerous respiratory, cardiovascular, and cerebrovascular effects.

- Air pollution from coal mines is mainly due to emissions of particulate matter and gases including CH_4, SO_2 and NO, as well as CO.

- Coal dust stirred up during the mining process as well as released during coal transport, which can cause severe and potentially deadly respiratory problems.

- Floods such as the Buffalo creek flood caused by mountaintop removal mining and failures of coal mine impoundments.

- Forest destruction caused by mountaintop removal mining - According to a 2010 study, mountaintop removal mining has destroyed 6.8% of Appalachia's forests.

Trees community

Trees Community

SHANNON WINNER DIVERSITY INDEX

$$H = -\Sigma[(n/N) \times \ln(n/N)]$$

Mined	1.860087
Unmined	2.872724
Total	2.83957

SIMPSON DIVERSITY INDEX

$$S = 1 - \Sigma[(n/N)^2]$$

Mined	0.541009
Unmined	0.576864
Total	0.541501

Margleaf Index (Species Richness)

$$D = (S-1)/\ln N$$

	Mined	unmined
Tree	1.985616	4.66775

Peilou (Species Evenness)

$$J = H'/H' \text{ Max}$$

Mined	0.577868
Unmined	0.892462

Shrub community

Shrub Community

- SHANNON WIENER (FINAL)

$$H = -\Sigma [(n/N) \times \ln(n/N)]$$

Mined	2.135587
unmined	2.44936
Total	2.44519

SIMPSON DIVERSITY INDEX

$$S = 1 - \Sigma [(n/N)^{\wedge} 2]$$

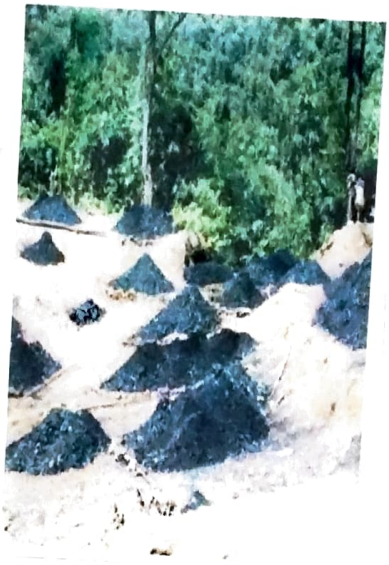
Mined	0.496523
unmined	0.509405
Total	0.505506

Species Evenness
Pielou $J = H'/H'max$

mined	0.788862
Unmined	0.84742

Species Richness
Mangleaf Index $D = (S-1)/\ln N$

	mined	unmined
Shrub	2.446346	2.778642



Herbs community

Herbs Community

SHANNON WIENER (FINAL)

$H = -\Sigma[(n/N) \times Ln(n/N)]$

Mined	3.220983
unmined	3.385482
Total	3.3633

SIMPSON DIVERSITY INDEX

$S = 1 - \Sigma[(n/N)^2]$

mined	0.58394
unmined	0.609793
Total	0.60144

Pielou (species Evenness)

$J = H'/H'Max$

mined	0.861762
Unmined	0.905773

Mangleaf (species Richness)

$D(S-1/lnN)$

Herb	Mined	Unmined
	4.093698	4.55373

Conclusion

- Manglef species richness was found to be more in unmined area than in mined area.
- Shannon wiennet Diversity Index and Simpson Diversity index was also found to be more than unmined area.
- Pielou Evenness Index also found to be more at the unmined area than mined area.
- The study proves that there is a disturbance in the vegetation composition in the over burden dump area because of the mining activities.
- Fabaceace family is the most abundant family found in the coal over burden area as they have Rhizobium bacteria in their root nodules which help them to thrive in the adverse condition.