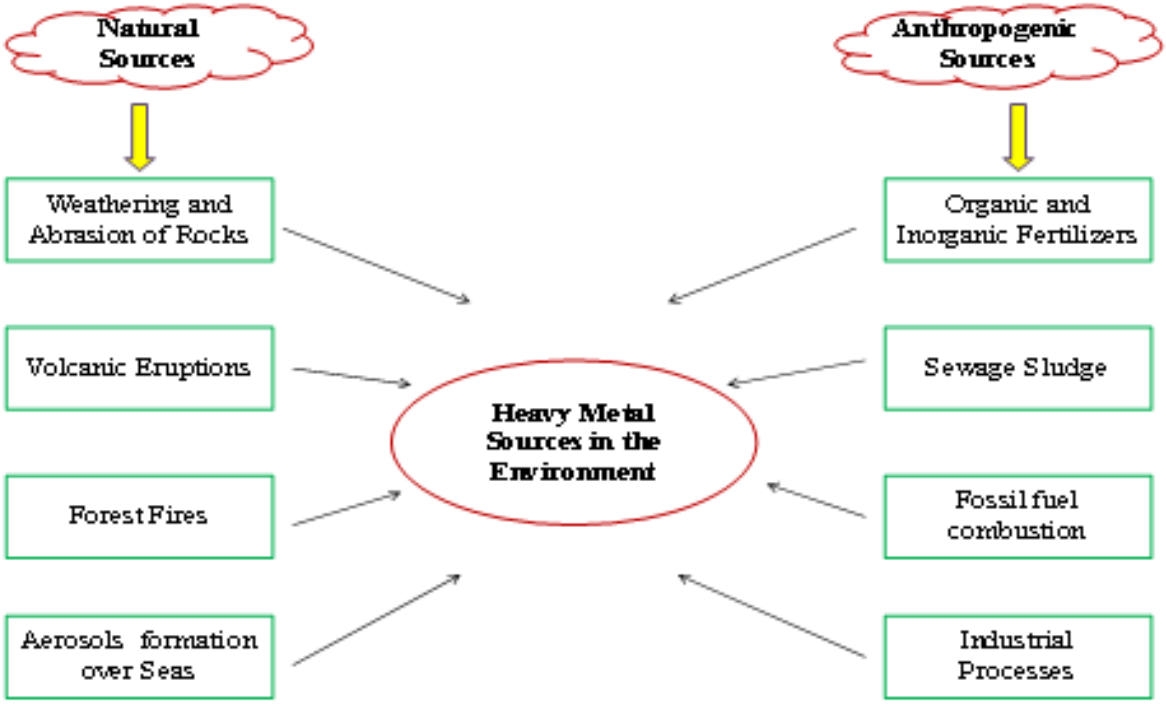
ASSESMENT OF TRACE METAL LEVEL IN SOIL AROUND THE VICINITY OF OKPELLA MINING SITES IN EDO STATE

ACCEPTED FOR ORAL PRESENTATION AT THE AMERICAN CHEMICAL SOCIETY CONFERENCE, NIGERIA CHAPTER, UYO. MARCH, 2018

- Environmental contamination by heavy metals has become an issue of concern in recent times.
- Heavy metal refers to any metallic element whose density is relatively high and is toxic even at low concentration (Lenntech, 2004).
- Heavy metals are major environmental contaminants after pesticide residues (Yu *et al*., 2017).
- Toxicity of heavy metals results from their redistribution from non-toxic geochemical state to the surface of the earth (Sayyed, and Sayadi, 2011).
- Heavy metals unlike some other pollutants are not biodegradable yet bio-accumulate along the food chain.

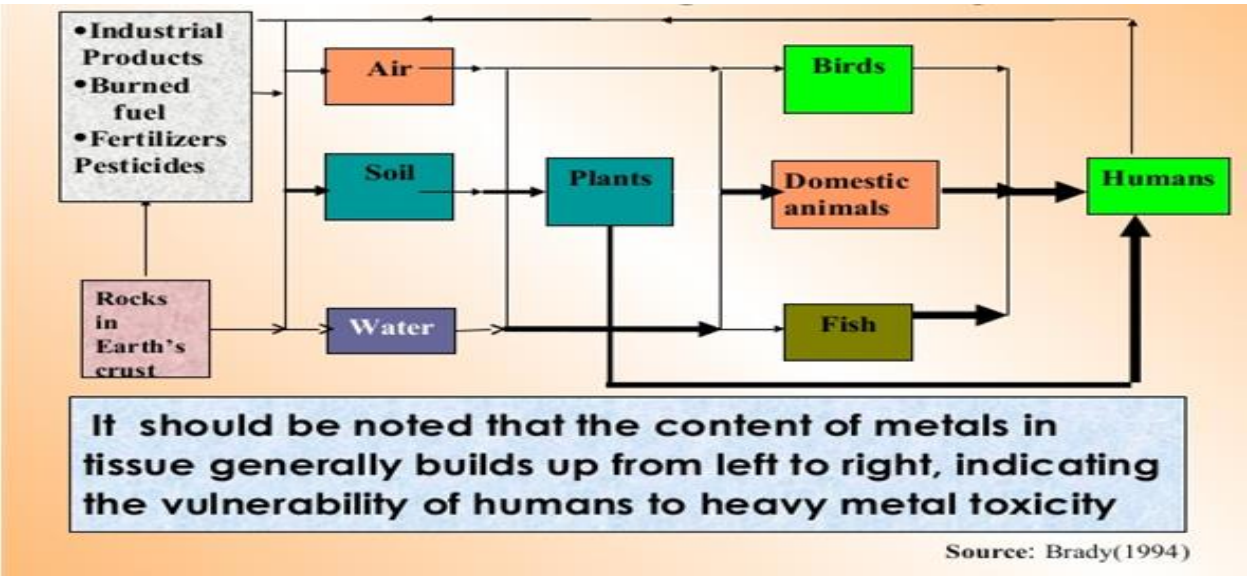
SOURCES OF HEAVY METALS



Source : Richa et al., 2017.

Contamination from anthropogenic sources increase the natural levels of heavy metals in soil, creating a health hazard (Richa *et al*.,2017).

BIOACCUMULATION OF HEAVY METALS



AIM OF STUDY

- The aim of the present study is to assess the level of trace metals and physicochemical parameters of soil around Okpella Mining area in Edo State.

METHODS

- Sampling Method: A total of ten (10) samples were collected in line with Akoji, 2010.
- Digestion of samples in line with Zou, 2015 and heavy metal content determination using AAS.
- pH: using pH meter (Sayyed, 2011).
- Organic Matter : Using WBM and WLI.
- Conductivity measurement: This was done using conductivity meter in line with Akoji, 2010.

RESULTS AND DISCUSSION

Table 1: Physicochemical parameters of soil samples

Samples	pH (water)	OM (WB)	EC (µs/cm)
1	7.0	2.89	1016.4
2	6.9	3.05	775.1
3	6.8	3.11	1361
4	7.9	3.00	1221
5	7.2	4.12	1258.4
6	6.8	2.11	1408.1
7	7.1	4.20	1337.8
8	7.3	3.89	1144.8
9	6.9	1.01	744.9
10	7.3	2.91	1371.5
mean	7.1	3.03	1163.9

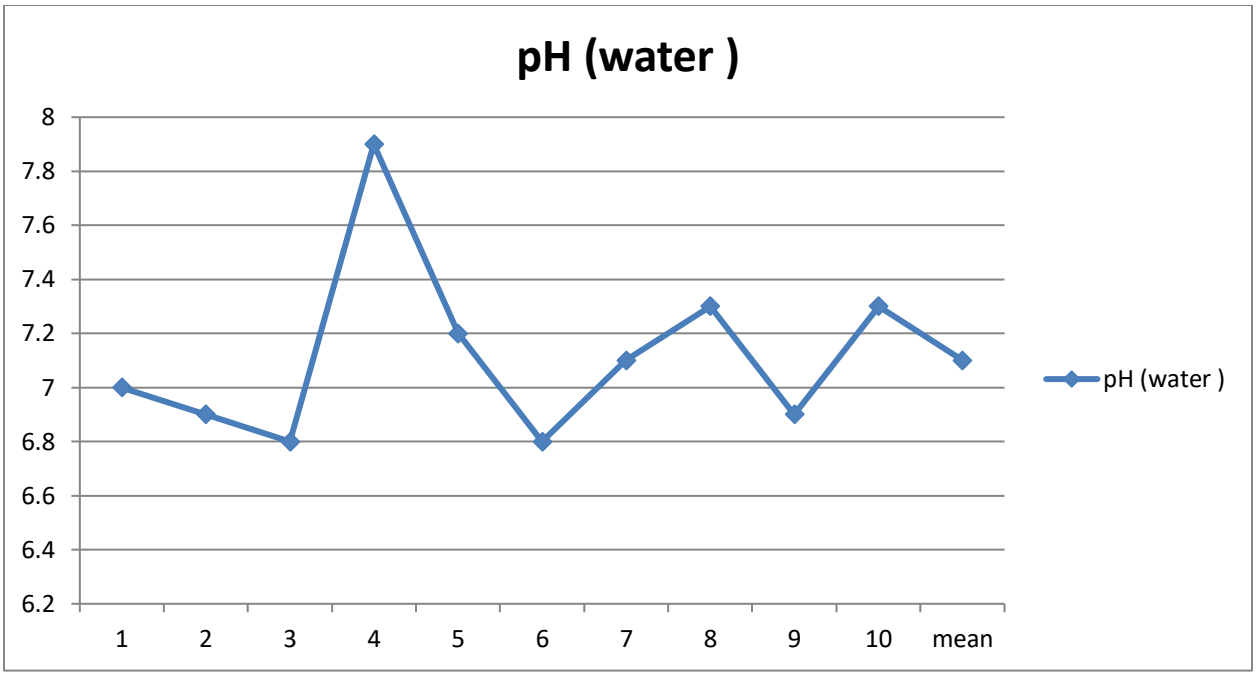


FIG 1 pH OF SOIL SAMPLES

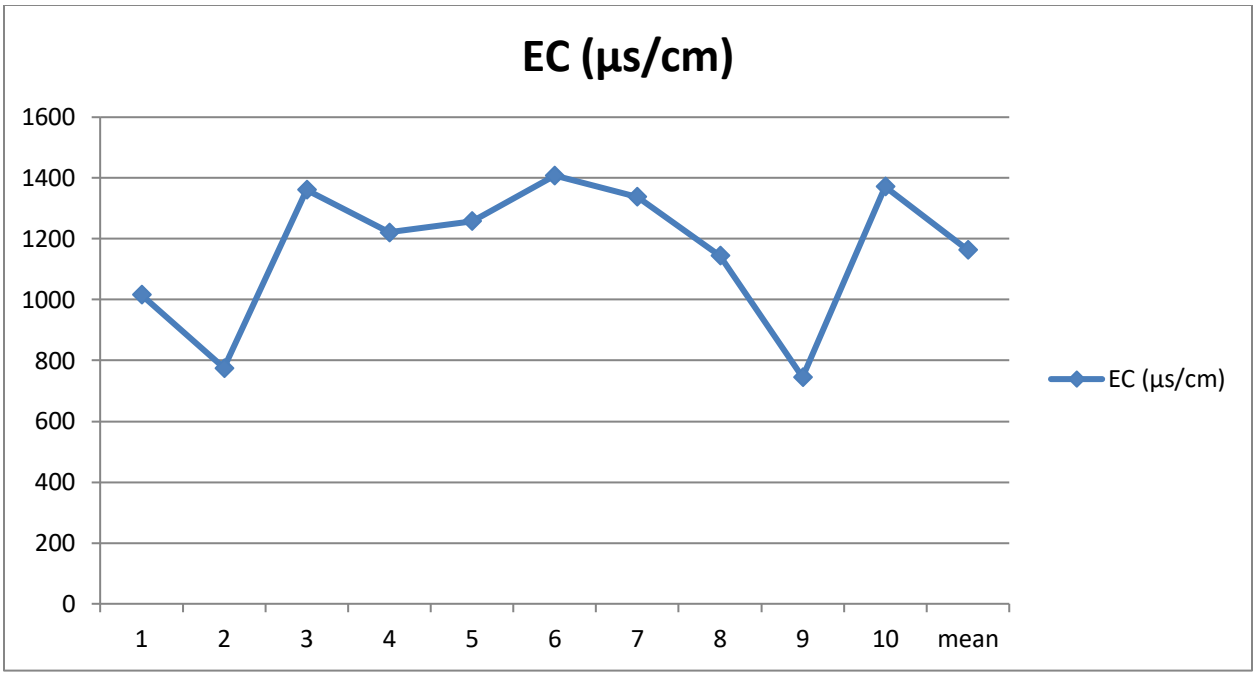


FIG 2: ELECTRICAL CONDUCTIVITY OF SOIL

Table 2: Heavy metal content in soil (mg/kg)

Sample	Cd	Cr	Ni	Zn	Pb	Cu	Mn	Fe	Co	As
SP 1	2.31±0.89^{g}	8.74±0.65^{i}	23.98±0.50^{h}	22.70±0.90^{e}	10.97±0.98^{e}	88.09±0.90^{d}	15.25±0.89^{d}	69.07±0.75^{c}	51.03±0.90^{d}	0.89±0.65^{e}
SP 2	0.99±0.10^{b}	1.24±0.09^{b}	10.10±1.08^{b}	9.19±0.78b	4.03±1.00^{b}	30.06±0.65^{b}	4.72±0.65^{b}	33.46±0.45^{b}	18.49±1.03^{b}	0.35±0.01^{a}
SP 3	2.08±0.01^{f}	4.45±0.23^{h}	32.10±0.89^{i}	18.60±0.27^{c}	10.48±0.56^{d}	81.05±1.01^{c}	13.51±1.02^{c}	70.47±0.89^{e}	51.43±0.89^{d}	1.06±0.02^{e}
SP 4	1.59±1.09^{c}	3.74±0.90^{f}	22.49±1.06^{g}	22.35±0.67^{e}	10.97±0.35^{e}	99.08±0.93^{g}	18.17±0.90^{e}	79.53±1.11^{g}	55.10±0.02^{h}	0.79±0.89^{c}
SP 5	2.48±0.67^{h}	3.99±0.23^{g}	21.96±0.34^{f}	25.46±0.78^{f}	15.43±0.99^{i}	91.90±1.00^{f}	19.19±0.67^{f}	76.03±0.97^{f}	49.01±1.08^{c}	0.90±0.23^{e}
SP 6	1.85±0.80^{e}	2.76±0.67^{d}	34.52±0.25^{j}	19.84±0.98^{d}	13.98±1.02^{h}	90.39±1.20^{e}	20.17±1.11^{g}	105.670.56^{i}	55.04±1.22^{h}	0.86±0.21^{d}
SP 7	3.11±0.23^{i}	3.26±0.09^{e}	16.03±1.22^{c}	19.89±024^{d}	10.05±0.43^{c}	90.99±0.34^{e}	22.50±1.92^{h}	105.63±1.21^{i}	49.01±0.98^{d}	1.00±0.11^{f}
SP 8	1.69±0.09^{d}	0.75±0.09^{a}	19.51±0.65^{d}	23.33±0.79^{f}	13.99±0.35^{h}	133.00±1.29^{h}	13.43±0.09^{c}	66.48±0.01^{d}	53.46±0.67^{e}	1.20±0.35^{e}
SP 9	0.70±0.78^{a}	3.24±0.78^{e}	5.00±0.45^{a}	3.29±0.89^{a}	3.50±1.00^{a}	23.03±0.99^{a}	3.49±0.23^{a}	22.03±0.56^{a}	9.99±1.21^{a}	0.40±0.01^{b}
SP 10	2.50±0.89^{h}	2.65±0.04^{c}	21.07±1.02^{e}	18.13±0.01^{c}	12.53±0.35^{g}	170.83±1.23^{i}	15.43±1.01^{d}	85.23±1.10^{h}	64.43±1.03^{f}	1.00±0.05^{f}
mean	1.93	3.48	20.68	18.28	10.59	89.84	14.92	71.36	45.77	0.84
PML	0.76	3.8	2.6	16	55	3.5			24	4.5

Results expressed as mean±SD for triplicate determinations. Values with same superscript on column do not differ significantly at p < 0.05. SP: Sampling Point. Permissible Limit *(Dutch Standard for Soil: Yu, 2016)

CONCLUSION AND RECOMMENDATIONS

- The contents of Cd, Co and Cu are higher when compared to permissible limits based on international standards.
- There is need for immediate intervention study in this area to include plants uptake and water quality.