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Comparative study of noise level intensity of two different industries and measure their diversity of species in a community, Dhanbad Jharkhand

Sonam Bharti, Dr. Dharmendra Kumar Singh
University Department of Environmental Science and Disaster Management, BBMKU, Dhanbad, Jharkhand, India
University Department of Chemistry B.B.M.K.U Dhanbad, Jharkhand, India

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ABSTRACT

Noise pollution is becoming major concern due to increase in urbanization, industrialisation and developments. Indirectly cause an adverse effect to society life and become a part of our society. Time to time assessment of noise pollution help to prevent from this and enhance our physical and mental health. This research paper mainly focus on analysis of noise pollution from two different industries and their co- relation depend upon the diversity calculation by Shannon index method and calculated their evenness indicate diversity was more diverse.by this help aware people plantation in not to control air pollution , balancing hydrological cycle but also as act green belt barrier for noise pollution, data from both industries average value indicate under limit as per ambient noise quality standard.
Keywords : Noise pollution, green belt Shannon index and Evenness

Introduction- Noise pollution is a result of growing urbanisation, traffic, religious activity, and development. This is a pressing issue of our time that has a harmful impact on the biosphere and the ecosphere. The Latin term "nausea," which means seasickness, is where the name "noise pollution" originated. Numerous studies have shown that noise pollution has a negative impact on animal behaviour and the ecology. There are two sorts of noise pollution's effects on birds and insects. (a) Direct impact, or a detrimental impact on insects like grasshoppers and birds. (b) Indirect effect, which has a favourable impact on the distribution and abundance of grasshoppers and odoratus in noise-exposed areas. (Senzaki et al.2020) Noise level is a significant issue in traffic areas and is mostly dependent on the volume, type, and number of vehicles. GIS and the CRTN model can forecast these variables. (Debnath et al.2018) (Debnath et al. 2022) After the traffic the second most important source of noise pollution is industry which causes adverse effect for by the worker CAM and CNC department recorded noise intensity 103.27dB. It can be minimized by worker by using ear plug (Subramaniam et al.2019) Other numerous mining and stone-crushing procedures, such as drilling, blasting, manually breaking stones with hammers, crushing stones into different sizes, etc., produce noise.(Duggal et al.2017) Disorders of the heart, nervous system, skin, ear, and mind are all regularly aggravated by noise. Not noise only has an impact

on humans, but there is evidence that noise may also cause significant stress, behavioural changes, and disruptions in animal mating behaviour. (Saha et al.2011)

This research report focuses mostly on the various industries' noise intensity levels and how plantations might reduce them. Since it has been discovered that by reducing the amount of noise pollution brought on by specific plant types, shrub (Dobson et.al 200) the comfort of persons using the roads while driving can be increased. Additionally, improving the road environment can aid in putting the concept of green infrastructure into practise. As a result, the quality of the road environment may be considered while developing urban roads.(Yofianti et al.2021)

Study area- The Dhanbad industrial region is covered in the present study. Located in the country's easternmost state of Jharkhand, at 85°45'E longitude and from 23°32'N latitude

Dhanbad district comprises a total dimension of about 355.77 km2. Dhanbad is 227 metres (745 feet) above sea level on average.

According to the forecast, there would be 3 million people living within the boundaries of the Municipal Corporation in 2036 (Source: CDP, Dhanbad, 2007). Between a humid subtropical climate and a tropical wet and dry climate, Dhanbad has sub-tropical climate. (Yadav et al.2018)

Winter (October–January), Monsoon (June–September), and Summer (February–May) make up the season. The average annual rainfall ranges from 945 to 1297 mm, while the average annual temperature ranges from 6 °C in the winter to 47 °C in the summer. Rocks and stones in the area have broken down, forming the soil. The state's soil and climate are ideal for the development of mushrooms, tea, decorative plants, and spices (Mahato et.al. 2021)

The Sample were collected from Kamal rice mill Govindpur and Maithon ceramic company for one month during time duration 6am to 10 am as per Central Pollution Control Board.

Map 1: Maithon Ceramic plant

Map 2: Kamal Rice Mill, govindpur Dhanbad

Method and Methodology

(a) noise Data collection

Instrument : Model :SL-4030 Sound Level Meter is used for collection of data

Fig: Noise level Meter

Methodology- The noise were measure in the regions 3 times in a day through one month duration 1st May 2023 to 30 May 2023.

(b) Species Collection : Shannon and Weaver,1949(Omayio et.al 2019)

Results:

Table:1 KAMAL RICE MILL, GOVINDPUR, DHANBAD, JHARKHAND, 828109

Date	Morning Time (06:00am to 10:00pm)			Night time (10:00pm to 06:00am)		
	Leq	Lmax	Avg.	Leq	Lmax	Avg.
01/05/23	46	76	61	57	91	74
02/05/23	58	84	71	34	77	55.5
03/05/23	57	88	72.5	35	82	58.5
04/05/23	59	88	73.5	38	88	63
05/05/23	32	85	58.5	42	79	60.5
06/05/23	32	87	59.5	41	82	61.5
07/05/23	49	89	69	43	92	67.5
08/05/23	59	84	71.5	45	90	67.5
09/05/23	57	76	66.5	35	88	61.5
10/05/23	34	89	61.5	32	88	60
11/05/23	35	92	63.5	39	85	62
12/05/23	38	88	63	45	89	67
13/05/23	50	91	70.5	57	84	70.5
14/05/23	49	69	59	50	70	60
15/05/23	61	89	75	49	82	65.5
16/05/23	40	81	60.5	58	76	67
17/05/23	41	81	61	47	71	59
18/05/23	41	88	64.5	43	76	59.5

19/05/23	54	84	69	38	88	63
20/05/23	57	75	66	56	73	64.5
21/05/23	55	68	61.5	49	69	59
22/05/23	58	81	69.5	41	79	60
23/05/23	56	78	67	54	75	64.5
24/05/23	55	79	67	57	76	66.5
25/05/23	56	84	70	45	72	58.5
26/05/23	54	72	63	57	75	66
27/05/23	57	70	63.5	49	79	64
28/05/23	56	74	65	35	71	53
29/05/23	56	75	65.5	54	79	66.5
30/05/23	57	76	66.5	52	78	65
Total average			55.8333	Total average		63.016

Table:2 **Biological diversity near Kamal Rice mill , Govindpur, Dhanbad**

Sl.no	Order	No. of Individual	n/N	p_i	P_i^2	In p_i	piIn p_i
1.	Teak wood (Lamiales)	6	6/56	0.1071	0.0114	-0.9702	-0.1039
2.	Oak (Fagales)	4	4/56	0.0714	0.0050	-1.1463	-0.0818
3.	Bamboo (poales)	17	17/56	0.3035	0.0921	-0.5178	-0.0279
4.	Peepal (Fius religoisal)	8	8/56	0.1428	0.0203	-0.8952	-0.0028
5.	Grass (Poales)	21	21/56	0.375	0.1406	-0.4259	-0.1597

S=05

N=56

Sum of p_i^2 = 0.2694

Sum of p_iIn p_i (H) = -0.3761

Dominance=1/0.2694 = 3.7119

E=H/Hmax =0.3761/1.61=0.2336

Table:3 Maithon Ceramic Plant, Dhanabd

Date	Morning Time (06:00 am to 10:00 pm)			Night time (10:00pm to 06:00am)		
	Leq	Lmax	Avg.	Leq	Lmax	Avg.

01/05/23	58	73	65.5	56	78	67
02/05/23	52	78	65	54	80	67
03/05/23	55	74	64.5	53	79	66
04/05/23	54	63	58.5	57	65	61
05/05/23	56	72	64	56	78	67
06/05/23	60	77	68.5	54	80	67
07/05/23	50	75	62.5	52	79	65.5
08/05/23	52	78	65	53	80	66.5
09/05/23	50	70	60	50	82	66
10/05/23	54	89	71.5	51	79	65
11/05/23	51	75	63	54	84	69
12/05/23	53	72	62.5	57	80	68.5
13/05/23	51	75	63	51	79	65
14/05/23	49	76	62.5	50	70	60
15/05/23	56	77	66.5	51	79	65
16/05/23	55	75	65	56	81	68.5
17/05/23	50	76	63	54	85	69.5
18/05/23	56	77	66.5	52	82	67
19/05/23	53	75	64	55	83	69
20/05/23	58	76	67	55	84	69.5
21/05/23	50	77	63.5	49	66	57.5
22/05/23	53	72	62.5	58	76	67
23/05/23	51	74	62.5	54	72	63
24/05/23	52	73	62.5	57	76	66.5
25/05/23	54	78	66	34	78	56
26/05/23	52	70	61	57	82	69.5
27/05/23	55	75	65	40	81	60.5
28/05/23	56	68	62	49	68	58.5
29/05/23	52	76	64	59	80	69.5
30/05/23	53	77	65	55	82	68.5
Total average			64.066	Total average		66.516

Table :4 Biodiversity near maithan ceramic plants

Sl.no	Order	No. of Individual	n/N	p_i	P_i^2	In p_i	piIn p_i
1.	Coconut (Arecales)	10	10/132	0.0757	0.0057	-1.1209	-0.0848
2.	Mango tree (Sapindales)	5	5/132	0.0378	0.0014	-1.4225	-0.0537
3.	Bamboo (Poales)	12	12/132	0.0909	0.0082	-1.0414	-0.0946

4.	Peepal (Ficus religiosa)	05	5/132	0.0378	0.0014	-1.4225	-0.0000
5.	Grass (Poaceae)	100	100/132	0.7575	0.0057	-0.1206	-0.0913

S = 05
Sum of p_i^2 = 0.0224
Sum of p_iIn p_i (H) = 0.3244
Dominance=1/0.0224=44.642
E=H/Hmax
=0.3244/1.61= 0.2014

Discussion- Analysis shows the both minimum noise pollution during day time 32 dB,49 dB and maximum 91 dB, 89 dB range found during the month which are high as per ambient noise quality standard. The average range for one month duration morning time 55.883dB,64.006dB and night time 63.01667dB, 66.516dB in Kamal rice mill and Maithon Ceranic Plant respectively. Biodiversity calculation shows Eveness value 0.2336, 0.2014 which is less than one which indicates diversity is most diverse. The results show that increases in plantations help to reduce noise pollution.

Conculsions -Noise pollution can be control by planting grass and shrub because many researches have evidence that wood species can absorbed noise but not more than grass. It has more toralance range for absorbance of noise pollution. Researcher show that roadside plants act as barrier, sound insulating. (Kumar et al. 2013) (Cook et al. 1978) (Reethof et.al 1973) Even in house indoor plant act as noise absorbed. Varieties of trees shape of leave and canopy have different capacity to absored noise intensity.(Malek et al. 2011)

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