International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2015): 6.391

Sound Pollution Effect on Fish Migration Rate in a Tank Experiment

NTE F.U.

Environmental Physics, Department Of Physics, Faculty of Science, University Of Port Harcourt, Nigeria

Abstract: ***The marine industries have been on a large scale expanse and are likely to endanger the aquatic organism that sustains life on earth. These activities include increase naval traffic, offshore trawlers coming near shore, dredging, seismic activities, rigs and drill ship all of which generate noise, heat and vibration. The aim of this study is to create an experimental scenario of finding out the noise impact on fish fingerlings using the difference between the noise impact in tank and the control study tanks as index. The fish of choice is tilapia Hertrobrancus because of their relative abundance and tolerance in ponds, fresh water and brakish water system. The experimental results show that fish fingerlings respond sharply to impulsive noise of pilling and blast even at low intensity and documented ap-value of 0.00 which is significant and an adaptation sequence of 2.5 if the sound source is notletal at the first instance, which is indicative of attenuation due to the stress of escape. Since migration is a function of locomotion, stress and exposure, it is deductive from existing sound impact studies that life risk, feeding rate, growth rate and reproduction is affected and to a large extent, extinction, if not well managed which calls for a close watch.***

1. Introduction

The need to protect our aquatic organism from sound impact is the subject of this paper. Our field survey reveals that when prey birds come for the chickens, the community raises a waaa noise to scare them away. Campers use explosives or gun short to scare away other wildlife from endangering them at night, while fishermen generate noise to scare the fishes from their hideout unto the net. These few indicative shows that noise have impact on migration and feeding rate of the fishes. The chief of the activities that can cartelize fish migration is dredging in search of sharp sand for building, reclamation for more lands, improvement of navigable roots and canalization to open up new roots and more effective distribution of water. The impact of the dredging is a function of the dredger and the ecological sensitivity index. These impact include earth work to create assess to the river, noise from the generator, cutter suction, pumps which are up to 115dBA±7. The dredging destroys the benthic communities that sustain the aquatic life, makes the river water turbid and reduces sunlight penetration, increase erosion in some cases and possible salt water incursion and causes fish migration from the dredging site, most of which becomes prey in cause of relocation. It generates unhealthy competition and social conflict including other marine dangers. The aquatic and marine studies include:

Afinovi (1990), Ajayi and Adetayo (1982), Alagoa (1990), Alred-Ochiya and Otobo (1990), Awosika (1991), Bayagbona (1979), Dublin-Green and Tohor (1992), Egborge (1993), Elliot (1993), Fagade et al. (1979), F.A.O. (1969, 1994), Moses (1991) Oladimeji (1987), Otobo (1991, 1992), Osibanjo and Bamgbose (1989), Satia (1990), Schneider (1990), Scott (1996), Sikoki and Kolo (1993). They all established base line and industrial impact on the fishery industries, erosion and toxicity. This effort is to experimentally determine sound impact on the fisheries.Studies of sound impact on human being are documented by Abel (1990), Anomohanran and Osemeikhian (2005), Basorun and Olamiju (2013), Bhargava (2001), Bluhm et al., (2007), Boateng and Amedafu (2004), Bronzaft (2000), Debasish and Debajish (2012), Miglani (2010) and Picard et al. (2008). From these studies it is obvious that the impact of noise is enormous on human being and could apply to fishes as living things which is the subject of investigation.

2. Methods

The experimental design involves two Perspex glass through of 60x30x15cmseperated at the middle with a lever grove and a screen aided by a pull rope to take up or return the screen undergravity. The through are marked X and Y at the two terminals, for both the experimental and the control. At intervals of 30minutes, a pendulum bulb is used to randomly strike the either ends while the screen is returned. It was repeated for as much as ten times while the population on either side is taken for both the experimental and the control. The result is as shown in tables 1 and the variance in fig 1 for the experiment and fig 2 for the control.

3. Result and Discussion

The Result of Sound Pollution Effect on the Migration of Fish Fingerlings is as Shown;

Table 1: Showing Distribution Scores during Migration Experiment

Number Of Trails	Experimental Site		Control Site	
	X END	**Y END**	**X END**	**Y END**
1	22	78	48	52
2	16	84	58	42
3	18	82	51	49
4	27	73	43	57
5	24	76	55	45
6	29	71	62	38
7	31	69	42	58
8	35	65	49	51
9	39	61	39	61
10	41	69	54	46
∑	**282**	**718**	**501**	**499**

3.1 Analysis of Result of Sound Pollution Effect on Migration of Fish Fingerlings

A total of 100 fingerlings of tilapia (cichildae) Hemichromis species were used for the experiment.

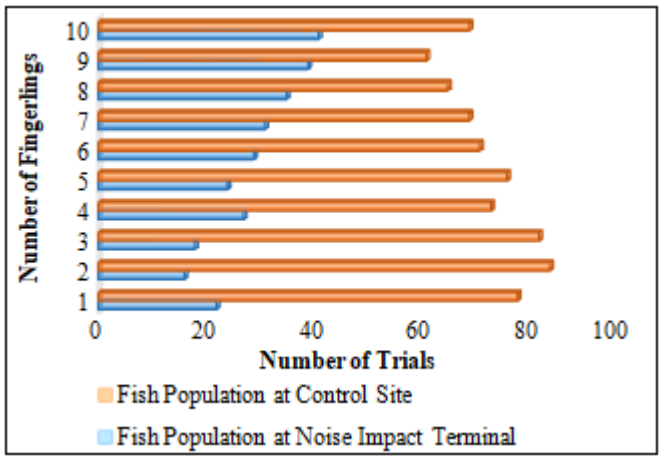

Figure 1: Showing Migration Pattern at Station A

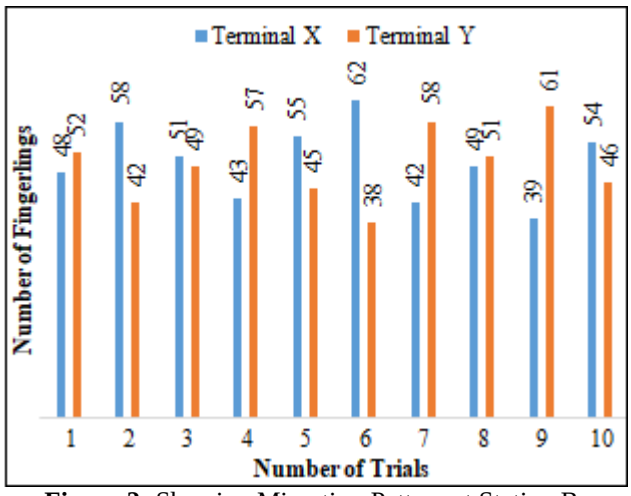

Figure 2: Showing Migration Pattern at Station B

3.2 Computation of Result Using Equation 1

(X_E) Number of fingerlings at the Impact terminal = 282

(X_C) Number of fingerlings at the control terminal = 718

μ = percentage of migration population

$$\mu = \frac{X_E - X_C}{X_E + X_C} * \frac{100}{1}\% \quad 3.1$$

$$\mu = \frac{282 - 718}{282 + 718} * \frac{100}{1}\% \quad 3.2$$

$$\mu = -44\% \quad 3.3$$

3.3 Discussion of Fish Migriation

Fishes generally respond to visual and sound pollution by migration. From table 1 we can see that a lesser number of fish responded to the noise impact at the first trial than during the second and third because of the problem of inertia or adjusting to initial shock.

Fig1 further shows a gradual decrease in migration response to the impact because of adaption to the noise impact or noise situation with time. This implies that fishes respond to noise impact through migration at the initial stages but adjust to the noise situation. If the noise is established to be just sound and not an attack. It could also empty that the fishes respond to initial noise impact by migration but eventually surrender to the danger situation due to exhaustion in which case a 44% negative impact is recorded as likely number of to be impacted.

3.4 Analysis on Sound Pollution Effect on Fish Migration Rate in a Tank Experiment

Experimental Site	Specimen	Mean ± SD	p-value	Remark
Site X	Treatment Control	28.20 ±8.47 50.10 ±7.37	0.00	Significant
Site Y	Treatment Control	71.11 ±8.68 49.67 ±7.78	0.00	Significant

Note: significant at p<0.05

3.4.1 Summary

Result from the analysis shows that there a significant difference of fish migration between the treatment group and control group for the two sites considered for the study.

3.5 Result of Sound Pollution Effect on the Migration of Fish Fingerlings over days

Experiment Site	*Days*	*Mean ± SD*	*p-value*	*Remark*
Site X	1	35.0 ±18.40	1.00	Not Significant
	2	37.00 ±29.70		
	3	34.50 ± 23.30		
	4	35.00 ± 11.31		
	5	39.50 ± 21.90		
	6	45.50 ± 23.30		
	7	36.50 ± 7.78		
	8	42.00 ± 9.90		
	9	39.00±0.00		
	10	47.50±9.19		
Site Y	1	65.00 ± 18.40	1.00	Not Significant
	2	63.00 ± 29.70		
	3	65.50 ± 23.30		
	4	65.00 ± 11.31		
	5	60.50 ± 21.90		
	6	54.50 ± 23.30		
	7	63.50 ± 7.78		
	8	58.00 ± 9.90		
	9	61.00 ± 0.00		
	10	52.50 ± 9.19		

Note: significant at $p < 0.05$

3.5.1 Summary

Analysis of variance (ANOVA) carried out showed that there is no significant difference in the Migration of Fish Fingerlings between the various days sampled out for the study.

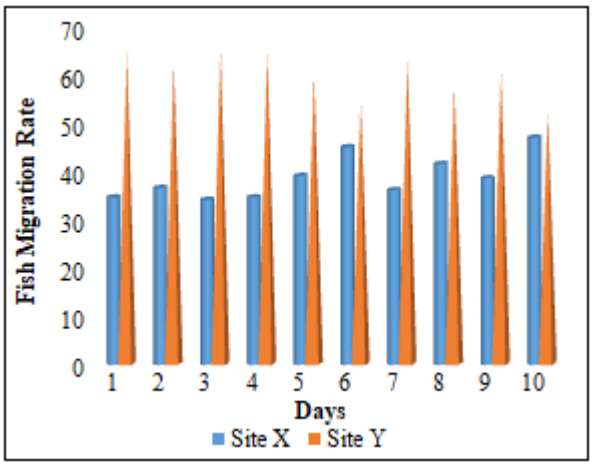

Figure 3: Graph showing the Migration of Fish Fingerlings over days sampled for two different site

From fig 3 above, the results shows that Site X has it highest fish migration of 50 fishes which occurred on day 10 while Site Y recorded its highest fish migration rate on day 3 with 65 fishes.

References

[1] Abel, S.M. (1990). The extra-auditory effects of noise and annoyance: an overview of research. *Journal of Otolaryngology, 19 (1),* 1-13.
[2] Afinovi. M. A. (1990) The Mangrove Oyster Crassostreagasar:Cultivation and Potential in the Niger Delta (Nigeria). Technicalpaper No. 14. NIOMR. Lagos. 10 pp with 3 tables.
[3] Ajayi. T. O. and Adetayo. (1982) On the Fish by catch and discards of the Shrimp Fishery of Nigeria. Technical Paper No. 5 NIOMR. Lagos. 28 pp.
[4] Alagoa. N. C. (1990) Experimental Studies of the Spatfall of the Mangrove Oyster (Crassostrea gasar, Adansons 1757) and the status and potentials of the culture of this oyster in the Niger Delta Region of Nigeria. M.Phil Thesis RSUST. Port Harcourt 152pp.
[5] Alred-Ockiya. J. F. and Otobo. A.J.T (1990) Biological Studies of Ofonitorubuo Lake in the freshwater swamps of the Niger Delta. Rivers State, Nigeria. Journal of Aquatic Sciences 5: 77-82.
[6] Amadi. A. A. (1982) Species Composition, Distribution, and Resource potential of fishes recorded in bottom trawling between 50-200m.
[7] Anomohanran, O. & Osemeikhian, J.E.A. (2005). Comparative Noise pollution Study of Some Major Towns in Delta State, Nigeria. *Global Journal of Pure and Applied..Sciences,* 11 (2), 285-290.
[8] Awosika, L. F. (1991) Geology. Hydrography. Coastal Erosion and Settlement Planning in relation to artisanal fishery development in the Niger Delta Area. In: Proceedings of Fisheries Development Extensionists Training Course. Federal Department of Fisheries 16-20 (286pp).
[9] Basomn, J. O. & Olamiju, 1.0. (2013). Environmental Pollution and Refinery Operations in an Oil Producing Region of Nigeria: A Focus on Warri Petrochemical Company. *Journal of Environmental Science Toxicology and Food Technology,* 2 (6), 18-23.
[10] Bayagbona. E. 0. (1979) Survey of Shrimp Resources of Nigeria. Occasional Paper No. 24 NIOMR. Lagos 59..
[11] Bhargava, G. (2001). Development of India's Urban, Rural and Regional Planning in 21st Century. (115-116), New Delhi: Gian Publishing House.
[12] Bluhm.L. G., Berglind, N., Nordling, E. & Rosenlund, M. (2007). Road Traffic Noise and Hypertension. Occupational and Environmental Medicine. *64 (2), 122-126.*
[13] Boateng, C.A. & Amedofu, G.K. (2004). Industrial noise pollution and its effects on the hearing capabilities of workers: A study from saw mills, printing press and com mills. *African Journal of Health Sciences,* 11 (12), 55-60.
[14] Bronzaft. A.L (2000). Noise: Combating an ubiquitous and hazardous pollutant. *Noise and Health,* 2 (6), 1-8. Clark. C. & Stansfeld, S. A. (2007). The Effect of Transportation Noise on Health and Cognitive Development: *A Review of Recent Evidence.* International Journal of Comparative Psychology, *20, 145-158.*
[15] Debasish. P.& Debasish, B. (2012). Effect of Road Traffic Noise Pollution on Human Work Efficiency in Government Offices, Private Organizations, and Commercial Business Centres in Agartala City Using Fuzzy Expert System: A Case Study. Advances in Fuzzy Systems http://dx.doi.org/10T 155/2012/828593 *-3344.*
[16] Dublin-Green. C. O. and Tobor, J. G. (1992) Marine Resources and Activities in Nigeria. NIOMR Tech.Paper No. 84-25pp.
[17] Egborge, A. B. M. (1993) Problems of Aquatic Resources Conservation:
[18] A case study of Nigerian Fishes. In Proceedings of the National Conference on Conservation of Aquatic Resources. NAFESCON 150-167.
[19] Elliot. O. O. (1993) Nigerian Coastal Fisheries Resources: Effort at Survival. Proceedings of National Conference on Conservation of Aquatic Resources. NARESCON 168-178
[20] F'.A.O. (1969). Fisheries Survey in Western and Mid-Western Region. Nigeria Final Report. UNDP/FAO ROME. 142 pp.
[21] F.A.O. (1994) "CECAF Statistical Bulletin No. 7: Nominal Catches 1979-1991 FAO Rome 334 pp.
[22] Fagade. S. O.. Adebisi. A. A. and Ugwumba. O. A. (1991) Conservationof Aquatic Resources through Aquaculture. In Proceedings of the National Conference on Conservation of Aquatic Resources. NARLSCON. 176-183
[23] Miglani, D.G (2010). Noise Pollution*:* Sources, Effectsand control *http://depssa.ignou.ac.in/wiki/index.php/Noise_Pollution*
[24] Moses. B. S. (1991) Fisheries Resources of the Nigerian South Eastern States of Akvva Ibom. Cross River and Rivers States. In Proceedings of Fisheries Development Extensionists Training Course. Federal Department of Fisheries. 236-260
[25] Oladimeji, A. A. (1987) Impacts of Oil Pollution on Nigerian Fishing Industry. Nigerian Journal of Applied Fisheries and Hydrobiology. 2: 81-90

[26] Osibanjo. O. & Bamgbose. O. (1989) Baseline Studies on toxic chorinated hydrocarbons in Nigerian Marine Fishes and Shellfishes. Proceedings of NAAS: 106-120
[27] Otobo, A. J. T. (1991) Threats from Siltation and use of Pesticides on Fish Production in the Freshwater Swamp Lakes of the Niger Delta Floodplain. Rivers State. Paper presented at the 6th Annual Conference of NAAS. Benin City. Edo State. 1 2p.
[28] Otobo. A. J. T. (1992) The Catch and Contribution of Freshwater Clupeids to the atalla catch of the Nun River, Niger Delta. Paper presented at the 7th Annual Conference of NAAS. Ilorin, Kwara State.
[29] Picard, M., Girard, S.A., Simard, M., Larocque, R., Leroux, T. & Turcotte, F. (2008). Association of work- related accidents with noise exposure in the workplace and noise-induced hearing loss based on the experience of some 240, 000 person-years of observation. *Accident Analysis and Prevention,* 40 (5), 1644- 1652.
[30] Satia. B. P. (1990) (Ed) National Review for Aquaculture Development in Africa: Nigeria. FAO Fish. Circ: (770.29) 191 pp.
[31] Schneider. W. (1990) FAO Species Identification Sheets for FisheryPurposes. Field guide to the commercial marine resources of the Gulf of Guinea. FAO Rome. 268pp with plates.
[32] Scott. J. S. (1966) Report on the fisheries of the Niger Delta Special Area. NDDB 109 pp.
[33] Sikoki. F. D. and Kolo. R. J. (1993) Perspectives in water pollution and, their implication for conservation of Aquatic resources. Proceedings of National Conference on Conservation of Aquatic Resources. NARLSCON. 184-192