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ORGANOCHLORINE PESTICIDES ANALYSIS OF USHIE WETLANDS FOR CAGE AQUACULTURE IN SECONDARY SCHOOLS AS A TOOL FOR EDUCATION REORIENTATION IN NIGERIA

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Abstract: **This was an ex-post facto research that investigated the content of organochlorine pesticides in the wetlands in Ushie. The study answered 3 research questions and tested a hypothesis, and in achieving these, the research area Ushie wetlands were mapped out into 5 research blocks and water samples collected with plastic sample bottles from 5 spots in each block at 10cm depth, bulked and composites taken, fixed with HNO_3 and stored in ice cooled boxes for analysis. The analytical standard adopted is USEPA 20160 and the instrument of determination used was Agilent 6100 series single quadrupole LC/MS. The mean results obtained were; α-HCH, 0.21±0.01 µg/l, β-HCH0.02±0.1 µg/l, γ-HCH, 0.02±0.10 µg/l, g-HCH 0.03±0.01 µg/l and adrin 0.05±0.10 µg/l. The mean results of the pesticides were subjected to test of significance with ANOVA using SPSS model 29 at 0.05 level of significance. The p value is 0.48 thus rejecting H_0. The study concludes that the wetlands is contaminated with the pesticides investigated above the permissible levels recommended by WHO. It recommends; that cage aquaculture should not be implemented in the wetlands, the source of pollution should be identified and blocked and remediation of the wetland should be embarked upon.**

Keywords: **wetlands, cage aquaculture organochlorine pesticide, bioaccumulation, human health.**

1. INTRODUCTION

Sustained economic growth and development of a country is predicated on reorientation of its educational curricular in line with global changes in science and technology. Orientation is change in direction or focus and ways of doing something (Jones, 2018, Petterson, 2019). It is the act of thinking out a new way of doing a thing, a change in method of implementation and direction of achieving a purpose (Charles, 2020, Johnson, 2021, Clark, 2022). Reorientation according to Brandy (2018) Samuel (2020) is the ability to determine your current position, assessing the achievements and figuring out other ways of achieving a better result. Reorientation is rerouting a thing or process to the right direction from the current stand point, a new way to achieving a better result (Edward, 2018, Phillip, 2021). It is the act of changing the position of something, a process to a different direction for the sole purpose of achieving a higher result (Bill, 2018, Sunil, 2020). Reorientation is to reorganize, reposition and redirect a thing or process for greater achievability (Benson, 2018, Patric, 2016). It is realignment reordering, refocusing and repositioning of a policy, process or thing for the better goal achievement or a higher dividend (Baldwin, 2018). Rapheal (2019) state that reorientation is rearrangement, adjustment and refocusing of a

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programme or policy while Morrison (2019) asserts that education policy reorientation is reorganization and retooling of education programmes and processes. Donkor (2021) asserts that for the education of any country to have meaningful impact on the recipient, it must be constantly be subjected to methods and process reorientation. This view was corroborated by Nwankwo (2021), Muhammed (2022). Tando (2023) who reiterated that Nigeria education curricular needs reorientation towards information technology, vocational and technical skills inline with global changes. Nigeria educational curricular from primary to tertiary level need total reorientation to vocational, technical and information technology; for the recipient to remain relevant in global politics and for economic growth and job creation (Asugo, 2020, Okere, 2021, Omorodion, 2022). According to Akpan (2021) Okogwu (2022) Nigeria educational curriculum is in dire need of re-orientation from emphasis on rote learning to manipulative skills for youths empowerment and employment creation.

According to Nigeria Bureau of Statistics (2023) 40.1 percent of Nigeria's youths were without jobs in the last quarter of 2022. International Monetary Fund (2022) revealed that Nigerians who are not gainfully employed are 41.5 percent while World Bank (2022) put the rate of Nigerians without jobs at that 42.4 percent.

Nigeria youths should venture into agriculture such as vegetable production, snail keeping, mushroom production amongst other ventures in agriculture (Obadoni, 2021). This stand point was supported by Adebola (2021), Tahir, (2022) that Nigeria youths should take to agriculture especially aquaculture for empowerment, job creation and food security. Afolabi (2022) in same vein advised youths to venture into aquaculture through deployment of cage aquaculture due to its low financial demand at take off and during production.

Nigeria annual fish demand is 1.1 million metric tonne while the local production is 800,000 metric tonnes (NBS, 2021). The short fall in demand and supply is bridged through importation. Cage aquaculture is the process of raising fish in a cage placed and anchored in existing natural water source (Ogwu, 2021). Water analysis must be conducted before the deployment of cage aquaculture for possible water pollutants to ward off bioaccumulation and biomagnification (Ogwu et al., 2022). Water pollutants as listed by Atshana and Atshana (2021) and United State Environmental Protection Agency (2012) include microplastics, polyaromatic hydrocarbons, detergents, heavy metals, pesticides such as carbamate, organophosphate and organochlorines. Organochlorines are compounds containing carbon and chlorine atoms that are used in pesticides formulation (Ogwu et al., 2023, USEPA, 2012). Bioaccumulation is the ability of a toxicant in aquatic environment to gain access to organism's tissues while biomagnification is the characteristics ability of the toxicant to multiply in rapid succession once in the organism (USEPA, 2012).

The effect of organochlorine in human include cancer, bone degeneration, osteoporosis, cardiovascular diseases and memory decline (World Health Organisation, 2018, USEPA, 2012). Wetland is an ecosystems that can habour water for 3 to 6 months in a year (Ransar Convention, 1971, Ogwu et al., 2022, Ogwu et al., 2022).

The focus of this study is the determination of the organochlorine content of Ushie wetlands for its suitability for the adaption of cage aquaculture in secondary schools as a tool for educational reorientation and for youths empowerment, job creation, poverty eradication and food security in Nigeria.

The organochlorine pesticides investigated are alpha lindane (a-HCH) beta lindane (β-HcH), delta lindane (γ-HcH), gama lindane (g-HCH) and adrin.

Research Questions

The study was guided by research questions as below:

1. what are the concentrations of α-HCH, β-HCH, g-HCH, and adrin in Ushie wetlands.
2. are the concentrations of the organochlorine pesticides within maximum permissible concentrations as stipulated by WHO 2014
3. can cage aquaculture be deployed in the wetland.

Hypothesis

This study was quided by a hypothesis as below:

H_o: There is no significant difference between the concentrations of the organochlorine pesticides investigated and WHO MPC for organochlorine pesticides in water.

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Study Area:

Source: Map of Ushie

Ushie is a sparsely, populated linear wetland community in Ndokwa East local government area Delta state Nigeria. It lies within the geographical coordinates of latitude 5.6286°N and longitude 6.3319°E with a land area of 17,698 59 km (6,8338m) and a population of 5,663,400 (National Population Commission, 2006). Ushie people are predominantly farmers and fishermen. Some are artisans while some are petty traders. A very few of the people are civil servants working as teachers in primary and secondary schools and in the Health centre. Ushe is surrounded by wetlands that receive the farm imput wastes, such as pesticides and fertilizer through runoffs and erosion.

2. MATERIALS AND METHODS

Sampling: Ushes wetlands were mapped out into research block tagged ABCDE (Soglo, 2016, Abdulai, 2020). From each of the research blocks water samples were collected at the depth of 10cm from 5 spots with clean plastic sampling bottle and covered subsurface. The samples were bulked and composites collected were fixed with nitric acid to avoid oxidation and placed in ice cool boxes for laboratory analysis.

Analysis: The laboratory analysis was carried out at the Marine Pollution Laboratory of the National Institute of Oceanography and Marine Research Victoria Island Lagos.

The analytical method adopted was United State Environmental Protection Agency (USEPA) 20106 as described by Derrek (2018). The samples were placed in clean beakers rinsed with deionized and double distilled water. 5g of Sodium sulphate and 3 ml acetone inetroleum spirit were added and made to 50:50. The beakers were swirled vigorously for thorough mixing and left to settle for 30 minutes. The extraction processes were repeated twice and the extract used to determine the organochlorine pesticides under investigation using Agilent 6100 series single quadrupole liquid chromatography and mass spectroscopy.

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3. RESULTS

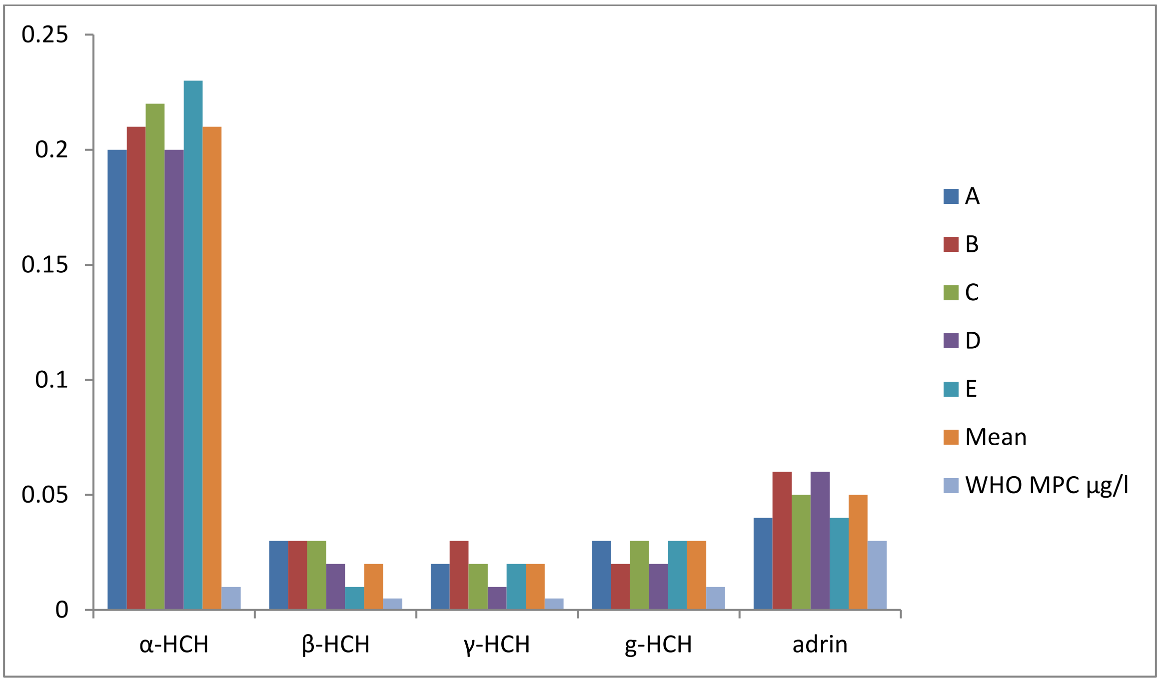
Results of the organochlorine pesticides investigated in Ushie wetlands are as in Table I.

Table 1: Results of the organochlorine pesticides content in Ushie wetland and WHO MPC in µg/l

	A	B	C	D	E	Mean	Sd	WHO MPC µg/l
α-HCH	0.20	0.21	0.22	0.20	0.23	0.21		0.01
β-HCH	0.03	0.03	0.03	0.02	0.01	0.02		0.005
γ-HCH	0.02	0.03	0.02	0.01	0.02	0.02		0.005
g-HCH	0.03	0.02	0.03	0.02	0.03	0.03		0.01
adrin	0.04	0.06	0.05	0.06	0.04	0.05		0.03

The organochlorine pesticides content of Ushie wetland were presented in graph as in Figure 2.

Figure 2: organochlorine pesticides in Ushie wetland and WHO MPC in µg/l.



The mean contents of the organochlorine pesticides in Ushie wetlands were subjected to test of significance deploying analysis of variance using special package for social science (SPSS) model 29 at 0.05 level of significance. The *p* value was 0.48 thus rejecting the H_0.

4. DISCUSSION

Analysis of Ushie wetlands water for the contents of organochlorine pesticides showed varying concentrations of the pesticides investigated.

The concentrations αHCH the analysis revealed was between 0.21µg/l to 0.23 µg/l with a mean concentration of 0.21 µg/l. World Health Organisation maximum permissible concentration for in water is 0.01 µg/l. The concentration of αHCH is higher than acceptable limit. This result is similar to the reports of Nwosu and Ikediashi (2018) in Omanbala River Anambra state. Ogwu et al., (2022) also recorded similar result in the Niger-Delta wetlands. The analysis of water in Ushie wetlands showed that the concentration of βHCH was between 0.01µg/l to 0.03 µg/l with a mean concentration of 0.02 µg/l. The acceptable critical point by WHO is 0.005 µg/l. Thus, the concentration of βHCH is higher than acceptable level. Omokhudu (2018) gave a similar report of high βHCH in Ikpoba River, Benin, Edo state. The report is also similar to Ogwu et al., (2022) in Niger-Delta wetlands. The analysis of water in Ushie wetland also revealed that the concentration of γ-HCH varied from 0.02 µg/l to 0.03 µg/l with a mean content of 0.02 µg/l. The maximum permissible content for γ-HCH in water

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recommended by WHO is 0.005 µg/l. This level recorded is visibly higher than acceptable limit. Clarke and Adeyemi (2020) recorded similar report of high γ-HCH in Olomoge wetlands in Badagry Lagos. Ogwu et al., (2021) also reported similar report in Ashaka wetlands Delta state, Nigeria.

The concentration of g-HCH in Ushie wetland as shown by the analysis is between 0.02 µg/l to 0.03 µg/l with a mean concentration of 0.03 µg/l. The WHO MPC for g-HCH in water is 0.01 µg/l. This report of increased y-HCH is similar to the reports of Ogwu, (2020). Osagide (2020) also gave similar report in Gelege wetlands in Benin City, Nigeria.

Wetland water analysis report of Ushie wetland also showed that the concentration of adrin was between 0.04 µg/l to 0.06 µg/l with a mean concentration of 0.05 µg/l. The acceptable limit for adrin in water by WHO is 0.30 µg/l. A similar report of high content of adrin in water was in Ogwu et al., (2022), Ogwu et al., (2021). Okolie and Osawaru (2021) also gave similar report of high adrin in Abudu wetlands in Edo state.

5. CONCLUSION AND RECOMMENDATIONS

The aspiration of any country is to achieve economic growth and development for improve standards of living for its citizen. Job creation, youths empowerment are recipes for achieving such goals and youths aquaculture have been highly favoured as a valuable tool for achieving such goals. Aquaculture requires good quality water for its implementation and that underscores this study in organochlorine analysis of Ushie wetlands for its suitability for cage aquaculture in secondary schools as a model for education reorientation in Nigeria. The results of the analysis showed that the wetland is polluted with the pesticides investigated and therefore not suitable for cage aquaculture deployment at its present state.

Following to this result, the study recommends that:

1. cage aquaculture should not be implemented in Ushie wetland.
2. the source of pollution should be identified and stopped.
3. remediation of the wetland should be commissioned to restore the wetlands to their hitherto pristine status for provision of ecosystem services and to allow for the deployment of cage aquaculture in secondary schools in Ushie and environs.

REFERENCES

[1] Jone M. C. (2018). Reorientation meaning https://www.dictionary.org 10023412

[2] Petterson, J. (2019). Reorientation meaning and definition https://www.vocabulary.com 121421321

[3] Charles, F. (2020). Reorientation https://www.collinsdictionary.com 211124200

[4] Johnson, S. C. (2021). Reorientation. https://www.dictionary.com_browse 10002121

[5] Clarke, P. C. (2022). Reorientation definition. https://www.lecrener.com 10002124.

[6] Edward, C. A. (2018). Reorientations meaning. https://www.oxfordnews.com 00123412

[7] Philip, S. O. (2021). Reorientation, verb, parties. https://www.mariam-webster.com 100021212

[8] Sunil, A. (2020). Reorientation, definition and meaning. https://youdictionary.com 21210021

[9] Benson, J. C. (2018). Reorientation definition meaning. https://www.freedictionary.com 123000212

[10] Patrick, B. C. (2016). Reorientation. https://www.thefreedictionary.com 012123012

[11] Baldwin, F. (2018). Reorientation. https://www.difinition.net

[12] Morrison, A. C. (2019). Reorientation. https://www.en.mwikitionary.org.wiki 100272152.

[13] Rapheal, M. (2019). Reorientation https://www.w.igiglobal.com 210021012

[14] Donkor, J. C. (2019). Reorientation of education key to growth and development in Africa. https://reorientation.of.africa.education.in.africa.com 102121021

[15] Okonkwo, C. C. (2021 6 May). Nigeria education requires reorientation. Punch news. Pp. 50.

[16] Muhammed, F. Q. (2022, 4 June). Why reorientation of Nigeria education is imperative. Vanguard news pp. 48.

[17] Tando, P. C. (2022 7 August). Federal government of Nigeria should reorientate her educational curriculum. Guardian news pp. 51.

[18] Ajugu, M. P. (2020). A case for educational reorientation in Nigeria. A keynote address National Conference of Education administrators Mina.

[19] Okeme, F. C. (2022 6 November). Reorientation schools curriculum federal government advised. Vanguard news, pp. 49.

[20] Omirodion, O. P. (2022 9 April). Why reorientation of Nigeria educational system is necessary. Tribune New, p. 33.

[21] Akpan, A. T. (2021). The case for educational reorientation in Nigeria. A lead paer presentation Annual International Conference curriculum society of Nigeria, Lagos.

[22] Okogwu, L. C. (2022). Federal government should reorientate youths education. A keynote address. Nigeria social studies association. Annual conference Uyo.

[23] National Bureau of Statistics (2023). Nigeria unemployment rate. An NBS publication Abuja, Nigeria.

[24] International Monetary Fund (2022). Unemployment in sub-Saharan Africa. IMF publication Washington DC USA.

[25] World Bank (2022). Unemployment in Africa south of Sahara. World Bank publication. Washington DC USA.

[26] Obadoni, S. C. (2021). Youths agriculture a panacea to unemployment in Nigeria. A keynote address Nigeria agricultural education teachers association. Obudu Cross River State.

[27] Tahir, J. T. (2022 8 July) Solve unemployment with youth involvement in agriculgture. Punch news, pp. 50.

[28] Adegbola, F. C. (2021 12 December). Why the youths should embrace agriculture. Leadership news paper, p. 48.

[29] Afolabi, F. C. (2022). Evaluation of cage aquaculture adoption in Ogun state. *Journal of Extension Agriculture* 18(3), 90-96.

[30] National Bureau of Statistics (2021). Nigeria annual fish production and demand. NBS Publication Abuja, Nigeria.

[31] Atshana, D, and Atshana, F. s. (2012). Environmental Chemistry. New Delhi: Schand Publishers.

[32] United State Environmetnal Protection Agency (2012). Organochlorine in the environment. A UsEPa publication atland Georgia

[33] World Health Organisation (20180. Effect of organochlorine pesticides in human health. WHO publication, Genera Switzerland.

[34] Ransar, Convention (1971). Convention on wetlands of international importance. Ransar, Iran.

[35] Sogho, J. (2016). Samples management in marine science. Lagos: Zanzar Book Ltd.

[36] Abdulai, S. O. (2020). Sampling in hydrobiology. Ibadan: Lukman Books Ltd.

[37] Derrick, J. C. (2018). United States Environmental Protection Agency organochlorine pesticide determination method, 26123.

[38] Nwosu, D. and Ikediashi, A. A. (2018). Organochlorine pesticide content of Omanbara River, Anambra state, Nigeria. *Journal of Marine Pollution* 17(3), 41-48.

[39] Omoikhudu, P. C. (2018). Pollution chemistry of Ikpoba River. *Journal of Environment and Ecology* 18(2), 121-127.

[40] Clarke, T. A. & Adeyemi, F. C. (2018). Organochlorine pesticides analysis of Olomoge lagoon, BAdagry, Lagos, Nigeria. *Journal of Chemical Society of Nigeria.* 21(3), 103-109.

[41] Osagide, L. A. (2020). Wetland pollution of gelegele wetland. *Chemosphere* 144: 212-218.

[42] Osagie, M. C. & Ojawaru, C. C. (2021). Organochlorine pesticides quantification of Abudu wetland, Edo State, Nigeria. *Journal of Marine Pollution* 31(2), 241-247.

International Journal of Recent Research in Interdisciplinary Sciences (IJRRIS)
Vol. 10, Issue 2, pp: (81-87), Month: April - June 2023, Available at: www.paperpublications.org

[43] Ogwu C, Imobighe M, Okofu S, Attamah F (2022), Speciation of heavy metals in fish species in the wetlands of oil-bearing communities of the Niger Delta; IJB, V21, N2, August, P169-178. https://innspub.net/speciation-of-heavy-metals-in-fish-species-in-the-wetlands-of-oil-bearing-communities-of-the-niger-delta/

[44] Ogwu C. (2021). Heavy metals loadings of *Telfairia occidentalis* (Fluted pumpkin) grown in Ekpan (Host community of Warri Refinery and Petrochemical) Nigeria. Quest Journals: *Journal of Research in Agriculture and Animal Science.* 8(1), 16-20

[45] Ogwu C., Azonuche J E and Okumebo V. O. (2021). Heavy metals content of *Telfairiaoccidentalis* (fluted pumpkin; order: Violales, Family: Cucurbitacea) grown in Ebedei (An oil and gas bearing community) Niger Delta, Nigeria. Quest Journals: *Journal of Research in Humanities and Social Science.* 9(4), 74-78

[46] Ogwu C., Azonuche J. E and Okeke, M. (2020). Heavy metals contamination status of *Telfairia*occidentalis (Fluted pumpkin) grown in Uzere oil rich community, Niger Delta. Quest Journal*: Journal of Research in Agriculture and Animal Science.* 7(7), 12-17

[47] Ogwu C., Azonuche J., and Achuba F (2021). Heavy metals quantification of Telfairia occidentalis (Fluted pumpkin, Order: Violales, family: Cucurbitaceae) grown in Niger Delta oil producing areas. International Journal of Biosciences. 13(2) 170-179.

[48] Ogwu C., Ideh Victor, Imobighe Mabel (2022), Bioaccumulation of heavy metals in some pelagic and benthic fish species in selected wetlands in oil-bearing communities of the Niger Delta; International Journal of Biosciences. 20 (6), Pp. 128-139. https://innspub.net/bioaccumulation-of-heavy-metals-in-some-pelagic-and-benthic-fish-species-in-selected-wetlands-in-oil-bearing-communities-of-the-niger-delta/