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Research Paper

Speciation Of The Organochlorine Pesticides (OCPS)In Ashaka Wetland Ndokwa East For Cage Aquaculture In Secondary Schools As A Recipe For Education Reformation In Nigeria

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ABSTRACT
This study investigated the organochlorine pesticides content inAshaka wetland for cage aquaculture in secondary schools. It answered 4 research questions and tested a hypothesis. To achieve these, Ashaka wetland was mapped out into 5 research cells. From each of the research cells water samples were collected from 5 sampling spots bulked and composites drawn, fixed with HNO_3 and placed in ice cooled boxes for analysis. The analytical standards adopted were APHA and CEAM and the analytical instrument used in the determination of the OCPs is Agilent LC/MS 6100. Results obtained are;adrin,range from 1.23 µg/l to 1.86 µg/l with a mean of 1.38 µg/l heptachlor content range from 0.90 µg/l to 0.99 µg/l with a mean of 0.95 µg/l, cis chlordane range from 1.21 µg/l to 1.42 µg/l with a mean of 1.33 µg/l.the concentration of αHCH range from 0.62 µg/l to 0.89 µg/l with mean of 0.76 µg/l while βHcH concentration range from 1.44 µg/l to 1.92 µg/l with a mean of 1.66 µg/l. The mean concentrations of the OCPs were subjected to test of significance with ANOVA using SPSS model 21 at 0.05 level of significance. The p-value is 0.43 thus rejecting H_0. The study recommends that cage aquaculture should not be deployed in Ashaka wetlands because of OCPs pollution the sources of OCPs into the wetland should be investigated and checked and remediation should be carried out to allow for the use of cage aquaculture and for healthy fish for both local and international consumers.

Keywords: *cage aquaculture,organochlorine pesticides, contamination, remédiation*

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I. Introduction

Economic growth, development and stability of any nation is predicated on the quality of education of that country and for the education to meet up with ever changing global trends, it must be subjected to consistent reformation. Reformation, according to Pedro (2016), Teddy (2017) is a marked change in nature, shape or form. It is to make new,changing the look or nature (Piccolo, 2018, Joseph 2018).Reformation in the review of Andrew (2014) is a total change in character, appearance, form, or shape. Reformation is transforming, change in composition, structure or mode (Macduff 2017, Samson 2019). Succinctly put by Edwin (2018) reformation is to remodel, to recast and restructure a thing, method or process. Reformation is total overhauling, a turnaround, a metamorphosis, a mutation or transmutation (Conrad 2015, Betrand(2017), Arnold (2018), Kelvin (2018), Felix (2019) encapsulate transformation as a total change, transformation, transmogrificationof a thing, a system or process. Transformation is creating something new from the old structure for more acceptability. Charles (2017) opined that transformation with respect to organization is transforming an organisational policy or programme,it entails total overhauling of the organisational mode of operation or changing the policy or programme thrust for higher profitability or service delivery. Harrison (2012) sees transformation in education as total restructuring of the curriculum for better product output. Okpaloka (2017), Haliru, (2019) believed that Nigeria education requires total transformation from scholarship to manipulative and psychomotor basecurruculum. This position was equally canvassed by Odia (2018), Omajuwa (2019) that transformation in our educational curriculum is imperative to make the products of our secondary schools to be job creators rather than job seekers. Nigeria educational curriculum should wean itself from British fed curriculum of rote learning

and scholarship to technical and vocational education curriculum to empower the youths (Olokor, 2019, Ochu, 2020), while Arinze (2019), Adebayo (2019), Sodiq (2018) admonished the policy makers and monitoring agencies to ensure adequate provision of implementation equipment and materials for trade subjects especially in fishery and aquaculture for job creation and food security.This was reiterated by Maduba, (2017), Abe (2019) that senior secondary school students should be encouraged to venture into aquaculture after graduation in line with the trade curriculum for job creation, wealth generation and food security.

Fish is important to man because it contains all the nutrients needed by humans for healthy living (Ajanuku, 2018). Fish is the easiest way rural population can achieve their daily protein requirement of 50g/day for men and 46g/day for women, as recommended by the World Health Organisation (Clark, 2018, Muhamed, 2016). Nigeria annual fish requirement is 3.1 million metric tonnes while the local production is 900,000 metric tonne (Adeosun, 2016, National Bureau of Statistics (NBS), 2021). Fish import bill of Nigeria in 2021 was 500 billion naira and Nigeria stands as the greatest fish importer in Africa (Ruwani, 2022, Oteriba, 2022, NBS, 2021). Ogwu (2020) advised youths and fresh secondary school graduates to take up aquaculture by deploying cage aquaculture method because it is less capital demanding. Cage culture is the art of raising fish in a cage placed and anchored in an existing body of water (Ogwu&Okonji, 2021). Lawal (2017) Bamgboye (2015) advised that water analysis should be conducted on the body of water to be so involved in cage aquaculture for the presence of toxic substances to ward off bioaccumulation and biomagnification. Posible water pollutants as listed by Ogunbiyi (2010), Jobdi (2012) are polyaromatic hydrocarbons (PAHs), furans, dioxins, detergents, microplastics, heavy metals, pesticides such as carbamate, organophosphate and organochlorine pesticides (OCPs). Bioaccumulation is the tendency of toxicants in an aquatic ecosystem to gain entry into the tissues and cells of aquatic organisms while biomagnification is the propensity for the toxicants once in the organisms tissue to multiply in geometry. (American Environmental Protection Agency (USEPA), 2012).Organochlorines are compounds containing carbon and chlorine atoms which are used in pesticide formulation (Ogwu, 2020). Prolonged exposure and ingestion of OCPs by humans will result in health complications as nausea, tremour, seizure, cancer of the lung, gastrointestinal disorder (International Agency for Research in Cancer (IARC), 2010), Agency for Toxic Substances and Disease Registry (ATSDR), 2012). Wetland is an ecosystem that has the capacity to harbour water for 3-6 months of the year (Ramsar, 1971, Ogwu&Attamah, 2022). The thrust of this study is the determination of the concentration of the organochlorine pesticides in Ashaka wetlands for cage aquaculture in secondary schools for educational transformation in Nigeria. The OCPs to be investigated are adrin, heptachlor, cis-chordane, alpha-lindane (αHCH) and beta-lindane (βHCH).

Research Questions

The study is guided by research questions as below:

1. What are the content of the OCPs in Ashaka wetlands
2. Are the concentration of OCPs within the limit stipulated by WHO (2014).
3. Can cage aquaculture be deployed in Ashaka wetlands
4. Can the produce from the Ashaka wetland meet Codex 1963 standards.

Hypothesis

This study is guided by a hypothesis as follows:

H_o: There is no significant difference between the concentrations of OCPs in Ashaka wetlands and WHO maximum allowable concentrationsfor OCPs in water.

Area of Study

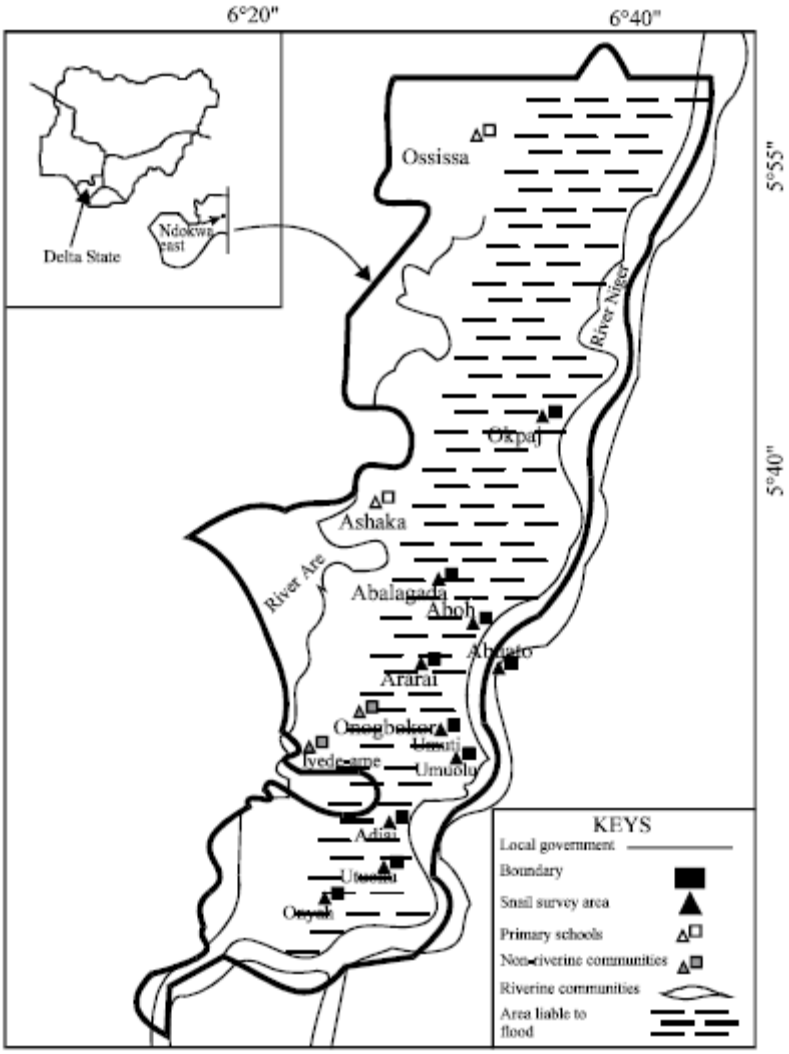

Figure 1: Map of ndokwa east showing ashaka
Source: Chinyere&Anyalebechi, (2017)

Ashaka is a clan in NdokwaEast local government area of Delta State. It is situated in the geographical coordinates of 5° 639′ N and 6° 399′ E and has a population of 5,255 inhabitants (National Population Commission, 2006). The people of Ashska are mainly farmers and fishermen, some are petty traders and artisans while a few work as civil servants teaching in secondary schools, some work in customary Court, maternity and hospital (Ndanenu, 2013). Ashaka is a wetland settlement and the farmers employ chemical pest control in their operations andthis is evident in the presence of backpack sprayers in everyhousehold in Ashaka.Thewetland remains the recipient of the agricultural wastes through runoffs, flash floods and erosion.

II. Materials and Methods

Ashaka wetland on the four flanks of the settlementwas divided into 5 research cells (Adegoke, 2012, Ajayi, 2015). From each of the research cells, water was sampled with a clean plastic sampling bottle from 5 spots at 10cm depth. The samples from each cell were bulked and composite drawn and fixed with nitric oxide to prevent oxidation then placed in ice-cool boxes for laboratory analysis. The analytical standards adopted were American Public Health Association Standard and Chemical Analysis for Ecological Matter (CEAM) standard. The analytical instrument deployed for the determination of the OCPs areAgilent 6100, series single quadrupole liquid chromatography and mass spectrometry (LC/M) 6100.

III. Results

The result obtained are as in Table 1

Table 1: result of the OCPs investigated and the WHO 2014 maximum allowable concentration for OCPs in water in µg/l

Parameter	LOCATIONS					Mean	SD	WHO in µg/l
	A	B	C	D	E			
Adrin	1.23	1.02	1.86	1.53	1.28	1.38	0.32	0.3
Heptachlor	0.99	0.97	0.98	0.91	0.9	0.95	0.04	0.1
Cis chlordane	1.26	1.43	1.33	1.21	1.42	1.33	0.10	0.005
Alpha lindane	0.89	0.62	0.67	0.88	0.72	0.76	0.12	0.01
Beta lindane	1.44	1.45	1.67	1.81	1.92	1.66	0.21	0.01

The mean concentration of the OCPs in Ashaka wetland presented as in Figure 2.

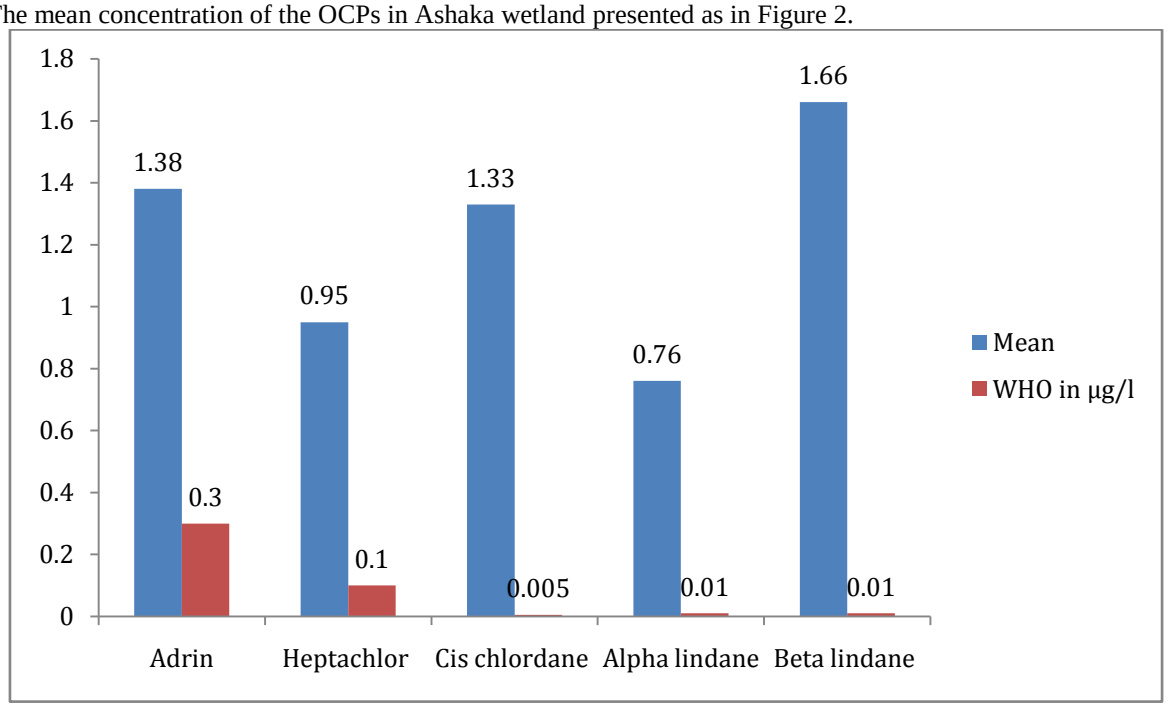

Figure 2: OCPs in Ashaka wetlands and WHO (2014) maximum allowable concentration in Ug/l

The mean concentrations of the OCPs were subjected to test of significance with analysis of variance (ANOVA) with social package for social science (SPSS) model 21 at 0.05 level of significance. The p-value is0.43 thus rejecting H_o.

IV. Discussion of Findings

The analysis of the OCPs in Ashaka wetland presented varying concentrations of the variables investigated.

The analysis showed that the concentration of adrin in Ashaka wetland range from 1.02 µg/l to 1.86 µg/l with a mean of 1.38 µg/l. The WHO maximum allowable concentration for adrin in water is 0.30 µg/l,This result of increased adrin in water is similar to the reports of Ajakaiye and Olumo (2015) in Ose River Ondo state and Abdulai(2016) in Gamji River Gombe State.

The investigation of the OCPs in Ashaka wetland also revealed that the concentration of heptachlor range from 0.90 µg/l to 0.99 µg/l with a mean of 0.95 µg/l. The WHO (2014) acceptable limit for heptachlor in water is 0.10 µg/l,Thusthe heptachlor content in Ashaka wetland is higher than maximum allowable limit. A similar result was presented by Odia (2019) in Ovia River Benin City and Ojikutu (2015) who also reported high heptachlor in Ogunpa River Ibadan Oyo State. The investigation of OCPs in Ashaka wetlands also showed that Cis chlordane content range between 1.21 µg/l to 1.43 µg/l with a mean concentration of 1.33 µg/l.The WHO (2014) maximum allowable concentration for cis chlordane in water is 0.005 µg/l. thus the cis chlordane content in Ashaka wetland is higher than the acceptable limit. Increased concentration of cis chlordane was

reported by Lam and Ikpe(2014) in KatsinaAla River Benue state. Ogwu et al., (2022) also reported high concentration of cis chlordane in Otorgo wetlands in Ughelli Delta State.

The investigation of the OCPs content of Ashaka wetland presented the concentrations of alpha lindane (αHCH) of range of 0.62 µg/l to 0.89 µg/l with a mean concentration of 0.76 µg/l. The maximum allowable concentration for αHCH in water is 0.01 µg/l. this concentration is higher than the acceptalbe limit for αHCH in water. A similar result was reported by Odalonu and Wigwe (2018) at Osamala wetland in Anambra state. This report is however a variation from the reports of Ogunbambi and Omiyale (2016) in Olomoge Lagoon Lagos. The wetland water analysis of Ashaka wetland revealed that the beta lindane (βHCH) content range between 1.44 µg/l to 1.92 µg/l with a mean concentration of 1.66 µg/l. The WHO (2014) maximum allowable concentration for βHCH in water is 0.01 µg/l. This concentration is above the acceptable limit. Oyeneye (2014) reported similar concentration of βHCH in Ominla in Osun state. Also Ekpo and Lember (2017) gave similar report in Omanbala River, Anambra state.

V. Conclusion

Education is the master key for unlocking every potential in the economy of any nation for it to be at par in comity of nations in job creation for the youths, wealth generation and food security. To achieve these, the education system and curriculum require constant restructuring and reformation. Severalmodels have been suggested as toolsfor job creation, and food security but the most highly recommended is youths empowerment through skill acquisition in aquaculture especially aquaculture adopting low capital intensive cage aquaculture. Good quality water is a factor in cage aquaculture and that mandated this study.

The analysis of the wetland water of Ashaka wetland for the concentration of OCPs showed that the wetland is polluted with the OCPs investigated thus making the deployment of cage aquaculture impracticable because it will be antithesis to the set objective as the product will not be healthy for consumers locally and internationally. This is because it will fail Codex Alimentarius (1963) set down standard for export of animal productsto international consumers.

VI. Recommendations

Against the backdrop of the results obtained from the analysis, the study recommends as thus:

1. Cage aquaculture should not be deployed in Ashaka wetland by the youths and schools in Ashaka and its environ.
2. The source or sources of OCPs into the wetland should be investigated and checked.
3. Remediation of the wetland is highly recommended to return the wetland to its hitherto pristine ecosystem for cage aquaculture development for healthy produce for local and international consumers.

REFERENCES

[1]. Abdulai, N. (2016). Pollution status of Gamji River, Gombi State.*Asia Journal of Marine Toxicology* 22(3), 112-119.
[2]. Adebayo, U. (2019). Evaluation of the trade curruculum in Nigeria.*Ebonyi State Journal of Education* 4(2) 28-35.
[3]. Adegoke, J. A. (2012). Sampling and samples management in Hydrobiology. Lagos: Oden Publishers Ltd.
[4]. Adeosun, K. (2015). Nigeria fish demand and supply.A ministerial brief.Federal Ministry of Finance. Abuja, Nigeria.
[5]. Agency for Toxic Substances and Disease Registry (ATSDR) (2012).Organochlorine pesticides.An aTSDR Publication, Atlanta, Georgia.
[6]. Ajakaoye, S. O. and Olumo, S. (2015). Organochlorine pesticides content of Ojeriver. *Journal of Environmental Monitoring* 18(3), 118-124.
[7]. Ajanaku, J. C. (2018). The proximate analysis of African cat fish (*Clariasgariepinus)*. *Journal of Fishery and Aquaculture*, 17(4), 102-110.
[8]. Ajayi, M. C. (2015). Sampling in Marine Science. Ilorin: Dawodu, Books Ltd.
[9]. Andrew, D. C. (2014).Meaning of reformation in English.https://dictionarycambridge.org. retreived June, 2021
[10]. Arnold, J. (2018). Meaning of reformation.https://www.idocaonline.com.reformation. Retreived June, 2022.
[11]. Bamgbo, E. E. (2018). Pollution studies of Iha wetlands Lagos. *Asian Journal of Marine Pollution and Control*, 112: 20-2013.
[12]. Charles, N. (2017). Reformation meaning in Christian Library https://www.chriatianstudy.ibrary.org.retrieved June 2022.
[13]. Clarice, M. T. (2018). Rural economy of the littoral.*Asia Journal of Economics* 21(3), 220-226.
[14]. Codex A. (1963). Codex Alimentarius commission (cAC) Food and Agricultural Organization /World Health Organisation Standard guidelines on food.
[15]. Comrad, F. (2015).Reformation definition.https://www.oxfordlearnersdictionaries.com. Retrieved april, 2021.
[16]. Ekpo, J. N. and Lember, C. C. (2017).Organochlorine pesticides assessment of Omambala River, Anambra State, Nigeria.*Elsevier* 177, 420-426.
[17]. Felix, O. C. (2019). Reformation: definition and synonyms. https://www.macmilliandictionary.com retrieved March, 2022.
[18]. Haliru, M. O. (2019). Education curriculum: the imperative of reformation in Nigeria. *Journal of Curriculum Studies* 12(3), 41-48.
[19]. Harrison, J. N. (2012). Education reformation meaning and types.https://www.intopleasing.com/reform retrieved May, 2022.
[20]. International Agency for Research on Cancer (IARC) (2010) Health effects of organochlorine pesticides (OPCs) Lyon, France.
[21]. Jobdi, S. C. (2012). Speciation of water pollutants in Ogun River.*Asian Journal of Toxicology*, 22(3), 202-210.
[22]. Johnson, L. (2018). Reformation: protestant. https://www.nationalgeographic.org. retreivedapril, 2022.
[23]. Joseph, S. (2018). Reformation definition and types.https://www.britanica.com?event retrieved June, 2022
[24]. Kelvin, P. (2018). Reformation, legal dictional.https:// legaldictionary.com.retrieved June, 2021.
[25]. Lam S. C. and Ikpe M. O. (2014). Pollution assessment of KatsinaAla River Benue State. Chemosphere, 118: 213-219.

[26]. Lawal, J. N. (2017).Water chemistry of Olomoge Lagoon Lagos, Nigeria.*Journal of Chemistry Society of Nigeria.*18(3), 91-98.
[27]. Macdoff, T. (2017). 8 best definitions of reformation. https://www.history.com?topics.
[28]. Mohammed, B.Q. (2016). The national value of *Orechrowasnoliticus (*Nile tilapia).*Journal of Food Science* 10(2), 124-130.
[29]. National Bureau of Statistics (NBS) 2021).Nigeria fish production and import.A publication of NBS, Abuja.
[30]. Ochu, B. A. (2020). Curriculum reformation in Nigeria; how far has trade curriculum fared? *Journal of Vocational Studies* 14(2), 31-38.
[31]. Odalonu, P. O. and Wigwe, A. A. (2018). Pesticides content of Osamala wetland Anambra state. *Journal of Environmental Monitoring* 12(4) 90-96.
[32]. Odia, M. (2019). Pesticides content of Ovia River Benin City Edo Nigeria. *Journal of Marine Science* 12(3), 125-131.
[33]. Ogunbiyi, N. T. (2010). Pollution status of Omimla wetland, Osun State.*Journal of Pollution Management* 20(3), 211-219.
[34]. Ogwu, C. and Attamah, O. F. (2022).Organochlorine pesticides quantification of Balagbe wetlands Ughelli Delta for cage aquaculture in secondary schools as a catalyst for economic growth in Nigeria International Journal of Research in Education, Humanities and Commerce, 3(3), 228-237.
[35]. Ogwu, C. and Okonji, A. O. (2021).Organochlorine pesticides content International Journal of Engineering Science Invention 10(3), 47-52.
[36]. Ogwu, C., Ehiequren, E. A. and Obue, A. (2022).Ogrganochlorine pesticides quantification of Otogor wetland Ughelli Delta for secondary schools cage aquaculture for hunger eradication in Nigeria. International Journal of Current Science Research and Review 5(3), 87-877.
[37]. Ogwu, C., Ejobe, J. E. and Itagah, O. (2022).Organochlorine pesticides characterization of Emede wetland Isoko south delta for pen aquaculture in secondary schools as emerging trend in vocational and technical education in 21st century Nigeria. International Journal of Current Science Research and Review 5(6), 1902-1907.
[38]. Ojikutu, S. T. (2019). Organochlorine pesticide contamination of OgunpaRiver , Ibadan Nigeria. *Journal of Marine Sciences and Toxicology* 14(3), 92-98.
[39]. Olokor, G. P. (2019). Psychomotor base curriculum: the imperativeness in Nigeria. *Sahal Journal of Education* 10(3), 42-48.
[40]. Omiyale S. N. &Ogunbambi, T. C. (2016).Pollution chemiserie of Olomoge Lagoon Badagry Lagos.*Journal of Ecology and Marine Science* 16(3), 40-46.
[41]. Oteriba, S. C. (2022). Fish importation and the economy of Nigeria. Lagos: Oteriba Financial Consultants.
[42]. Oyeneye, M. T. (2014). Organochlorine pesticide speciation of Ominla wetlands Osun state.*Journal of Ecosystem Management* 12(2), 241-247.
[43]. Pedro, S. (2016). Reformation, meaning and synonyms.https://www.vocabulary.com. Retrieved June, 2022.
[44]. Piccolo, A. C. (2018).Reformation definition and meaning.https://www.dict.browse.com
[45]. Ramsar Convention on wetlands of international importance (1971) Ramsar Convention, Ramsor, Iran.
[46]. Ruwani, B. (2022). Nigeria import bill on fish is 500 billion naira in 2021. Lagos: Financial Derivatives Ltd.
[47]. Sodiq, M. A. (2018). Trade curriculum implementation in Niger State.*Journal of Science and Technology Federal University of Technology, Mina* 8(3), 9-15.
[48]. Teddy, A. (2017). Reformation definition and meaning.https://www.collinsdictionary.com retrieved June, 2022.
[49]. United States Environmental Protection Agency (USEPA) (2012). Bioaccumulation and biomagnification in of toxicants in aquatic ecosystem.USEPa Bulletin Publication , Washington DC, USA.
[50]. World Health Organisation (WHO) (2014).Maximum allowable content of OCPs in water.WHO publication Geneva Switzerland.
[51]. Ndanenu, J. C. (2013). History and culture of the Ashaka clan of Ndokwa East, Delta Nigeria.Owerri: TransAfrique Books Ltd.
[52]. Chinyere, Ononugbo&Anyalebechi, C. (2017).Natural Radioactivity Levels and Radiological Risk Assessment of Surface Water from Coastal Communities of Ndokwa East, Delta State, Nigeria.Physical Science International Journal. 14. 1-14. 10.9734/PSIJ/2017/31782.
[53]. Abe, E. (2019, 12 February) Solve youths unemployment with aquaculture. Punch News, p. 48.
[54]. Okpalanka, J. C. (2017, 17 May). Nigeria education needs reformation. Punch News p. 42.
[55]. Odia, C. (2018, 18 June). Why Nigeria education should be reformed. Vanguard News, p. 40.
[56]. Arinze, O. (2019, 12 August). Deficit of secondary education curriculum in Nigeria.*Abia StateJournal of Education* 5(3), 91-97.
[57]. Omajuwa, E. (2019, 16 September). We need reformation of education in Nigeria. Guardian News, p. 52.