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THE APPLICATION OF FRAMEWORKS IN THE UNPACKING OF THE PROBLEMATIC OF HUMAN-ENVIRONMENTAL INTERACTION: THE CASE OF THE QUA IBOE RIVER IN THE NIGER DELTA OF NIGERIA

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ABSTRACT: *This paper looks at human-environment interaction (HEI) using the lens of three frameworks- DPSIR, Resilience/ Panarchy and Political Ecology as vehicles for a holistic understanding of the impact of anthropogenic activities on the environment. Drawing evidence from the case of the Qua Iboe River in the Niger Delta region of Nigeria as a marine resource, the complexity in the interaction between the local communities, the Federal Government and the oil companies were identified. The result of this interaction is the pollution of the river and the conflict between the stakeholders. It is therefore recommended among others that there is the need for multilayer governance involving all the stakeholders as a baseline for mitigation of the problem.*

KEYWORDS: DPSIR, Resilience, Panarchy, Political Ecology, Qua Iboe River, Federal Government, Environmental Pollution, Niger Delta, Conflict

Introduction

This paper will look at the multi-functional use of the Qua Iboe River in the Niger Delta of Nigeria as a marine resource and how competition between the various users generates conflict and its impact on the environment. This paper will focus on two kinds of stuff: fish (a source of livelihood to the local communities) and the waterway (a source of transportation and discharge of industrial waste by private companies).

The question of who should have access to what, why and when, and the environmental impact of usage concerning marine resource remains one of the topical issues in Nigeria´s Niger Delta. The Niger Delta covers an area of over 70,000 square kilometres, one-third of which consists of wetlands (Osinbanjo, 1992). It stretches between the Benin River estuary in the West and Imo River estuary in the East thereby making it the largest delta in Africa (NDES 1997). It is "an extensive mangrove swamp and connections of waterways which opens into the sea through a host of rivers- Benin, Escravos, Forcados, Ramos, Dodo, Middleton, Fish Town, Nun, Brass, San Batholomew, Bonny, Opobo and Qua Iboe (Agbeja 2010). These waterways and mangroves made the region rich in marine biodiversity and serve as both a source of food, transport, hygiene and other purposes for communities living along its riverbeds. One of the oldest communities in the Niger Delta is the Ibeno people that settled around the Qua Iboe river since 1500 A.D (Enemugwem, 2000; Enemugwem, 2009).

The discovery of large crude oil deposit offshore of the Qua Iboe river basin and the beginning of its extraction in commercial quantity by ExxonMobil in the early 1980s created an increase in economic

activities in the area due to the influx of other private companies that provides subsidiary and service functions to ExxonMobil. These industrial activities include the building of shallow-water ports, platforms and terminals for shipping and other activities. As will be shown later in this paper these activities have a negative environmental impact on the ecology of the Qua Iboe River and affect the local community that depends on it for livelihood. This creates multi-layer nodes of interaction between three primary stakeholders and makes the problem complex. The stakeholders are:

1. **The Federal Government of Nigeria.** Under the Petroleum Act of 1969, Land Use Act of 1976 and Section 44 (3) and Item 39 Schedule II of the 1999 Constitution of the Federal Republic of Nigeria all rights over land and waterways within the international borders of the state is vested on the Federal Government. The Federal Government, therefore, lease land and waterways (including access to the Qua Iboe River) to private companies and in turn receive royalties.

2. **Private Companies**. Firms like ExxonMobil, Shell, FMC and others secure access from the Federal Government to use and extract stuff and pay the royalty. In the case of the Qua Iboe River ExxonMobil and its subsidiaries and servicing companies possess legal access to use the Qua Iboe River having acquired same through a lease from the Federal Government.

3. **Local Communities**. These are indigenous people that depend on the Qua Iboe River and whose means of existence is directly affected by the activities of the private companies. They are also isolated from the economic dividend since royalties are not paid to the local community or any form of compensation.

The focus of this paper will, therefore, be to look at the intercourse between these various parties concerning the marine ecosystem of the Niger Delta with the view of using different perspectives to highlight areas of conflict and to generate policy-relevant suggestions from the conclusion derived.

The Geography of the Qua Iboe River

The Qua Iboe River is one of the longest and economically most important rivers in the Niger Delta region of Nigeria. It is located in the modern-day Eket and Ibeno Local Government Areas of Akwa Ibom State, Nigeria. Its coordinates are 4° 32' 60" N, 7° 58' 48" E. A detailed description of the geography of the area is provided by Oze et al (2020:1):

The Qua-Iboe River originates from Umuahia in Abia State, Nigeria. It meanders through the rain forest and communities of Abia and Akwa Ibom states and empties its water into the Atlantic Ocean via its estuary in Ibeno LGA (via Eket) of Akwa Ibom State, Nigeria. It covers a distance of about 150- 180km. The estuary of the river lies near the ExxonMobil Oil Terminal and effluent treatment and discharge site. Human settlements, economic and social activities thrive along the bank of the estuary. The inhabitants depend on the water of the estuary for some of their domestic, economic, cultural and recreational activities. Fishing is the principal occupation of the inhabitants. Most of those involved in oil exploitation and processing live in the Qua- Iboe Terminal community and the off-shore platform. Some of the communities at the bank of the estuary include Qua-Iboe Terminal, Ukpenekang, Itak- Abasi, Iwuo-Achaug, and Ikoro-Itub.

The Qua Iboe River: Property, Resources and Institutions

According to Pregernig (2019:3), "a property is any physical or intangible entity that is owned by a person or group". In light of this, property right refers to the "enforceable authority to undertake particular actions related to a specific domain" (Pregernig 2019:3). Historically, since the first settlement in 1500 AD the right and use of Qua Iboe River is vested on traditional institutions that exist in the local communities in the river banks. The river served a multi-functional purpose and shapes the economic, social and spiritual life of these communities.

During British colonialization of the area in 1889 and its conglomeration with other parts of the Niger Delta into the Protectorate of the Oil Rivers, there was the institutionalization of a hierarchic legal framework which introduced a system whereby the authority over the use of the river was given to warrant chiefs who are in turn answerable to the British District Officers. At independence, the Nigerian state created a new land system that incorporates inland waterways. As used here the concept "land system" refers to the institutional framework within which decisions are taken about the use of land (and waterways), embodying that legal or customary arrangement whereby individuals or groups or organizations gain access to economic and social opportunities (Udotung et. al, 2015). In application, it constitutes the rules and procedures which govern the right and responsibilities of both individuals and groups in the acquisition, use, and control of resources (Udoekanem et. al 2014). The new system isolated the local communities and transferred the right over the Qua Iboe River to the Federal Government by ordinance of the Land Use Act. Section 47 (1 & 2) of the Land Use Act specified that:

1. This Act shall have effect notwithstanding anything to the contrary in any law or rule of law including the constitution of the Federal Republic of Nigeria and without prejudice to the generality of the foregoing, no court shall have jurisdiction to inquire into.
(a) Any question concerning or pertaining to the vesting of all land in the Governor in accordance with the provisions of this Act; or

(b) Any question concerning or pertaining to the right of the Governor to grant a statutory right of occupancy in accordance with the provisions of this Act; or

2. No court shall have jurisdiction to inquire into any question concerning or pertaining to the amount or adequacy of any compensation paid or to be paid under this Act.

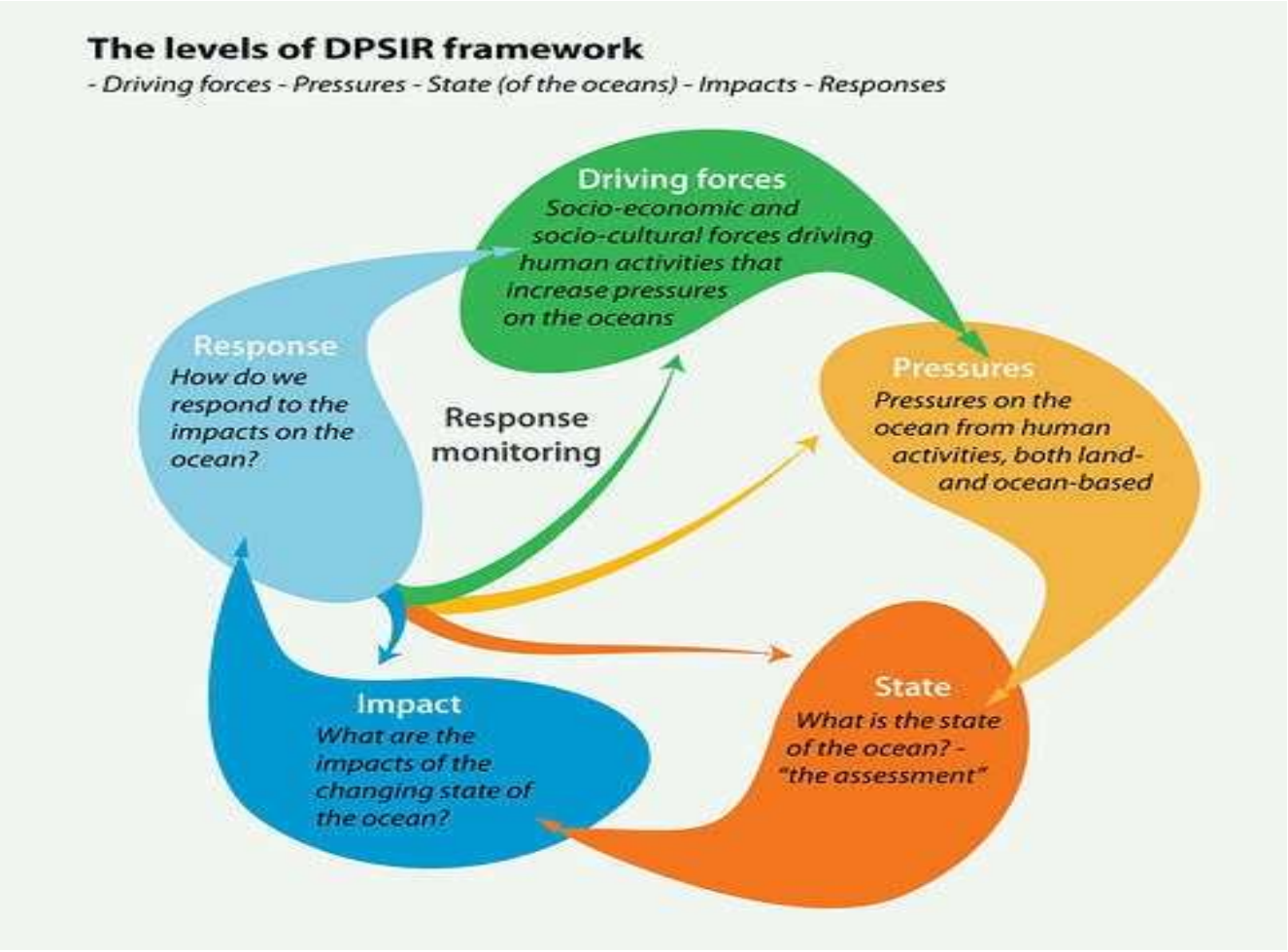
Although the local communities still use the resources in the river despite this law it nevertheless alienated the communities from possessing right over it. Hence with the discovery of crude oil around the river basin in the 1980s, the government began to lease to ExxonMobil and other companies the access to carry out their economic activities in the area without compensation or consideration of the impact on the local communities and with little or no oversight on the effect on the marine ecosystem (Enemugwen, 2000). It is important to note that the stuff which these users (private companies and local communities) need are different- the local communities need access to the river for fishes and social activities. In the other hand, ExxonMobil´s stuff of interest is crude oil while its subsidiaries need the waterways for transportation and also the discharge of industrial waste. Before analyzing how these users interact and how the intercourse gives rise to the complex problem it is important to conceptualize the framework of analysis used to make sense of this problem.

Frameworks of Analysis

Three frameworks will be used to analyze this problem holistically. These are DPSIR, Resilience/Panarchy and Political Ecology.

DPSIR

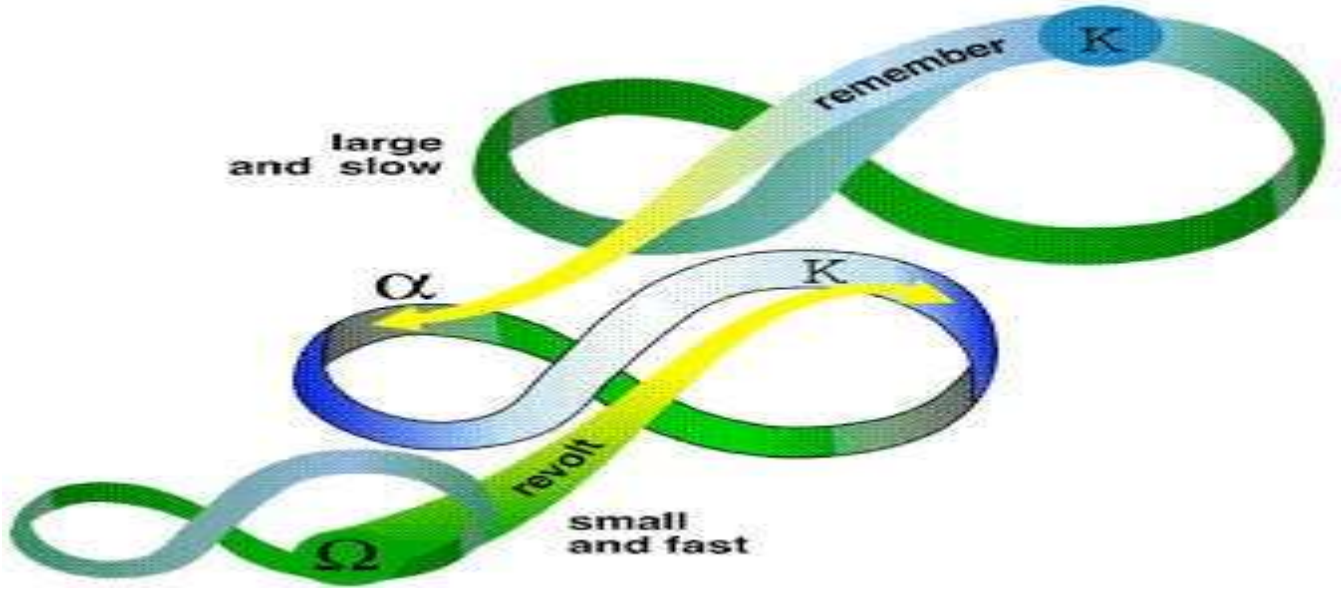
As an analytical tool, Kristensen (2004) described the DPSIR framework as a "chain of causal links starting with '*driving forces*' (economic sectors, human activities) through '*pressures*' (emissions, waste) to '*states*' (physical, chemical and biological) and '*impacts*' on ecosystems, human health and functions, eventually leading to political '*responses*' (prioritisation, target setting, indicators)".



Picture 1: The DPSIR Framework
Source: GRIDA (undated)

Resilience/Panarchy

According to Holling (1973) "resilience is the capacity of a Social-Ecological System (SES) to absorb or withstand perturbation and other stressors such that the system remains within the same regime, essentially maintaining its structure and functions". In the other hand, panarchy refers to the interacting set of hierarchically structured scales that determines the dynamics of an SES at any focal scale (Gunderson & Holling 2002).



Source: Resilience Alliance (Undated)

Political Ecology

As an analytical framework, Political Ecology looks at the intersection between environmental issues in one hand and on the other hand are political, economic and social factors. It looks at how actions and reactions in the political and socio-economic sphere shape the environment.

This paper will, therefore, adopt these frameworks in the next section to "pick out the threads" of the complex problem in the use of the case study.

Analysis And Discussion

In this analysis, I shall use a game of three players in an attempt to make sense of the complex problem- Player A (Federal Government), Player B (private companies) and Player C (local communities). The first assumption guiding the game is that each player has a need. The second assumption is that the resource (Qua Iboe River) to meet the need of each player is inelastic and scarce but not a zero-sum. Hence the action of each player has the potential of a positive or negative impact on itself or the other players.
Player A (Federal Government): Is a rentier player whose need is the royalties (tax, rents, duties etc) paid by Player B. But for the sake of legitimacy Player A need to consider the satisfaction of Player C since its legitimacy comes from C. Player A depends also on the royalties to meet its financial obligations since its

budget depends on it. Without B´s royalties, A will not function.

Player B (private companies): Having paid royalties to A and obtained access to the resource Player B wants to get back its investment and also optimize its profit through the extraction and use of the resource. Without this activities, B will go out of business and to optimize its profit (which is essential) B needs a cheaper way to dispose of its industrial waste which is simply discharging it into the resource (having paid royalties for it already). This action does not affect B´s business but affects Player C livelihood.

Player C (local communities): Player C depends on the resource for its livelihood. The fishes in the river are the player´s major source of feeding. The ecological stress as a result of B´s activities is polluting the river and killing the fishes, therefore, affecting negatively C´s means of survival, also it exposures C to many pollution-related health problems. C reacts through sabotage (vandalization of pipelines and other equipment) which in turn spills pollutants into the river which further harms itself and the other two players (A and B). Such sabotage harms B because it becomes a loss to its investment and A because it affected B´s capacity to remit royalties.

Hence there is a competition to protect personal interest between Players A, B and C and these multi-level political, social and economic interactions shapes the environmental issue (pollution of the Qua Iboe River) as encapsulated in the frameworks of Political Ecology, DPSIR and panarchy. Summing up the interlink between these three players, Osinbanjo (1992: 30) observed that:

> Activities of companies have impaired and attenuated the value of aquatic resources for recreation, fishing and transportation. The continuous discharge of industrial effluent, petroleum hydrocarbons, dredge materials and garbage has aggravated problems of the (Qua Iboe River). The indigenes have reacted to neglect (by the government and companies) in various ways ranging from disruption of industrial activities, violent demonstrations, hostage-taking, vandalism of assets and communal clashes.

The impact of industrial activities around the Qua Iboe River is well documented in the literature. A study by Oze et al (2020) showed a high level of contamination of seafood from samples drawn from the Qua Iboe river all of which are traceable to oil Spillage (ExxonMobil) and discharge of industrial waste into the river by other companies (see table 1).

Table 1: Mean Concentration (mg/g) of metals in Fish Samples from the Qua Iboe River estuary

	Itak -Abasi Cumm.	Ukpenekang	Iwuo-achang	Ikoro-Itub			
Quo-Iboe Terminal						Mean (x)	Reference Standard
Ni	I.96±0.l^{+++}	13.34± 0.63^{+++}	19.14±1.49^{+++}	I5.1±0.92^{+++}	12.2±0.26^{+++}	12.35	0.0-0.140
Cd	0.38±0.06^{++}	0.64±0.09^{++}	0.7±0.8^{+++}	077±0.03^{++}	0.77i0.08^{+}	0.66	0.0-0.2 .
Fe	5.98±l.80^{+}	I66.3±8.00^{+++}	203.3±0.44^{+++}	5.90±0.87^{+++}	6.3it.2l^{+++}	132.0	4-48.0
Cu	0.34±0.6^{+}	5.64±0.5^{++}	5.78±0.44^{++}	5.90±0.87^{++}	6.3±l.2l^{++}	4.80	4-10.0
Zn	6.65±0.45^{+}	90.5±2.33^{++}	94.7±4.83	103.3±l.95^{++}	97.5±l.l5^{++}	78.52	58-150
Mn	I2.85±0.66^{++}	298.4±9.34^{+++}	337.7±4.22^{+++}	387.1±6.02^{++}	60l.1±7.86^{++}	327.42	0.0025-0.005
Pb	25.4±1.22^{+++}	25.5±0.95^{+++}	32.1±0.87^{+++}	28.8±2.10^{+++}	5.37±0.8l^{++}	27.44	0-1.5
Cr	ND	1.05±0.11^{+++}	0.70±0.l6^{+++}	0.56±0.13^{+++}	0.84±0.15^{+++}	0.63	0.1-0.15

Table 2. Heavy metal concentrations in estuarine water samples from Qua Iboe River.

Heavy metals	Qua Iboe River Estuary		Douglass Creek		WHO Max Permissible Limits	DPR / FMEnv Limits
	Wet Season	Dry Season	Wet Season	Dry Season		
Cadmium (Cd) ($mgdm^{-3}$)	ND	0.041	0.07	0.058	0.005	<1.0
Cobalt (CO) ($mgdm^{-3}$)	ND	0.271	0.08	0.264	-	-
Zinc (Zn) ($mgdm^{-3}$)	2.14	1.272	3.24	5.051	15.0	<1.0
Copper (Cu) ($mgdm^{-3}$)	0.08	0.064	0.06	0.080	1.5	<1.0
Aluminium (AI) "	3.755	11.45	5.75	12.80	-	-
Nickel (Ni) "	0.237	0.330	0.37	0.685	-	-
Lead (Pb)	ND	0.025	ND	0.047	0.05	<1.0
Manganese (Mn) (μgdm^{-3})	3.2	16.57	6.53	13.70	0.5	5.0
Iron (Fe) ($mgdm^{-3}$)	41.29	59.37	31.29	48.80	1.0	20.0

ND= Not detected; DPR= Department of Petroleum Resources; FMEnv = Federal Ministry of Environment.
Source: Federal Ministry of Environment (2005).

In table 2 above the result of an Environmental Impact Assessment (EIA) by the Federal Ministry of Environment in 2005 showed that the there is a high level of pollution of the river from industrial waste which is significantly higher than the WHO benchmark. This collaborates the source of the metallic positioning discovered by Oze et. al (2020).

Table 3: Annual mean of the industrial discharge into the Qua Iboe River in 2018

Metal	Mean Concentration (mg/L) Effluent	Exxon-Mobil Water	Comment
Ni	0.23±0.271	0.22±0.09	NSD
Cr	0.04±0.004	0.21±0.18	NSD
Cd	0.30±0.029	0.02±0.04	SD
Fe	3.16±0.56	0.73±0.79	SD
Cu	0.1±0.042	0.01±0.07	NSD
Zn	0.34±0.03	0.08±0.04	NSD
Mn	0.29±0.031	0.03±0.05	NSD
Pb	1.8±0.09	0.18±0.09	SD

Values are mean ± Standard Deviation; SD: Significant Difference ($P<0.01$); HISD: No Significant Difference. ($P>0.01$).
Source: Akwa Ibom State Government (2019)

In a similar vein, Osinbanjo (1992) asserts that the waterways left for the indigenous people has been polluted by activities of multinational companies and marine ecology has been degraded. Pollution of the river, stream and creek has continually debased the fishing occupation, which is the economic life wire of more than 90% of community dwellers. A sad example as illustrated by Nnaa (2007) shows where more than one million assorted fishes were seen dead in the swamp near the flow station of Elf petroleum (NIG) limited. Ikelegbe (2010) in his observation described the situation:

> The contradictions are several; first while being the breadbasket of the nation in a federal state, it has received only a trickle of revenues particularly since 1981. Second, while providing the revenues for the development of other parts of the nation, it has not experienced much of these developments and the area is reputed to be one of the least developed and poorest in the country. Third, while being home to the oil and gas resources and oil infrastructure, it participates little in their control and management. These conditions create numerous crises. In addition, poverty and misery have produced mass discontent, resentment alienation, hostility and a generation of angry citizen.

Similar to the above postulations, Dode (2015) further asserted that, as consequences, the area has been immersed by agitation, protest and struggle against perceived injustice, inequality, disinheritance, marginalization and neglect. These situations have slipped the region into insurrection and insurgency.

This situation calls for a holistic approach to the problem. Although there might not exist a clear-cut single action to solve this situation considering the clash of interest there is a need nevertheless for a framework that harmonizes the interest of these three players in such a way that the environment is preserved while each player optimizes its use of the resource. As theorized by proponents of the resilience theory, the Qua Iboe River will likely recover over time if proper consideration is given to its marine ecosystem.

Conclusion And Recommendation

This study looks at the problem associated with human-environment interaction using the case of the Qua Iboe River in the Niger Delta region of Nigeria. As a marine resource, the river provides the means of economic livelihood (fishing) and social activities to the local communities living in its riverbed since 1500 AD. But since the 1980s the river serves also as a means of transport and other industrial activities by private companies that pay royalties to the Federal Government to use the river has threatened the sustenance of these local communities. In the course of its activities, these companies discharge industrial waste into the river which contaminates the fishes and pose a serious health threat to the local communities therefore creating a conflict between the users. While one can argue that the problem can be solved linearly by the private companies through finding an alternative means of the disposing waste but it is not simple since an alternative means will increase the cost of production as observed by Soludo (1998) and significantly affect negatively the commercial liquidity of these companies due to increased cost of production.

The multi-dimensional nature of this complex problem makes it difficult to recommend a clear-

cut solution but measures that can be taken to ameliorate the problem includes among others:

I. There should be multi-layer governance which involves the local communities, private companies and the Federal Government. The three parties can negotiate a feasible framework of action with each party clearly understanding potential trade-offs and gains.
II. The Federal Government could encourage private companies to seek alternative technologies or means to dispose of its industrial waste. The burden of this can be shared through the reduction in the percentage remitted to it as royalties.
III. Through a public-private partnership funding and ideas can be provided for alternative means of livelihood for the local communities.
IV. Due consideration and actions should be taken towards sustainable use of the Qua Iboe River thorough cleaning of the water of toxic materials and pollutants.
V. There should be an institutionalized framework for marine ecosystem conservation.

VI. There should be an effective regime for industrial waste management.

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