Trans Border Natural Resource Management Institutional Factors and Sustainable Development in the Mano River Basin of West Africa

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Abstract: *This study investigated the influence of trans-border natural resource management institutional factors on sustainable development in the Mano River Basin of West Africa which is shared by four countries of Liberia, Sierra Leone, Guinea and Ivory Coast. Specifically, the study examined if the trans-border natural resource management institutional factors and its parameters namely; policies, cultural practices, conflict management practices, information exchange channels, support service availability and decision making politics influenced sustainable development in the Mano river Basin. The descriptive cross-sectional survey design involved 555 respondents who were interviewed and completed self-administered questionnaires, whose validity and reliability were duly tested using factor and reliability analysis. Triangulation was done at the level of data collection (i. e. the study used both qualitative and quantitative research approaches). Qualitative data was analysed using NVivo9 software while quantitative data was analysed using SPSS. Quantitative data was first subjected to missing value analysis using (MCAR) test and test of parametric assumptions. The emerging results were then treated to descriptive analysis using means and standard deviations, while inferential analysis used correlations and multiple regressions. The main findings were that trans-natural resource management institutional factors negatively influenced sustainable development. Therefore the study recommended that the Mano River Union should enhance and strengthen trans-border natural resource management institutional factors (policies, cultural practices, conflict management practices, information exchange channels, support service availability and decision making politics) if sustainable development is to be attained.*

Keywords: Trans-Natural Resource Management, Institutional Factors, Sustainable Development

1. Introduction

Over the past 20 years, the Mano River Basin in West Africa, comprising countries of Liberia, Sierra Leone, Guinea and Ivory Coast has been an area of violent upheavals and political instability (Annan, 2014). This is because the region is endowed with abundant natural resources like diamond, gold, iron ore, bauxite, oil, waters, fish, forest timber and wild life that cut through the four countries. It also serves as a conduit for transportation and its tributaries, alluvium and lowlands are used for farming within the region (Jörgel and Utas, 2007). The scramble for these resources led to over 300, 000 deaths; millions of people displaced and mass economic hardships. In particular governance systems, infrastructure, commerce and communities' social fabric have been devastated. Although there have been attempts to overcome these problems by establishment of Mano River Union (MRU), sustainable development remains unattainable (Afolabi, 2017, 2018).

Sustainable development refers to the development that is supposed to meet the needs of the present without compromising the ability of future generations to meet their own needs (OECD, 2012). A more elaborate definition of sustainable development is provided by Norgaard (2012), Emas (2015); Gupta & Vegelin (2016) as target-oriented, long-term (continuous), comprehensive and synergetic process that impacts on all aspects of life in terms of economic, social, environmental and institutional at all levels. Klarin (2018) specifically identifies some of the

manifestations of this type of sustainable development in the Mano river basin which include but not limited to social, economic and environmental factors.

On the other hand, trans boarder natural resource management is defined as any process of cooperation across boundaries that facilitates or improves the management of natural resources to the benefit of all parties in the area concerned (Griffin et al, 2009; Hamilton, 2007). It includes not only specific initiatives but also traditional or informal resource sharing arrangements at community-level as well as multi-lateral agreements and authorities such as policies, cultural practices, conflict management practices, information exchange channels, support service availability and decision making politics (Appelgren & Klohn, 2007).

Trans boarder natural resource management institutional factors can negatively affect not just sustainable development but also the stability of the Mano river basin. Also there are no known studies on the effects of trans-boarder natural resource management institutional factors on sustainable development in the Mano river basin. If left unattended as Afolabi (2017 & 2018) claims, this problem will expand conflict and destabilise the whole region. As you can see, these will negatively affect sustainable development which can be expressed most visibly in form of social, economic and environmental parameters. In fact a study conducted by Jörgel & Utas (2007) revealed that the negative outcomes of sustainable development in the Mano river basin have caused an estimated 300, 000 deaths,

brought massive social dislocation of communities, devastated the countries' infrastructure, eroded the social fabric and led to crippling economic hardship for the majority of the population, making sustainable development unattainable. Without doubt, achieving sustainable development is a recurring problem in the Mano river basin. Hence it's precisely in this context that the researcher aims to determine the influence of trans boarder natural resource management institutional factors on sustainable development. In particular this paper aims to identify those factors that negatively affect the attainment of sustainable development in Mano river basin. The researcher argues that there is need to determine the trans-boarder natural resource management institutional factors that affect sustainable development because knowing and understanding the problem will put the researcher in the best position to offer some alternatives to the problem. Indeed it is only when we have performed some kind of a diagnosis that we can offer better practicable solutions to the problem. In the case of Mano river basin, determining trans boarder natural management institutional factors that affect attainment of sustainable development are the very first steps in addressing the problem.

This paper made several contributions to the literature. First, based on the past studies, we carefully examined the trans-boarder natural resource management institutional factors in relation to sustainable development and provided evidence that sustainable development was unattainable in Mano river basin. Secondly, our research provided direct evidence that weak trans-boarder natural resource management institutional factors were responsible for the negative achievement of sustainable development. Our research not only enriches the literature in these two areas, but also provides far reaching implications for Mano River Union`s efforts to attain sustainable development initiatives

2. Theoretical Framework

The theoretical basis for this study was derived from the Common-Pool Resource Theory of Ostrom (1990). In this theory, Ostrom (1990) defined several characteristics descriptive of local communities that developed successful management institutions and that allow individual countries to achieve long-term productive outcomes in managing common-pool resources. Indeed, Agrawal (2007) contends that CPR theory has been important to the institutional design of commons projects such as the Mano River Union. Although Pinkney (2001) claims that there are a myriad of other internally and externally derived political and economic influences (i. e. trans boarder natural management intuitional factors that led to the widespread adoption of this approach in West Africa during the 1990s, these projects sought to shift conservation from the centralist state to civil society at the local level. They asserted the compatibility of conservation and development aims and commonly emphasized market mechanisms to achieve the goals of sustainable development (Murphree 2001).

One way to recognize common-pool resources (CPR) that transcend borders such as forests, groundwater basins, grazing lands, and fisheries, water, minerals, forests, oil and gas is that it is difficult to exclude beneficiaries from using these resources, and use of these resources by one person or group reduces resource availability for others and hence breed conflicts (Poteete et al, 2010). For example, Berkes (2007) posits that since social systems are multileveled, perspectives from each level are likely different. This suggests that institutional practices might be perceived differently between the different levels of governance and within the community itself. Therefore, a multileveled assessment of both state and local institutions might be more appropriate for assessing the ability of trans border natural resource management institutional factors (policies, cultural practices, conflict management practices, information exchange channels, support service availability and decision making politics) to address sustainable development within the context of the Mano River Union (Basurto and Ostrom, 2009).

3. Developments of Hypotheses Frameworks

3.1 Policies

Policies are definite courses or methods of actions selected either by a government, group or individual from alternatives and in light of given conditions to guide and determine the present and future decisions (Dahida & Maidoki, 2013). Oni (2016) contends that policies are concerned are steps taken by those concerned to solve problems, make decisions, allocate resources or values, implement policies and in general to do the things expected of them by their constituencies. Thus, policies are a set of interrelated decisions by an actor or group of actors concerning the selection of goals and the means of achieving them within a specified situation where those decisions should in principle be within the power of those actors to achieve (Dahida & Maidoki, 2013).

In the managing of trans-border natural resources, there is need for functional policies to ensure that the resources are properly managed. Therefore the principles governing the management of trans boundary natural resources demand that states have the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction (Muigua, 2018). Dhliwayo (2002) further explains that in the absence of a comprehensive management programme for trans-border natural resources, there are a number of key threats, which may contribute to a reduction in biodiversity and may foster regional conflicts. Based on the literature reviewed, the study wanted to test the hypotheses whether:

H1: Policies positively influenced sustainable development

3.2 Cultural Practices

Culture is an umbrella term which encompasses the social behaviour, institutions, and norms found in human societies, as well as the knowledge, beliefs, arts, laws, customs, capabilities, and habits of the individuals in these groups (Hofstede, & Minkov, 2010). Thondhlana & Shackleto,

(2015) explain that cultural values of natural resources are broadly described as the cultural services or benefits obtained from ecosystems. Cultural values are also fundamental in understanding the importance of natural resources for different people for a number of reasons and influences the way such resources are used (Cocks, 2006, Pretty 2006).). Chunhabunyatip et al. (2018) investigated the factors that influence the management of natural resources and the conservation of river ecology by the indigenous people in the Nongchaiwan wetland in the Lower Songkhram River Basin in Thailand. The findings revealed that cultural factors influence natural resources management because they traditionally link people and natural resources. Thondhlana and Shackleton (2015) explored the cultural significance of natural resources and different land-use practices among the San people bordering Kgalagadi Trans frontier Park in South Africa. Their findings cultural values were inextricably linked to resource use. Although there is abundant literature on cultural practices, there are no studies that explain the importance of cultural factors in the conserving of cross-border natural resources in the Mano river basin. Because of the scanty literature that empirically associates cultural practices to sustainable development, there was need to test the hypothesis whether:

H2: Cultural practices positively influenced sustainable development

3.3 Conflict management practices

A conflict is a dynamic process that occurs between interdependent parties as they experience negative emotional reactions to perceived disagreements and interference with the attainment of their goals (Boateng, 2014). Anderson and Baum (2008) opine that trans boundary dynamics and pressures are often beyond the capacity of a single sovereign state to manage unilaterally, requiring cooperation and co-management with neighbouring countries. In a study conducted by Gaynor (2016) on community-based conflict resolution in the Ituri district, north-east Congo, Gaynor's (2016) on addressing decades of civil violence and instability, revealed that that the conflict resolution initiatives placed significant emphasis on cooperation and on finding solution promoting development. Mulcahy (2000) expounds that conflict resolution is in a privileged position to transform disputes into processes of collective action. In her study of community mediation, the study found that conflict resolution stressed the state's responsibility for addressing structural injustice leading to sustainable development. Palma (2019) indicated that conflict resolution enables transformation because it helps people mobilise their own resources, validate their needs and enhance their capacity to provide self-help solutions. Because of scanty literature on this subject, we developed a hypothesis that:

H3: Conflict management practices positively influenced sustainable development

3.4 Information exchange channels

Information exchange is the process that facilitates data collection, documentation, and the storing, retrieving, and transferring of information (Hassan & Nasereddin, 2018).

According to Page, Dray, Perez & Garcia, (2016), communication fosters improved efficiency and better decision making. De Nooy (2013) examined effect of interpersonal communication among stakeholders in natural resource management in projects done in Australia, USA and New England. The results revealed that stakeholders tended to agree more with communication partners from other stakeholder groups while they disagreed with partners from their own group. Ongare et al. (2013) sought to identify appropriate environmental information sources and communication channels to enhance the uptake of alternative and more sustainable agro-biodiversity practices within the Masai Mara in region in Kenya. The study revealed that a successful information exchange brought about change in environmental behaviour within the community. Although some literature on information exchange channels exists, it does not directly relate to sustainable development in the Mano river basin hence the need to test the hypothesis that:

H4: Information exchange channels positively influenced sustainable development

3.5 Support service availability

Support services such as management, inspection, legal services and monitoring of cross-border natural resources are vital for sustainable development (Werner & Gallo-Orsi, 2016). Under trans boundary natural resource management, states must transcend their sovereign rights, come together and resolve issues concerning trans boundary natural resources and their common concerns regarding them (Okonkwo, 2017). Okonkwo (2017) also carried out a review on management of trans boundary natural resources. The review revealed that the management of these resources should be anchored on some solid legal and institutional framework and there is the need to strengthen the legal and institutional framework for proper international, regional and national management of natural resources that straddle more than one state. Further, Ombara et al. (2020) examined the role and responsibilities of different actors cross border natural resource management in Kenya. The findings revealed that the roles and responsibilities of different actors were indispensable. However since the literature does not closely associate support service availability to sustainable development, we needed to test the hypothesis that:

H5: Support service availability positively influenced sustainable development

3.6 Decision making politics

Decision making is a dynamic and interactive process incorporating a sequence of events from the time when decision makers recognize the need to solve a problem until the time when they authorize a course of action to solve it (Moghaddam, 2017). Conroy and Peterson (2013) indicate that in managing trans-border natural resources, decisions should be driven by explicit objectives with sophisticated approaches for modelling decision influence and incorporating feedback from monitoring programs into decision making via adaptive management. Mattsson et al. (2019) evaluated the collaborative decision application in

two trans boundary regions in Europe that were Julian Alps along the Italian–Slovenian border, and the Bavarian–Bohemian Forest along the German–Czech border. The study revealed that collaborative-decision making led to bilateral agreements about multi-year resource allocations by protected areas in these two trans boundary regions of Europe. Although there are no empirical studies relating decision making politics to sustainable development in Mano river basin, testing a hypothesis was imperative that:

H6: *Decision making politics positively influenced sustainable development*

4. Methods

4.1 Research philosophy and design

The research design was constructed and guided by ontological, epistemological and methodological prepositions (Sarantakos, 2013). The study adopted a descriptive cross sectional survey design which described the characteristics of variables, measured and manipulated them (Sarantakos, 2013) . The quantitative approach tested theories composed of variables, measured with numbers, and analyzed with statistical procedures to determine whether the predictive generalizations of the theory held true (Creswell, 2003) . The qualitative research approach was used at the level of data collection and it enabled the researcher to provide an opportunity for the voice, concerns, and opinions of the respondents to be heard (Cole, 2006; Weaver and Olson, 2003) . With a survey, the researcher gathered data from a large number of respondents and generalized from the sample used to the whole population. (Caelli, Ray, and Mill, 2003 & Johnson and Dubeley, 2000) .

4.2 Population and Sample

The research population comprised 790 community members, local political leaders; Mano River Union management and NGOs staff members. The study adopted probability sampling design and stratified random sampling by proportional allocation technique to select a sample. Slovene's formula was then used to determine the sample size as presented in Table 4.1. Besides, there were 15 respondents for qualitative study that were nine politicians, officials of Unions and six staff of NGOs who were determined purposively.

Table 4.1: Population and Sample size

Category	Population	Sample size	Sampling Strategy
Community Members	600	400	Simple random sample
Local political Leaders	50	44	Simple random sample
Mano River Union management	20	19	Purposive Sampling
NGOs staff members	120	92	Simple random sampling
Total respondents	**790**	**555**	

4.3 Data collection methods and instruments

Data collection methods were both quantitative and qualitative. These were used to generate both primary and secondary data (Kothari, 1985). The study used self-administered questionnaires, interview guide and focus group discussion schedule to collect primary data while secondary data was through study of documents

4.4 Data management

5. Results

5.1 Demographics:

Quantitative data on retrieved questionnaires were edited, coded and only 410 were entered into the computer using the Statistical Package for Social Sciences (SPSS). Missing value analysis, test of parametric assumptions, validity and reliability was done. Emerging results were then subjected to descriptive analysis using means and standard deviation while inferential analysis used multiple correlations and regression analysis. Qualitative data was analysed using NVivo9 software

Table 5.1: Presents the distribution of the respondents' bio data by description and category,

Item	Categories	Frequency	Percent
Nature of Respondents	Community Members	399	71.9
	Local Political Leaders	43	7.7
	Mano River Union	20	3.6
	NGO Staff Members	93	16.8
	Total	555	100.0
Gender	Male	314	56.6
	Female	241	43.4
	Total	555	100.0
Marital Status	Single	214	38.6
	Married	336	60.5
	Divorced	1	0.2
	Widow/widower	4	0.7
	Total	555	100.0

Highest Level of Education Achieved	Primary Education	23	4.1
	High School	204	36.8
	Under graduate	241	43.4
	Master's degree	82	14.8
	Others	5	0.9
	Total	555	100.0
Age of the Respondents	18-25	214	38.6
	26-35	231	41.6
	36-45	88	15.9
	46-55	15	2.7
	56+	7	1.3
	Total	555	100.0
Period lived or worked in the area	Less than 1 year	181	32.6
	2-5 years	252	45.4
	6-8 years	103	18.6
	9+	19	3.4
	Total	555	100.0

Source: Primary data

Table 5.1 presents the distribution of the respondents` bio data by description and category, with 71.9% respondents drawn from community members, 16.8% NGO staff members, 7.7% local political leaders and 3.6% Mano River Union. On gender distribution, 56.6% were male while 43.4% were female. Regarding the respondents' marital status, 38.6% were single, 60.5% married, 0.2% divorced and 0.7 Widowed. With Education levels 4.1% had Primary Education, 36.8% High School, 43.4% under graduates, 14.8 % Master degrees, and 0.9% others. On the ages of the respondents, those within the bracket of 18-25 were 38.6%, 26-35 (41.6%), 36-45 (15.9%), 46-55 (2.7%) and 56+ (1.3%). Regarding the period lived or worked in the Mano river Basin, 45.5% had spent 2-5 years, 18.6% had spent 6-8 years, 4.3% had spent over 9 and 32.6 % spent less than one year. These demographic characteristics had an implication on this study.

5.2 Descriptive analysis of the dependent variable: Sustainable Development

Sustainable development the dependent variable in this study was multi-dimensional made of 7 items for economic factors, 4 for environmental factors and 4 items for social factors, each scaled 1=Strongly Disagree; 2= Disagree; 3=Neutral 4; Agree; 5= Strongly Agree. Overall, the results presented in Table 5.2 showed that social development in the Mano river basin was very low.

Table 5.2: Analysis of the dependent variable

Dimension	means	Standard deviation	Interpretation
Economic factors	1.67	1.106	Low
Environmental factors	1.88	1.194	Very Low
Social factors	1.48	1.329	Very Low

5.3 Descriptive analysis of the independent variable: Trans-Border Natural Resource Management Institutional Factors

The independent variable, Trans-border natural resource management institutional factors was also multidimensional with 6 items for support services, 6 items for cultural factors, information exchange with 5 items, 5 items for polices, decision making 5 and 5 items for conflict resolution. Each of these items was scaled as for the dependent variable.

Results in table 5.3 revealed that trans-border natural resource management institutional factors were weak

5.3 Analysis of the independent variable

Dimension	means	Standard deviation	interpretation
Support services	2.17	1.400	Weak
Cultural factors	2.68	1.267	Weak
Information exchange	1.82	.937	Weak
Polices	1.88	1.194	Weak
Decision making	1.71	.804	Very Weak
Conflict resolution	1.38	1.322	Very Weak

5.4 Inferential statistics:

Multivariate Regression of Trans-border natural resource management institutional factors on Sustainable Development

Pearson Product Moment Correlation was used to determine the relationship between trans-border natural resource management institutional factors and sustainable development. The results were negatively correlated and statistically significant at 0.001confidence level (r=-.539, p<.001).

To test the hypotheses and to establish which of the six parameters of trans-border natural resource management institutional factors were significant in explaining sustainable development, a multivariate tool namely multiple regression analysis was run. Analysis of variance (F= 16.74) suggested that the model relating to DV and the six IVs was good at the one percent level of significance (p=0.001) and the adjusted R square (R=.539), indicated that 54% of the variation could be attributed to the six IVs. Of the six IV`s, conflict resolution contributed most to the model (β=.473), implying that it explained 47% of the variation in the DV. The t values suggested that all the six IVs were negative but significant at one percent level of significance. In other words multivariate regression analysis led to the rejection of all the six null hypotheses. Therefore remaining variance of 46% was attributed to other factors which were not included in this study although could be important.

Trans-border natural resource management institutional factors	β	t	sig
Support services	.221	- 2.461	.000
Cultural factors	.324	- 2.758	.000
Information exchange	.251	- 2.821	.000
Polices	.378	- 3.446	.000
Decision making	.411	- 3.733	.000
Conflict resolution	.473	- 4.121	.000

6. Discussions

The study supported the descriptive analysis and the entire six hypotheses which found that trans-border natural resource management institutional factors were weak and negatively influenced sustainable development. This was further supported by qualitative findings that a majority of the respondents felt that they were affected by trans border natural management institutional factors including bad governance and political, social and economic exclusion, which accentuated their marginalization and further entrenched vulnerability and poverty. As in the past, this leads to potential insecurity and instability hotspots with negative impact on social development. Further challenges observed included the lack of harmonization and enforcement or implementation of agreed principles, protocols and conventions by member nations, harassment and extortion by security personnel, weak government accountability, poor infrastructure, the absence of public service delivery, youth marginalization and organized crime. These findings are in tandem with the study hypotheses, corroborated by past researchers Afolabi (2017, 2018), Annan (2014), Boating, (2014), although inconsistent with a few others (e. g. Hamilton, 2007; Appelgren & Klohn, 2007). The findings fortify theoretical assertions such as those of Agrawal (2007), Pinkney (2001) and Murphree (2001) that weak trans border natural resource management institutional factors were responsible for negative sustainable development. The findings led to the conclusion that trans-border natural resource management institutional factors negatively influenced sustainable development in the Mano river basin of West Africa.

7. Recommendations

The study recommended that in order to attain sustainable development in the Mano river basin of West Africa, trans-border natural resource management institutional factors should be enhanced and strengthened. More emphasis should focus on information exchange and support services while policies to fully achieve sustainable development should be put in place. Despite the contribution, the study had limitations. For example, the process of data collection encountered some problems but did not substantially affect the quality of resulting data and its subsequent analysis. These included: the geographical scope and respondents availability. As there are not many studies on this topic, it seems therefore, that the future researchers may need a more contextual and contingency research.

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