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Freshwater governance; Case of Lake Bosomtwe in the Ashanti Region of Ghana

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Abstract

The study, investigates the nature of governance system around Lake Bosomtwe and its impact on the conservation of the freshwater resources. It also seeks to understand the structural process and contribution of local knowledge in freshwater conservation, which is a gap identified in freshwater governance. Data was based on residents' impact and institutions involved in collation, formulation and implementation of freshwater policy. Based on the findings there is a unanimous indication that, locals are not part of freshwater governance at Lake Bosomtwe and this finding has nothing to do with their educational background. This renders the system of governance as a top-bottom approach. Indications are that this system does not support the conservation of the Lake considering the apathy in adhering to rules and regulation by the locals. The locals believe that their contributions and participation would help strengthen capacities of knowledge and practices in freshwater governance to reduce degradation.

Keywords: Freshwater Governance; Degradation; Local Knowledge; Conservation; Stakeholder's Perception; Water Policy

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1. Introduction

There is increasing global need to improve the crisis in freshwater governance (FWG) (Pahl-Wostl, et al., 2013; RKNOW, 2016) which is the major threat to freshwater degradation. Freshwater governance is describes by Armitage, de Loë, Morris, Edwards, Gerlak and Hall (2015), as a structural process where local communities or indigenes are allowed to voice out their interest in decisions making and implementation processes of freshwater resources use.

Franks and Cleaver (2007) emphasis that freshwater governance is an ordered arrangement of actors, resources, mechanisms and processes, which control society's access to freshwater. In this case the local community contributes to the social, economic, political and administrative data on freshwater resources, for the formulation and implementation of freshwater policy.

Nonetheless, freshwater governance in Ghana has evolved through several approaches to the Integrated Water Resources Management (IWRM). IWRM uses the welfare dependency approach which seeks to identify stakeholders within the interactionist theoretical perspective, in response to these freshwater challenges (Akrong, 2006; WWAP-UNESCO, 2012). Within the stakeholders approach, it helps to identify how a network of relationships are able to improve benefits to individuals and groups of people who are likely to be affected by or can affect the resources (Donaldson and Preston, 1995).

Even though considerable efforts have been made towards the conservation of freshwater resources, the trade-offs between man and the freshwater resource needs are increasing all over the world (Afroz, et al., 2014). This is because unregulated human activities around freshwater resources are increasing and leading to their degradation (Afroz et al., 2014; De Stefano, Svendsenb, Giordanoc, Steel..., 2014).

The study examined the institutions and structures that govern the use of Lake Bosomtwe, as a common resource. In addition, the research investigated relevance of government rules guarding the lake, aimed at the perception of the differences in the educational level of local communities from the two districts around Lake Bosomtwe. The rationale for the study was based on the fact that understanding local concerns within a resource-context would provide the dearth of information for policy formulation and implementation towards freshwater conservation (Mendoza Lawas, 1997; Woodley, 2002; Tuhiwai-Smith, 2002). The analysis was on how relevant current state of governance in terms of data collected, formulation, implementation and enforcement of water laws and practices are towards networking and relationship amongst freshwater stakeholders. The results were consistent and do imply that majority of the respondents believe that government's rules are ineffective in protecting the lake based on its top-down approach.

2. Study Area

The study site, Lake Bosomtwe, a unique and threatened ecosystem, is located in the Ashanti Region of Ghana, which is situated between longitude 0.15°W and 2.25°W, and latitude 5.50°N and 7.46°N. It is found 90-250 km inland from the sea and shares its administrative boundary with the Eastern, Central, Western and Brong-Ahafo Regions. Lake Bosomtwe is located about 30km south-west of Kumasi the capital of the region, in the

forest zone of the Ashanti Region of Ghana within latitudes $6^{\circ} 28' 15.11''\text{N}$ and $6^{\circ} 32' 28.53''\text{N}$ and longitudes $1^{\circ} 24' 24.06''\text{W}$ and $1^{\circ} 26' 46.30''\text{W}$ (Amu-Mensah et al., 2014).

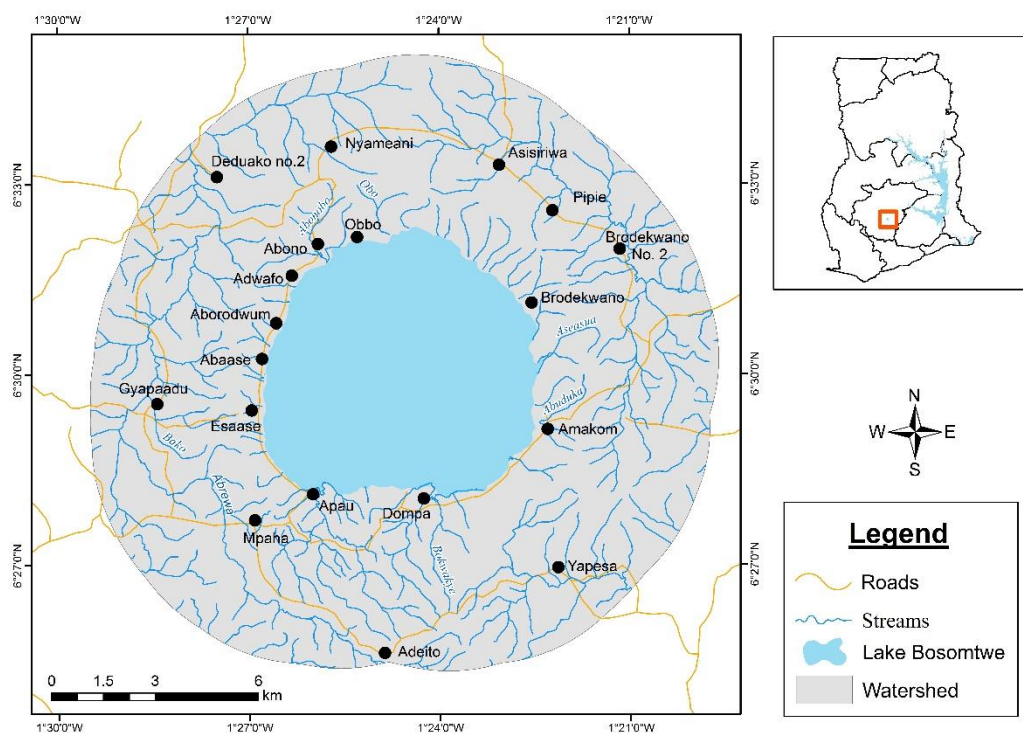


Figure 1. Data Map of Lake Bosomtwe's watershed (Source: Remote Sensing Cartographic Unit, University of Cape Coast, 2017)

2.1. Drainage

The drainage pattern around Bosomtwe district is dendritic and centripetal in outlook (Ghana Statistical Services, 2014; Turner, Gardner and Sharp, 1996). Around Lake Bosomtwe, there is an internal drainage where the streams flow from surrounding highlands into the lake in a centripetal fashion. The lake currently has no outlet, although it did overflow in the recent geologic past (Turner, et al., 1996). The lake is an endorheic lake with a radial drainage pattern. This is totally detached from the general drainage system of the rest of Kumasi or Ghana due to the high crater rim surrounding it (Koeberl et al., 2007). According to Whyte (1975), thirty-seven (37) streams flowed into the lake during rainy seasons nonetheless only five specifically, Abono bo, Abrewa, Ebo Kwakye, Bo Twiwaa and Konkoma were believed to be permanent but with no outflows.

2.2. Socio-economic activities

The fairly uniform distribution of temperature and rainfall enhances the cultivation of many food and cash crops including, cocoa, plantain, cassava, cocoyam, maize. In addition, vegetables such as cabbages, pepper,

tomatoes, okra and garden eggs are cultivated. Current method for clearing the land is the application of weedicides as well as the slash and burn method (Amu-Mensah et al., 2014; MoFA, 2017a; MoFA, 2017b). Previously, the method for preparing the land was dominantly slashing and mulching especially around areas closer to the lake, however, the culture is dying (Amu-Mensah et al., 2014; Yamba, 2016). Mulching is a traditional on-farm activity among smallholder farmers which helped to protect and improve the soil (Yamba, 2016). Such unregulated agricultural practices like the slash-and-burn method ends up destroying portions of land which was initially not designated for clearing thus exposing the land to the ravages of torrential rainfalls as it causes the soil to erode (MoFA, 2017a; MoFA, 2017b).

In addition, fishing and animal rearing is also a major agricultural activity around Lake Bosomtwe. In the case of animal rearing, faecal materials from sheep, dogs, pigs, ducks and fowls are washed into the lake during rain events, consequently increasing the organic matter load in the lake. Chemicals (fertilizers and herbicides) used on the farms to increase crop yield and sludge, also enter the Lake just like runoff from crop and animal residues (Amu-Mensah et al., 2014).

2.3. Nature of formal governance under the district assembly

In 1988, Ghana changed from the local authority system of administration to the district assembly system. In that year, the then existing 140 local authorities were demarcated into 110 districts (Esta, 2012). The Bosomtwe District is therefore, governed by two systems of governance, the District Assembly and the Traditional Governance systems; the latter system is currently dwindling.

The Lake Bosomtwe was initially under Bosomtwe Atwima-Kwanwoma District with its capital at Kuntanase and Amansie East District, whose capital was at Bekwai (two different administrative authorities), the districts were later changed to the Bosomtwe and Atwima-Kwanwoma Districts in 2008 by LI 1922. The Bosomtwe-Freho District was carved out of the former Amansie East District, with Asiwa elevated as its capital. The Bosomtwe and Bosomtwe-Freho District Assemblies are constitutional bodies established by the Local Government Act 1993, (Act 462), National Planning Systems Act 1993 (Act 480), the Civil Service Act 1993, the Local Government Service Act 2004 (Ghana Statistical Service, 2014a; MoFA, 2017a; MoFA, 2017b).

In order to ensure decentralisation processes at the grassroots, the Assembly has been demarcated into four area councils. These are Bosomtwe East Area Council, Nsuta Area Council, Bosomtwe Area Council and Sunso Freho Area Council. The District Assembly is made up of the District Chief Executive as the political head, the Presiding Member, who is the Chairman of the General Assembly and one person from each of the electoral areas within the Districts. It is the highest policy-making body of the District which represents the entire political and administrative and planning authority of governance at the district level.

The assembly is responsible for the facilitating and implementation of government policies and programmes at the district level while ensuring good governance. It is supported administratively by decentralised departments and other quasi-agencies of government (Ghana Statistical Service (GSS), 2014 a and b).

Under the Water Resources Commission Act 522 (1996) Section 35(f), the Water Resources Commission (WRC) may, by legislative instruments, make regulations to facilitate a proper operational environment, for its mandated functions at Lake Bosomtwe through the district assemblies.

2.4. Nature of informal traditional governance

The traditional level of governance has been in practice before the colonial government and the current governance system of IWRM. The traditional system, deals with purely traditional affairs concerning customs and stool land administration. The method of governance is through a complex local network system of traditional chiefs and elders. Each community has a chief of some level from “Odikro” (chief) to “Omanhene” (paramount chief) with the Asantehene as the only King of Asante. Representatively it is like having a president for the country. Each chief has “divisional chiefs” with portfolios, similar to the national President and Ministers (Ghana Statistical Service, 2014a and b). The ascension into chieftaincy (except “Nkosohene”) is through the matrilineal structure. The Bosomtwe District has one Paramountcy that is Kuntanase Traditional Council with about thirteen (13) divisional chiefs (“Abrempong”) and Bosome-Freho is under the jurisdiction of the Kokofu Paramountcy. Dadease and Asakyiri are other notable stools in the District (Esta, 2012; Ghana Statistical Service, 2014a and b). Currently Nana Kuntansehene, Nana Kokofuhene and Nana Asamanhene are in control of land around the area with the Asamanhene in charge of the Lake, holding it in trust for the Asantehene (Elliot-Ofosu, 2006; Appiah-Kubi II, n.d).

Following Amu-Mensah et al. (2014), Abreu et al. (2016) and Watson (2010) reports, indications are that, the Asantehene (King of the Asante), is the ultimate custodian of the lake. The Asantehene is said to have entrusted the lake to the Asamanhene who reports to the Asantehene on issues pertaining to the Lake (Appiah-Kubi II, undated). McCaskie (2003) and Appiah-Kubi II, (n.d) stress that the Asantehene is responsible for enforcing prohibitions and officiates at the annual rites.

Traditionally, law enforcement used to be upheld through experiences, beliefs and traditional practices of the people in the protection of the lake. Furthermore, the rich cultural heritage of the communities also supported the conservation of the Lake (Esta, 2012). Such indigenous knowledge and practices in relationship to the Lake used to be a potential source of contribution to its conservation through taboos, totems festivals and observation of certain rest days (Elliot-Ofosu, 2006 and Appiah-Kubi II, n.d).

3. Methodology and data collection

With a population of 17,783, a targeted population of 9,702 was determined using available figures provided by the (Ghana Statistical Service, 2016a) based on the communities immediately surrounding the Lake Bosomtwe in the Bosomtwe and Bosome-Freho Districts. A sampling size of 370 respondents was determined, using the Krejice and Morgan (1970), sampling size methodology.

A multi-staged sampling was used for the selection of respondents. An initial purposive sampling was used to select six (6) institutions from the government sector, based on their involvement in freshwater policy

formulation and implementation. A non-random purposive sample was used to select the six (6) respondents from each institution based on their position and involvement in water policy formulation for the past 15 to 20 years. Finally, purposive sampling was used to select 30 key informants (chiefs, sub-chiefs, elders, experts, priests, assemblymen and women, unit committee members, opinion leaders from the nineteen (19) communities). Their selection was based on their leadership role in the communities, for participation of an in-depth interview through snowballing. In the next stage, 354 respondents from 19 communities around Lake Bosomtwe were selected for the survey using accidental and voluntary selection. This was to ensure that each gender group within the community had their views captured. The data was collected through a questionnaire which was administered verbally by six research students and the researcher. Semi-structured questionnaires and well-structured interview schedule were administered mainly to the local leaders during an in-depth interview. Direct observation was also used with the help of a digital camera. A total of 380 respondents were used for the study. Educational Attributes of the respondents interacted with are shown in Table1. Age distribution of the respondents is also shown in the Figure 2.

Table 1. Educational Background of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
No formal education	67	18.9	18.9	18.9
Primary	58	16.4	16.4	35.3
JHS	107	30.2	30.2	65.5
MSLC	86	24.3	24.3	89.8
SHS	18	5.1	5.1	94.9
Tertiary	16	4.5	4.5	99.4
N/A	2	0.6	0.6	100.0
Total	354	100.0	100.0	

Source: Authors field work, 2017

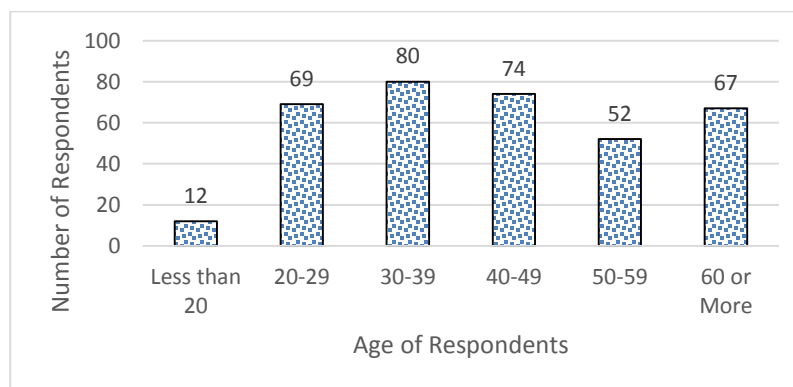


Figure 2. Age distribution of respondents (source: Authors field work, 2017)

4. Research results

4.1. Relevance of current freshwater governance

Responses to the perception of respondent are presented in Figure 3 based on local dwellers' level of education. Responses by those with SHS level of education with reference to "Yes", government rules are working and "No" it is not working, does not show any significant differences. Yet there is a unanimous affirmation that government rules and regulations are not helping to reduce the degradation of the lake Bosomtwe. The majority of respondent 74 percent with the "No" decision were JHS level graduates, followed by MSLC level graduate with 71 percent. The least respondents who were not sure were 7 percent with MSLC level of education.

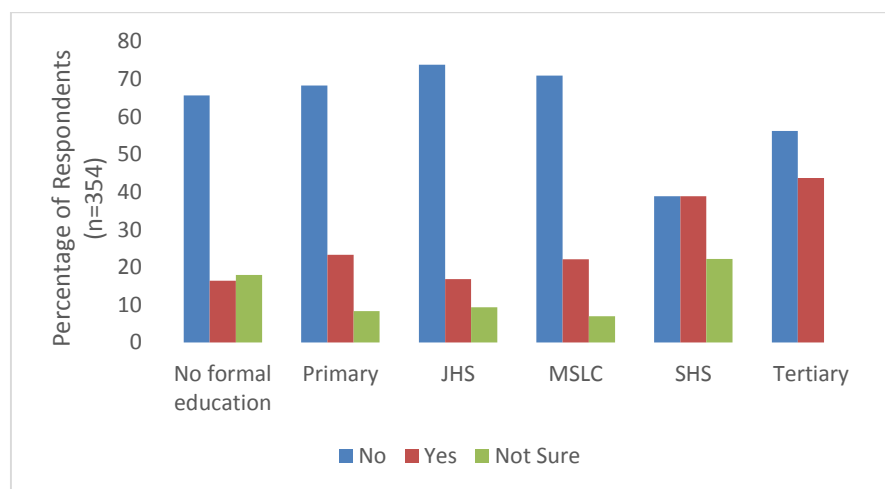


Figure 3. Respondents Perception on Relevance of Government Regulations in Protecting Bosomtwe (Source: Authors Fieldwork, 2017)



Plate 1. Rubbish dump close to the water course (Stream) (Source: Authors Fieldwork, 2016)



Plate 2. Washing of dirty cloths by the shores of the Lake (Source: Authors Fieldwork, 2016)



Plate 3. Logging in Bosomtwe Catchment (Source: Authors Fieldwork, 2016)

Using the Pearson χ^2 as an indicator with a Cramér's V of 0.2 and a P of 0.025. Indications are that the differences in the responses have weak relationship, therefore the responses are not dependent on their level of education. This result is confirmed through observation of human activities around the lake that impacts on the lake. Evidence from Plates, 1, 2 and 3, show unregulated human activities around freshwater resources. This gives indications of weak institutional governance where locals do not adhere to rules and regulations. Here people dump refuse in the water course indiscriminately, without counting the cost or implications on the water body and their source of livelihood.

From the results, indications are that, there is a nexus between the aspirations of the local communities and the aim of protecting and conserving the lake as a sustainable resource. According to a male respondent (19/11/2016), enforcement of rules and regulations are in the hands of the government, yet within the communities there is no one to ensure that the right practice is adhered to. Another female respondent indicated that the chiefs, who can help to enforce these laws are not respected by the government officials.

This is because their authority to enforce certain laws has been taken away by the district assembly officials who do not live in the communities around the lake and therefore do not even understand their plight.

4.2. Perception of policy formulation and implementations

On the issue of stakeholders' perception of governance with respect to government's policy formulation, one of the facilitators for policy formulation said, (12/10/2016).

"Sometimes the key stakeholders or local communities, are not involved in policy formulation. It is better to involve them so that they would own it. Broad stakeholder's consultation is the best option"

Another policy formulation facilitator explained that;

"The challenge we have is that the basin authority is supposed to work with the local authorities but the relationships are not very strong, the reasons being that the assemblies have their own challenges (financial and other logistics). There are expectations from the traditional authorities that is difficult for the District Assemblies to comply with for example, who buys the schnapps and with what money" to initiate a collaboration, (4/9/2016).

4.3. Ownership and Control of Lake Bosomtwe

Perception of respondents on who has ownership and therefore has the authority to make rules and control practices around the lake is shown in Table 2.

A cross tabulation of the ownership of the lake and control of the lake shows that majority (n=183, 51.7%) of the respondents believed that Otumfuo who is the King of Ashanti owned the lake and therefore has the right to make rules and control issues around the Lake. Another significant number of respondents indicated that God controlled the lake (n=83, 23.4%). There was significant dependence on the control and ownership of the lake as shown in Table 2 and based on Table 3 of the Chi-square analysis.

Table 4 presents the Pearson chi-square test of association between the Ownership and Control of Lake Bosomtwe. The results show that there is association between Ownership and the person who controls the Lake Bosomtwe. This was evident from the Pearson chi-square results of ($\chi^2 = 4.3252^a$, df=25, p=0.000).

From the results it can be seen that government's authority to enforce rules and regulations is not strong since the respondents do not recognise the control of government and its officials around Lake Bosomtwe. In addition, there is a clear lack of distinction or collaboration between local traditional governance and formal institutional governance. This makes it uncertain as to "who" has the right to formulate and implement rules, as well as whose rules and regulations should be enforced and by whom.

Another dilemma observed was, if the traditional authorities (TAs) who are in the locality own the Lake then it would not be in wrong for government to impose its rules. To ensure enforcement of rules there should

be a collaboration in the area on data gathering for the formulation and implementation of rules and regulations.

Table 2. Ownership and Control of Lake Bosomtwe

		Who has the right to make rules and control the lake?							Total
		Otumfuo	Gov't	God	Everyone	Nobody	N/A		
Who owns the lake?	Otumfuo	Count	183	5	0	0	2	0	190
		% of Total	51.7%	1.4%	.0%	0.0%	0.6%	.0%	53.7%
Gov't		Count	8	4	1	0	1	0	14
		% of Total	2.3%	1.1%	.3%	.0%	.3%	.0%	4.0%
God		Count	83	5	15	6	3	0	112
		% of Total	23.4%	1.4%	4.2%	1.7%	.8%	.0%	31.6%
All of us		Count	17	1	1	1	3	0	23
		% of Total	4.8%	.3%	.3%	.3%	.8%	.0%	6.5%
Nobody		Count	12	0	0	0	1	0	13
		% of Total	3.4%	.0%	.0%	.0%	.3%	.0%	3.7%
N/A		Count	0	0	0	0	0	2	2
		% of Total	.0%	.0%	.0%	.0%	.0%	.6%	.6%
Total		Count	303	15	17	7	10	2	354
		% of Total	85.6%	4.2%	4.8%	2.0%	2.8%	.6%	100.0%

Source: Authors fieldwork 2016

Table 3. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.3252 ^a	25	.000*
Likelihood Ratio	95.090	25	.000*
N of Valid Cases	354		

Source: Authors Fieldwork 2016

This issues are confirmed in an in-depth interview with an elderly man aged 74, who indicated that, he was not sure whose rules they were supposed to enforce, their customary laws or the bye-laws from the government, which according to them was created in the same year the study was conducted. A 67-year-old elderly man also explained “*The law is good but people do not abide by it. The community members do not respect the local authority because even chiefs can be sent to the police station*” (20/12/2016).

The respondents explained that the chiefs and “Odikros” have better ways of presenting stringent rules that attract strict measures for not adhering to rules, yet all these systems have broken down due to the inception of the western system of governance which puts authority in the hands of the government. Analysis of the data, presented in Table 2, confirms this assertion, by respondents numbering 92 percent. Indications are that they are not involved in making rules or in the management of the lake.

Table 4. Community Involvement in making rules and managing the Lake

	Frequency	Percent	Cumulative %
Very much	1	0.3	0.3
Sometimes	27	7.6	7.9
Not really	76	21.5	29.4
Not at all	248	70.1	99.4
Neutral	2	0.6	100.0
Total	354	100.0	

Source: Authors Fieldwork 2017

In an in-depth interviews (GOOF¹ 1, 12/10/2016), revealed that water governance at Lake Bosomtwe is dependent on the local environment. The officer explained “*Although freshwater problems are general, the issue of ensuring quality and maintaining the quantity is defined by the governance of the activities within the environment and the seasonality of rainfall. In the case of Lake Bosomtwe its natural nature also contributes to the current state, although the activities intensify the problem of quality*”. From the results, indications were that policies were enacted from the water related ministries and enforced by their agencies or institutions at the district level to ensure implementation of rules and regulations.

GOOF 1, explained that on the issue of policy formulation

“The institutions provide the technical inputs or data, before the policies are developed for the Ministry of Environment Science and Technology Innovation (MESTI) and agencies under the Ministry then implements them”.

The officer explained that there are three categories of institutions: first the Water Related Management Institutes and Agencies, the Regulatory Institutions and the Water User institutions & Data Management Institutions. Under the Data Management Institutions are:

CSIR Water Research Institute responsible for quality and sediment data collection; Hydrological Services Department collects stream flow data and the Ghana Meteorological Agency which provides key data for temperature and rainfall which feed into water management policy. Water Resources Commission then collects the data, processes the information for the Ministry, but it is not a data gathering institution.

¹ GOOF - Government Official

The situation around the Lake also depicts how current government institutions have shaped the behaviour of individual members and produced the chain of apathy around Lake Bosomtwe. This is because the people perceive that, the Asantehene (Otumfuo) is supposed to own and control the lake with his own set of customary rules, well understood by the people in the community. However, they believe the government has usurped this power without instituting written laws for the people to adhere to. A young woman indicated that “*We are weeding everywhere around the Lake because that place is fertile “Yenni emra no ho nimdie”* meaning “We don’t have an understanding of the government rules”.

5. Discussion

Indications are that locals do not have a good grasp of some of the rules and their implications on the lake and their livelihood. Here, their participation in the rules, principles, values, policies and laws which provide the bases for strengths and weaknesses of governance is not properly in place signifying a weak institutional system (Rim-Rukeh et al., 2013). The opportunity to participate and contribute their knowledge to policy is thus lost. There is a signal that there are inadequacies in the dearth of information for policy formulation and implementation towards freshwater governance, confirming Mendoza Lawas (1997); Woodley (2002); Tuhiwai-Smith, (2002).

From the results, there was no mention of any institution or the collection of information on social, anthropogenic and cultural issues pertaining to the catchment area that could impact on the freshwater resources. This is a clear indication of top-down, stewardship style of governance indicated by Giddens (1998) structuration theory and not the stakeholder approach or IWRM as the current integrated system of governance on paper. Indications are that, government presents bye-laws which are supposed to be enforced by the district assembly officials, who are subordinate to the chiefs and the heads of clans “Odikros” and therefore does not help to identify a network of relationships. The kind of system would not be able to improve benefits to the local people who are likely to be affected by or can affect the resources (Donaldson and Preston, 1995). In addition, they have the support and power from government to impose and control what the locals could do and not do around the Lake. This situation confirms the argument made by Daily et al. (2003) and Kendie and Mensah (2008) that rules or bye-laws are imposed to protect the honour of the government officials who believe to have accomplished their jobs, by imposing such rules and bye-laws. From the results, rules are not working because the system for enforcement is weak, because it does not have the support of the locals directly or indirectly. Respondents expressed doubts whether government rules can really function without a bottom-up approach.

The notion is created that the perspectives of owners of the resource or the direct beneficiaries may not be considered in the formulation and implementation of policy. This confirms the gap identified in the Stakeholder’s theory indicating that, structures are built on the government executives’ understanding or perception of the phenomena (Donaldson and Preston 1995). Governance of Lake Bosomtwe from the results is not an ordered arrangement of actors, resources, mechanisms and processes, controlling the local’s access. This is because the local communities’ contribution to the social, economic, political and administrative data

on freshwater resources, for the formulation and implementation of freshwater policy is not adequately in place.

6. Implications for policy

The study, therefore in both theory and policy, would be able to contribute to the understanding of the local knowledge and its benefits to freshwater conservation, which is a gap identified in freshwater governance. This would inform freshwater stakeholder's knowledge in freshwater governance at Lake Bosomtwe. The data will contribute to knowledge on the use of local ideas and practical solutions to control the degradation of freshwater resources. Furthermore, it would help strengthen capacities of local knowledge and practices to be effectively used in freshwater policy formulation, enforcement and management.

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