Assessing Level of Awareness about Water Governance Structures and Challenges in the Volta River Basin

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Abstract

To enhance transboundary water management and cooperation in the Volta River Basin, the Project for Improvement of Water Governance in the Volta Basin (PAGEV) program established the code of conduct between Burkina Faso and Ghana with support from partner organisations. However, regular flood risk in the Basin remains unresolved. This paper assesses the level of awareness of riparian communities about the Volta Basin Authority (VBA) and the code of conduct. It also attempts to understand the extent to which local people perceive water governance challenges in the Basin. We used a questionnaire survey to understand these. Our results show that 84% and 91% of the respondents in Burkina Faso and Ghana did not have knowledge about the VBA. Only 11% of the respondents in Ghana were aware of the code of conduct. The respondents in both countries identified Bagre Dam water spillage, flood protection, environmental regulation enforcement and community participation as their major challenges in the sustainable management of basin water resource. Chi-squared analysis reveals that our respondents' awareness was significantly correlated to their education, gender and years of residency along with location. This paper then highlights water governance challenges to be solved in the future in the Basin by better incorporating local needs.

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Key Points:

We conducted a survey in Burkina Faso and Ghana to understand awareness of residents about water resource governance and their perception about governance challenges in the Volta River Basin. Results revealed that only a small portion of the respondents had knowledge of the Volta Basin Authority and the existence of the code of conduct. The spillage of excess water from Bagre Dam was the most pressing concerns of most residents.

Abstract

To enhance transboundary water management and cooperation in the Volta River Basin, the Project for Improvement of Water Governance in the Volta Basin (PAGEV) program established the code of conduct between Burkina Faso and Ghana with support from partner organisations. However, regular flood risk in the Basin remains unresolved. This paper assesses the level of awareness of riparian communities about the Volta Basin Authority (VBA) and the code of conduct. It also attempts to understand the extent to which local people perceive water governance challenges in the Basin. We used a questionnaire survey to understand these. Our results show that 84% and 91% of the respondents in Burkina Faso and Ghana did not have knowledge about the VBA. Only 11% of the respondents in Ghana were aware of the code of conduct. The respondents in both countries identified Bagre Dam water spillage, flood protection, environmental regulation enforcement and community participation as their major challenges in the sustainable management of basin water resource. Chi-squared analysis reveals that our respondents' awareness was significantly correlated to their education, gender and years of residency along with location. This paper then highlights water governance challenges to be solved in the future in the Basin by better incorporating local needs.

Key words: Volta River Basin, riparian community awareness, water governance challenges, Burkina Faso and Ghana.

1 Introduction

Proponents of transboundary water management have long sought for an effective cooperation mechanism among basin countries (Islam and Susskind, 2013). As early as 1997 the UN Watercourses Convention emphasized international cooperation in managing shared international watercourses. In western Africa, the World Bank, the Economic Community of West African States and the European Union Water Initiative have supported the establishment of a cooperation mechanism among six riparian countries of the Volta River Basin since the 1990s (Opoku-Ankomah and Ampomah, 2006; World Bank, 2015; Yankey, 2019). This effort resulted into the establishment of the Volta Basin

Authority (VBA) in 2007 (which came into effect in 2009) (Amuquandoh, 2016; Global Water Partnership, 2014).

The Volta River Basin affects water supplies for about 24 million people (as of 2010) and this number is expected to reach 33.9 million in 2025. Riparian communities in this Basin are largely rural and poor, engaging in small-scale agriculture (UNEP/GEF-Volta TDA, 2013; Global Water Partnership, 2014). Considering this economic situation along with cultural diversity, the fundamental question is how the VBA can implement its policies effectively among its members. Article 6 of the Volta Convention mandates it to promote consultation and partnership among these people. It also encourages the implementation of integrated water resources management (IWRM) and the equitable distribution of benefits (IEADB, 2020; Yankey, 2019). The 2015-2019 Strategic Plan of the VBA further aimed at enhancing stakeholder participation through enhanced communication (World Bank, 2015).

The effectiveness of the VBA has been questioned by scholars. Gao and Margolies (2010) found that the Basin had suffered increasingly from deteriorating water quality in the last ten years. Several other scholars stressed poor coordination among the six countries for flood risk assessment and planning (Obrecht and Mead, 2014; World Bank, 2015; Yankey, 2019). The World Bank (2015) also observed increasing extreme climate events, continuing deforestation, and soil degradation. Yankey (2019) noted that the VBA was not respected by stakeholders. IUCN (2012) encouraged the VBA to show tangible results and improvements to water users in order to have good community participation at transboundary levels.

One of the most contentious issues that gained attention from scholars was the controversy over Bagre Dam spillage near the Ghana-Burkina Faso border (Kobbina, 2019; Yankey, 2019). Some studied the effect of Bagre Dam spillage on downstream watershed areas in Ghana (Ampomah, 2017; Mul et al., 2015). Another group of researchers focused on water allocation between the two countries (Andreini et al., 2002; Baah-kumi and Ward, 2020; Leemhuis et al., 2009). Some studies looked at the institutional arrangement for

undertaking integrated water resource management in this border area (Agyenim, 2011; Opoku-Ankomah et al., 2006).

However, there is no study that assessed the level of awareness among riparian communities. Koop et al. (2017) noted that awareness is a prerequisite for effective change. Awareness means a good comprehension of causative factors as well as effects and dangers associated with governance challenges. Regarding the Volta River Basin, Global Water Partnership (2009) noted that the level of awareness about water governance, especially integrated water resources management, has improved since the 1990s, but it is still important to enhance the awareness of all riparian communities about water governance structures and programs.

Heeding on its suggestion, this paper seeks to assess the level of awareness among riparian communities about the Volta Basin Authority and the code of conduct between Burkina Faso and Ghana. It also identifies some major challenges of water governance in the Volta River Basin from the perspectives of riparian communities.

2 Materials and Methods

2.1 Study Area

In this paper, we focus on the controversy over Bagre Dam spillage. We chose some of the most affected areas, including Bagre District of the Eastern Central Region of Burkina Faso and the so-called Bawku zone of the Upper East Region in Ghana (Figure 2). In 2005, a code of conduct for the sustainable management of the Volta River Basin was developed to guide both Burkina Faso and Ghana (Global Water Partnership, 2014; World Bank, 2015; Yankey, 2019). In 2008, a 14-member local transboundary committee was formed, consisting of seven members each from Ghana and Burkina Faso. As the first piloted local water governance structure in the Volta River Basin, this committee aimed at coordinating joint activities and solving local water use disputes (IUCN, 2012). This pilot local governance structure is not yet replicated widely across the Basin.

In 2019, we conducted a preliminary field visit in this area and interacted with some community members. We found that downstream communities below Bagre Dam both in Burkina Faso and Ghana had frequently suffered from flooding from its regular spillage.

Bagre Dam is located in the Eastern Central Region of Burkina Faso. It was built in 1992 and began operation in 1994 mainly for power generation and large-scale irrigation purposes (Gao and Margolies, 2010; IIED, 2020).

The town of Bagre is known for its agribusiness projects in connection to the dam. It is a home to 19,164 people from various ethnic groups (City Population, 2020). The climate is characterized by dry (harmattan) and wet (rainy) seasons with an average annual rainfall of 1,000 mm (Coche, 1998). Its vegetation is predominantly covered with scattered shrubs, short grasses and acacia trees. Crop farming, livestock breeding, and fishing constitute main livelihood activities. Rice, maize, vegetable and fruit plantations are main farming activities (City Population, 2020).

The economy of the Bawku zone largely depends on agriculture, which employs about 80% of the population (Ghana Statistical Service, 2014). The climate here is characterized by the wet season from May to October and the dry season from November to April. An average annual rainfall ranges from 950 mm to 1,100 mm. The vegetation here is similar to the study area in Burkina Faso. Riparian communities conduct limited irrigation by drawing water from the Volta River. Major food crops here include maize, rice, sorghum, pepper, watermelon and onion (Ghana Statistical Service, 2014; Ministry of Food and Agriculture MOFA, 2015). The construction of Kpalugu multipurpose dam in downstream commenced in April 2020. Once completed, it will be the first storage dam in this part of the Basin to provide irrigation water to farmers (Construction Review Online, 2020).

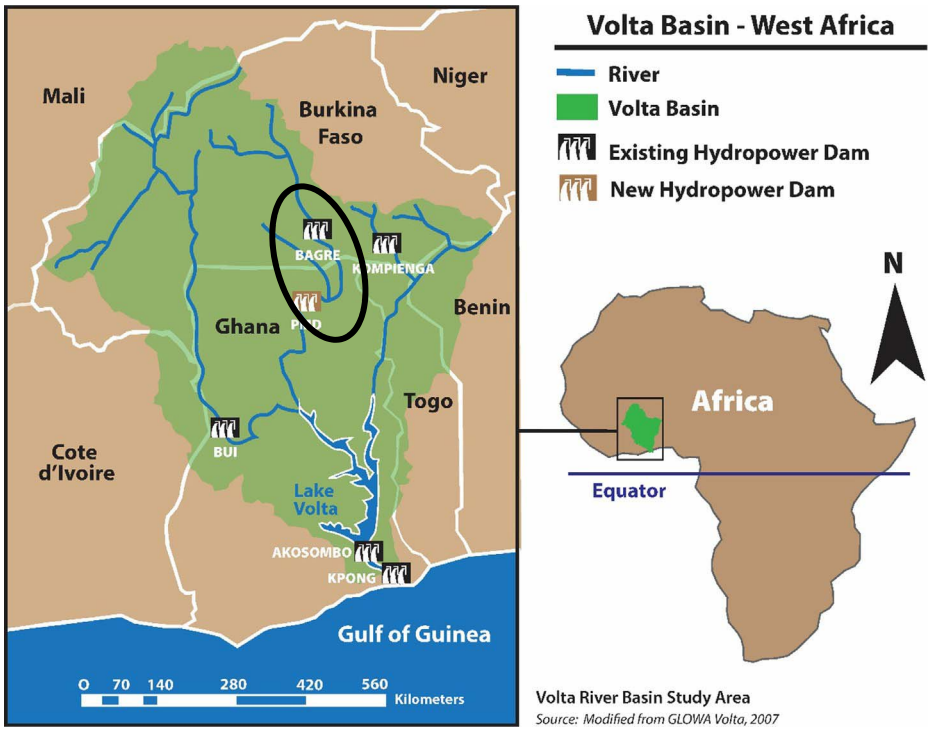

Figure 1. Map of the Volta River Basin showing the study area circled (Source: Baah-kumi and Ward, 2020).

3 Data

In December 2019 and January 2020, we conducted questionnaire surveys in the two study areas along the Volta River. In Burkina Faso's Bagre District, we randomly sampled 30 residents each at Poanga, Benkaku and Dirlakou communities. In the Bawku zone of Ghana, we randomly distributed the questionnaire to 50 residents each at Azum-Sapeliga, Gentiiga and Songo communities. Our selection of sampling sizes was based on the population differences between these two areas. A population of Bagre District was 19,164 (City population, 2020) and that of Bawku zone was 290,117 (Ghana Statistical Service, 2014). Due to their limited reading and writing skills, we obtained support from local enumerators and administered the questionnaire by translating English into local languages called Mossi in Burkina Faso and Kusaal in Ghana. The response rate was 100% in Burkina Faso and 99% in Ghana. Altogether we collected 238 valid responses.

The questionnaire had three parts. The first part attempted to identify the socio-demographic characteristics of our respondents. The second part tried to understand community members' awareness about water governance in the Volta River Basin. The third part focused on governance challenges. The questionnaire responses were coded and entered in the Statistical Package for Social Sciences (SPSS version 23) worksheet for analysis. Descriptive statistics in the form of frequencies and percentages were largely used to discuss the results. We also used the Pearson Chi-Squared to understand correlations between respondents' socio-demographic characteristics and their awareness (Kent State University Libraries, 2020). The null hypothesis (H_o) of the Pearson Chi-Squared (χ^2) is that there is no significant difference in responses among categories for the alternate hypothesis (H_a). The null hypothesis was tested at 0.05 level of significance. H_o is rejected if the p-value is lower than the significance level. However, when the p-value is higher than the significance level, then we accept H_o.

4 Results

4.1 Socio-demographic characteristics of the respondents

Among 238 valid responses, 148 were from Ghana and 90 were from Burkina Faso (Table 1). In terms of gender 66% in Ghana and 50% in Burkina Faso were males. The mean age among the Ghanaian respondents was 39.7 years old whereas that in Burkina Faso was 40.5 years old. About 93% of the Ghanaian respondents belonged to either 40-59 age group (57%) or the 18-39 age group (36%). In Burkina Faso, the 40-59 age group consisted of 37% whereas the 18-39 age group had 53%. To place these age differences in a context, according to the World Bank (2020), average life expectancy in Burkina Faso is 61 years old, and that of Ghana is 64 years old (World Bank Group, 2020). Among them, 62% in Ghana and 30% in Burkina Faso were household heads.

The results on economic aspects show that the Bawku respondents (Ghana) were largely farmers (98%). In Burkina Faso, 70% was farmers. The rest was mainly engaged in trading (18%) and teaching (7%). Only 1% of the Ghanaian respondents were engaged in trading on the contrary. These differences mean that, in Bagre District, the Bagre Dam irrigation project had induced occupation diversity. The residents here typically engage in

fishing, rice farming and vegetable cultivation throughout the year. This town has attracted a small number of traders and artisans.

Regarding the duration of their residency in the study areas, we found that about 75% of the Ghanaian respondents lived for 5-20 years in the same community, whereas 65% of the respondents in Burkina Faso did so. About 5% of the Ghanaian respondents lived in the same community for more than 40 years whereas none did so in Burkina Faso.

The educational level of the respondents was low in both countries as 57% in Ghana and 60% in Burkina Faso had no formal education. In Burkina Faso, a small portion of the respondents had completed primary education (20%) and junior high school education (10%). In Ghana, the percentages of primary education (16%) and junior high school one (12%) did not show much difference from Burkina Faso counterparts. Also, 5% of the respondents in Burkina Faso had tertiary education whereas 4% in Ghana did.

Table 1 Socio-demographic characteristics of the respondents

Socio-demographics		Burkina Faso (Percentage)	Ghana (Percentage)
Age	18-29	18 (20%)	9 (6%)
	30-39	30 (33%)	44 (30%)
	40-49	19 (21%)	53 (36%)
	50-59	14 (16%)	32 (21%)
	60+	9 (10%)	10 (7%)
Gender	Male	45 (50%)	97 (66%)
	Female	45 (50%)	51 (34%)
Education	No formal education	55 (60%)	84 (57%)
	Primary	18 (20%)	24 (16%)
	Junior high school	9 (10%)	18 (12%)

	Senior high school	4 (5%)	17 (11%)
	Tertiary education	4 (5%)	5 (4%)
Occupation	Artisan	2 (2%)	0 (0%)
	Farmer	63 (70%)	146 (98%)
	Student	3 (3%)	1 (1%)
	Teacher	6 (7%)	0 (0%)
	Trader	16 (18%)	1 (1%)
How long (years) have lived in this area	5-10	9 (10%)	55 (37%)
	11-20	50 (55%)	55 (37%)
	21-30	24 (27%)	17 (11%)
	31-40	7 (8%)	14 (10%)
	41-50	0 (0%)	3 (2%)
	51-60+	0 (0%)	4 (3%)
Total		90 (100%)	148 (100%)

183

184 4.2 Awareness about the Volta Basin Authority and the Code of Conduct

185 In the second part of the survey we attempted to understand respondents' awareness of
186 transboundary water governance practices. First, we asked the respondents whether they
187 knew of the Volta Basin Authority (VBA). We also asked them whether they were aware of
188 the code of conduct between Ghana and Burkina Faso. Finally, we asked them whether they
189 knew of their status as key stakeholders of the VBA.

190 In response to the first question, only 16% of the respondents in Burkina Faso and
191 9% in Ghana answered positive. With regards to our second question, 69% of the
192 respondents in Burkina Faso knew of the code of conduct. In Ghana, only 11% were aware
193 of the code of conduct. Among them, the result of our third question showed that only 9%

of the respondents in Burkina Faso knew of their status as key stakeholders. Similarly, 9% of those in Ghana recognized themselves as key stakeholders (Figure 2).

These results clearly show the limited knowledge and understanding about the VBA and its mandate among riparian community members. It also revealed a slightly higher level of awareness about the code of conduct among the respondents in Burkina Faso. The code of conduct being the first bilateral international agreement for the sustainable and equitable management of the Volta Basin was initiated as part of the Project for Improvement of the Water Governance in the Volta Basin (PAGEV) program between June 2005 to June 2006 (Yankey, 2019). This program had its headquarters and many of its staff in Burkina Faso. Its output contributes to the VBA Observatory (IUCN, 2009). Program implementation by the PAGEV in Burkina Faso may have contributed to this higher awareness level. However, that only 9% in both countries recognized themselves as stakeholders mean that the VBA had largely operated as a top-down institution without much public engagement or participation.

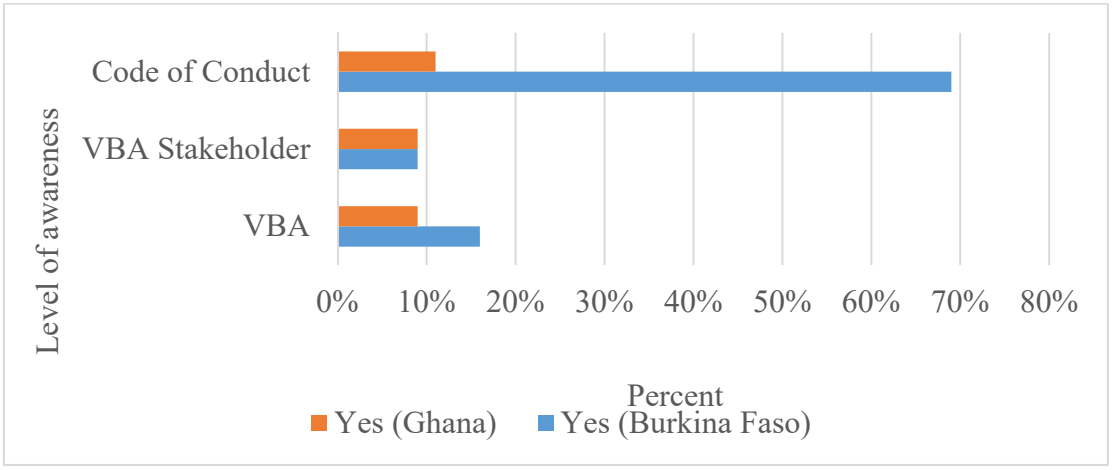

Figure 2 Riparian communities' knowledge about the VBA and the code of conduct

We then conducted Chi-squared analysis to gain further insights on correlations between respondent's knowledge and socio-demographic characteristics. We found that gender in Burkina Faso showed a significant correlation with respondents' knowledge as being key stakeholders of the VBA (χ^2=4.939, df=5 and p=0.026) (Table 2). This implies

that more males were aware of their status as key stakeholders of the VBA in Burkina Faso. We did not find a similar gender difference in Ghana. This regional deviation could partly be explained by the fact that men generally dominate in community meetings and external workshops that discuss issues about the Volta River Basin. Also, the presence of teachers and traders in Burkina Faso might have affected this result to some extent.

We also found a significant correlation between education and Ghanaian respondents' knowledge about the VBA (χ^2=36.181, df=5 and p=0.000). Among those Ghanaians who did not have formal education 99% was not aware of the VBA. However, among those with senior high school and tertiary education, 35% and 75% knew of the VBA respectively. A similar result was found regarding the knowledge on the code of conduct among the Ghanaian respondents (χ^2=22.024, df=5 and p=0.000). Here, 95% of the respondents without formal education had not heard about the code of conduct. In contrast, 30% and 75% of those with senior high school and tertiary education knew of it. Regarding their awareness of being key VBA stakeholders, 99% of those without formal education answered negative whereas 35% and 75% of those with senior high school and tertiary education gave positive answers respectively (χ^2=36.181, df=5 and p=0.000) (Table 3; Appendix 1).

In Burkina Faso, however, we found that education had a significant correlation only with respondents' knowledge of being key VBA stakeholders (χ^2=14.771, df=5 and p=0.005) (Table 3). Here, 98% of those without formal education did not know of being key stakeholders, whereas 33% with junior high school education did. Among those with tertiary education, 50% did not know (Appendix 1). Years of residency also significantly influenced respondents' knowledge as being key stakeholders (χ^2=7.848, df=5 and p=0.049). Among those who had lived in the study area for 11-20 and 21-30 years, 6% and 8% knew of their status as stakeholders, respectively. Also, 33% of those who had lived for 5-10 years knew about their status. Regarding the knowledge about the code of conduct, 92% of the respondents who had lived in the Basin for 21-30 years knew about it whereas 62% of those who had lived for 5-10 years were also aware (χ^2=8.443, df=5 and p=0.038) (Table 4; Appendix 2).

In Ghana however, no significant correlation was found with their years of residency regarding all three questions. This result suggests that, overall, all residents were not well-informed about the VBA.

Table 2 Correlations between gender and respondents' knowledge about the VBA

Cross-tabulation	Gender (Ghana)	Gender (Burkina Faso)
Are you aware of the VBA?	0.903	3.045
	(0.342)	(0.081)
Are you aware you are a stakeholder of the VBA?	0.903	4.939
	(0.342)	(0.026*)
Have you heard about Code of no conduct for cooperation between Ghana and Burkina Faso?	2.014	0.210
	(0.156)	(0.647)

Table 3 Correlations between education and respondents' knowledge about the VBA

Cross-tabulation	Education (Ghana)	Education (Burkina Faso)
Are you aware of the VBA?	36.181	7.406
	(0.000*)	(0.116)
Are you aware you are a stakeholder of the VBA?	36.181	14.771
	(0.000*)	(0.005*)
Have you heard about Code of no conduct for cooperation between Ghana and Burkina Faso?	22.024 (0.000*)	2.421 (0.659)

Table 4 Correlations between years of residency and respondents' knowledge about the VBA

Cross-tabulation	How long have you lived along the Volta river? (Burkina Faso)
Are you aware you are a stakeholder of the VBA?	0.342
	(0.049*)

Have you heard about Code of conduct for cooperation between Ghana and Burkina Faso?	8.443 (0.038*)

255

256 4.3 Riparian community's challenges in water governance

257 In the third part of our survey, we tried to identify challenges the respondents face to
258 participate in water governance. We presented a list of possible challenges to them and
259 asked to rank them in order of importance (i.e., important, not important, not sure). The
260 challenges presented to the respondents are: (1) inadequate enforcement of environmental
261 regulations, (2) poor community participation in governance, (3) insufficient flood
262 prevention, and (4) untimely information about spillage from Bagre Dam.

263 The result shows that the respondents from both Ghana (96%) and Burkina Faso
264 (97%) ranked the fourth challenge as the most serious. This result shows that a lack of
265 sufficient information about the spillage had significantly affected their livelihood. The
266 second most important challenge was flood prevention with 92% in Ghana and 95% in
267 Burkina Faso. The challenge of inadequate legal enforcement was also found high in Ghana
268 (90%) and Burkina Faso (92%). Poor community participation was identified by 88% of
269 the Ghanaian and 91% of Burkinabe respondents (Table 5). Overall, these answers suggest
270 serious governance failure in the two study areas.

271

272 Table 5 Challenges of water governance for the respondents in Ghana and Burkina Faso

Challenges	Burkina Faso			Ghana		
	Not important	Important	Don't know	Not important	Important	Don't know
Enforcing regulation	5 (6%)	83 (92%)	2 (2%)	10 (7%)	134 (90%)	4 (3%)
Public participation	6 (7%)	82 (91%)	2 (2%)	12 (8%)	131 (88%)	5 (4%)
Flood prevention	4 (4%)	85 (95%)	1 (1%)	6 (4%)	136 (92%)	6 (4%)

Untimely information of spillage	2 (2%)	87 (97%)	1 (1%)	1 (1%)	143 (96%)	4 (3%)

5 Conclusions

This research assessed the level of awareness and perceptions among Volta Basin Authority stakeholders in Ghana and Burkina Faso. Concerning the awareness, we found that only a small portion of the respondents had knowledge of the Authority and the existence of the code of conduct. Regarding their awareness, our statistical analysis found some regional differences in connection to gender, education, and years of residency. More males in Burkina Faso were aware of their status as key stakeholders of the VBA although this gender difference was not found in Ghana.

In Ghana's study area, education appeared to have a significant correlation with its respondents' awareness. About 35% of those with secondary education and 75% of those with tertiary education knew of the VBA, the code of conduct, and their status as stakeholders. In Burkina Faso, however, we found that education had significant influence only on their awareness of being stakeholders. Regarding the knowledge of being key stakeholders of the VBA, 33% of those with secondary education and 50% of those with tertiary education were positive.

In Burkina Faso, years of residency in Bagre District appeared to show a significant correlation to their awareness. Among those who had lived for 21-30 years in the study area, 92% knew of the code. Among those who had lived in the study area for 5-10 years, 62% had knowledge about the code of conduct.

Regarding four pre-identified challenges of water governance, more than 90% of the respondents in both countries similarly found seriousness of these challenges. In particular, the spillage of excess water from Bagre Dam appeared to have been the pressing concerns of most residents. The other challenges are related to inadequate flood prevention structures and the inadequate enforcement of environmental regulations.

All these suggest that the residents knew well about what challenges are needed to be addressed to secure their livelihood, but they did not know how their voice can be represented on transboundary water governance matters. If properly executed, the VBA can be a powerful venue for residents to express their needs and monitor progress. We recommend that the VBA continuously disseminate information about its potential roles to its stakeholders. Local transboundary committees already exist in these two study areas for different purposes. Therefore, a similar committee for water governance, especially on flood protection policies, should be formed by inviting representation from local communities.

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Data Availability Statement

This research work did not use any new data.

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Appendix 1

Cross-tabulation on level of education and riparian awareness about VBA, code of conduct and status as key stakeholders

Cross-tab.		Education (Ghana)					Education (Burkina Faso)				
		no formal education	JHS	SHS	Tertiary	Primary	no formal education	JHS	SHS	Tertiary	Primary
Are you aware of the VBA?	no	83	17	11	1	22	51	6	3	3	13
	yes	1	0	6	4	2	4	3	1	1	5
Sub-total		84	17	17	5	24	55	9	4	4	18
Are you aware you are a stakeholder of the VBA?	no	83	17	11	1	22	54	6	3	2	17
	yes	1	0	6	4	2	1	3	1	2	1
Sub-total		84	17	17	5	24	55	9	4	4	18
Have you heard about Code of conduct for cooperation between Ghana and Burkina Faso?	no	80	16	12	1	22	14	4	2	1	7
	yes	4	1	5	4	2	39	5	2	3	11
Sub-total		84	17	17	5	24	53	9	4	4	18

Appendix 2

Cross-tabulation on years of residency and riparian awareness as key stakeholders and the code of conduct

Crosstab		How long have you lived along the Volta River?				Total
		5-10	11-20	21-30	31-40	
Are you aware you are a stakeholder of the VBA?	no	6	47	22	7	82
	yes	3	3	2	0	8
Sub-total		9	50	24	7	90
Have you heard about Code of conduct for cooperation between Ghana and Burkina Faso?	no	3	20	2	3	28
	yes	5	29	22	4	60
Sub-total		8	49	24	7	88

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