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A review of the design and implementation of Ghana's National Water Policy (2007)

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ABSTRACT

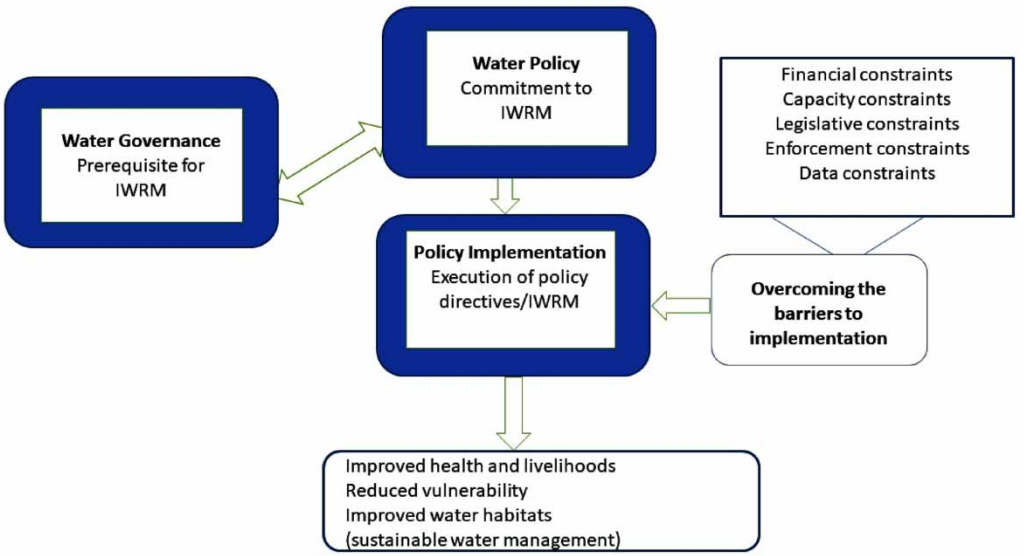
Access to water is a matter of daily survival for people around the world. Water is crucial for human survival and also central to the development of every nation. The recent literature on world water suggests that the water crisis being experienced is related to governance and not a real crisis of scarcity and stress. This paper aims at identifying water governance practices and the challenges associated with water governance in Ghana. The paper reviews the literature on the implementation of policy directives and actions with specific focus on water resources governance aspects of Integrated Water Resources Management (IWRM) in Ghana. Ghana's National Water Policy is expected to turn the fortunes of the country around in terms of water resources management. Concerning water resources management, the policy advocates for an IWRM approach. Since its implementation, certain setbacks have been challenging the effectiveness of the policy, such as inadequate institutional capacity, inadequate funding, ineffective enforcement of existing regulations, inadequate legal framework, and lack of adequate data. The paper suggests, among other things, the building of both human and institutional capacity, and making the environment a government priority, as ways to contribute to the effective implementation of the National Water Policy.

Key words: Ghana, Integrated Water Resources Management, Policy design, Policy implementation, Water policy

HIGHLIGHTS

- Integrated Water Resources Management (IWRM) is challenged by weak institutional capacity and inadequate funding.
- Weak enforcement of regulations and poor data affects the implementation of IWRM.
- Building both human and institutional capacity will help the successful implementation of IWRM.
- Adequate funding is required for the implementation of IWRM.

GRAPHICAL ABSTRACT



INTRODUCTION

'Water is life' is said in many languages around the globe. This shows how access to water is a matter of daily survival. According to Lozán *et al.* (2007), water is the most essential element, next to air, for human survival. Not only is water crucial for human survival, but likewise it is central to the development of every nation. The quantity and quality of water available to a population are affected by a wide range of natural and human influences including geological and hydrological factors (Bartram & Balance, 1996). There is also further stress on water resources around the world due to the impact of climate change. The 4th Intergovernmental Panel on Climate Change (IPCC) reports a clear relationship between water and climate change, with water resources predicted to be among the most affected sectors by changes in climate. To reduce vulnerability due to climate change and ultimately to ensure water availability in sufficient quantity and quality, the importance of sound water management practices has been highlighted.

Ghana is a country located in the western part of Africa with a population of about 25 million people as of 2010 (Ghana Statistical Service, 2012). Drinking water supply, irrigation, livestock watering, and industrial supply are the main consumptive uses of water in the country. The country has two water pricing regimes for urban and rural areas with periodic increases in tariffs. Water pricing in urban areas aims at recovering the full cost of providing the service, which includes initial investment and operational and maintenance costs, while in the rural areas, water tariffs should cover at least the operational and maintenance cost (Gyau-Boakye & Ampomah, 2003). Gyau-Boakye & Ampomah (2003) assert that the Ghana Water Company Limited (GWCL) is able to meet its operational cost of water supply through the payment of water tariffs by domestic and commercial potable water users. The Ministry of Water Resources, Works and Housing in 2010 reported that the country's consumptive water demand for the year 2010 was estimated at 3.0 billion m^3, which is about 7.4% of the

annual runoff from Ghana alone (The Ministry of Water Resources, Works and Housing, 2010). This shows that Ghana is well endowed with freshwater resources; however, the amount of water available keeps decreasing as a result of climate change, increased environmental degradation, and pollution of rivers (EPA, 2017). Research has shown that climate change impacts the distribution and magnitude of atmospheric parameters such as rainfall and temperature, which affects water availability (Xia *et al*., 2017). For example, Abungba *et al*. (2020) report an increase in temperature in the Black Volta Basin in Ghana, resulting in increased evapotranspiration and, as a result, reduced availability of surface and groundwater in the basin area. Water pollution is another major environmental issue in Ghana. According to Yeleliere *et al*. (2018), the quality of surface and groundwater keeps deteriorating as a result of illegal mining, waste, use of chemicals in fishing, and leachate from chemical fertilisers and pesticides used in farming. Though climate change and other bio-physical factors have contributed to Ghana's water-stressed status with a renewable freshwater resource per capita of 1,113 m^3 as of 2014 (World Bank, 2019), the recent literature on world water suggests that when water crises appear these are also related to governance, rather than only being a bio-physical crisis of scarcity and stress (UNDP, 2006; OECD, 2011). As argued by Nayar (2013), it may be tempting to blame natural factors or population explosion as the only causes of stress on water supply or water scarcity, while the problem often lies with the way we as societies manage water. The water crisis experienced in many countries is therefore not just about the availability of water to satisfy our needs, but equally about how water resources often are managed and used in households and economic sectors, causing billions of people and the environment to suffer. Consequently, how countries choose and are able to manage their water resources has profound implications for the sustainability of water resources and people's livelihoods.

In water governance, the development of policies to tackle water problems and the subsequent implementation of the water policies are both crucial and indicative of governance practices. This paper aims first at identifying practices and secondly on scrutinising the challenges associated with water governance in Ghana, and discussing possible ways to overcome these. The paper presents conceptual approaches to examine water governance, before identifying water policies in Ghana and the challenges with the implementation of integrated policies to manage water resources. Finally, the paper suggests actions to improve integrated water management.

CONCEPTUAL FRAMEWORK

The concept of water governance

'Environmental governance' is a broad term that covers rules, practices, and institutions related to the management of the environment. Processes and institutions, both formal and informal, used by citizens, organisations, social movements, parliaments, and municipalities can be perceived as being included in the definition (see, e.g., Haque, 2017). Water governance, specifically, refers to the political, social, economic, and administrative systems in place that influence the use and management of water (Batchelor, 2007). Water governance is more about the way in which decisions are made and implemented regarding water resource development and management. According to Saleth & Dinar (2005), the key components of water governance are water law, water policy, and water organisation (see Figure 1).

Figure 1 shows the key variables of water governance joined in a common framework. From the figure, water law addresses, among other things, water rights, conflict resolution, and scope of private participation, while water policy refers to matters such as setting priority for the use of water resources, how water projects are selected, cost recovery for investment in the water sector, water transfers, privatisation, and technology policy. Lastly, water organisation is concerned with the structure of water administration, adequate financing and staff, pricing and fee collection, and technical capacity, among others. Water governance provides the

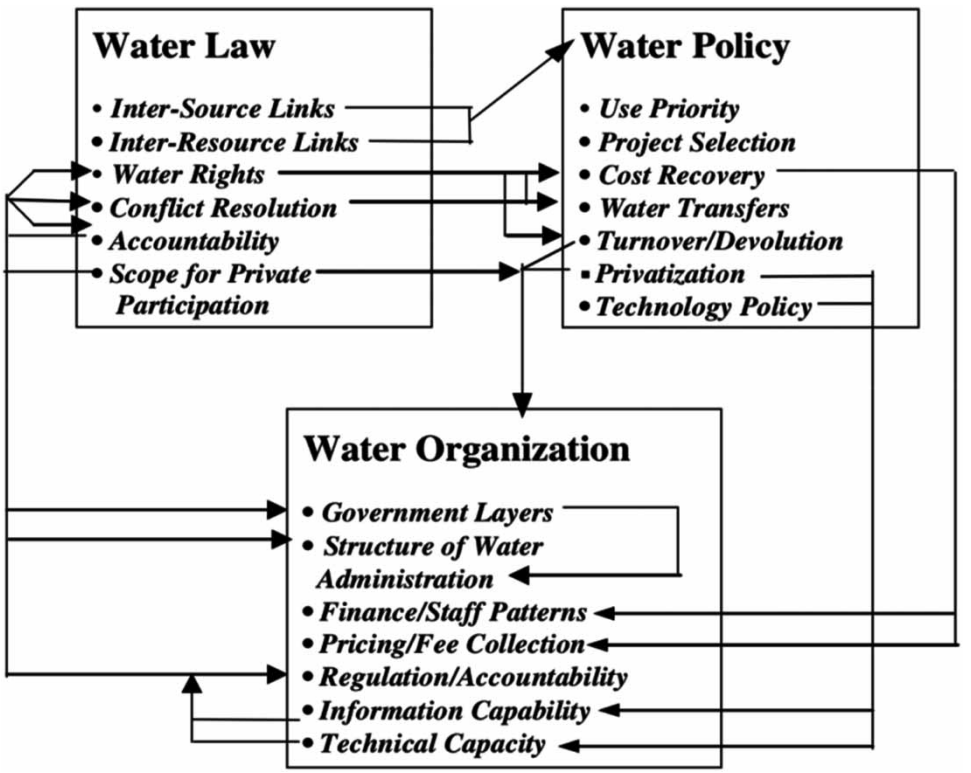


Fig. 1 | Components of water governance. *Source*: Saleth & Dinar (2005).

administrative (institutional), economic, and legal framework for managing water resources in an integrated way. Indeed, effective water governance is required for the success of Integrated Water Resources Management (IWRM).

Integrated Water Resources Management

In recent times, the global water policy arena has been characterised by the IWRM concept. Principles of IWRM are believed to support efforts at ensuring that the competing demands of water are met (UN & OECD, 2014). Policy-makers around the world have adopted the IWRM approach to replace the traditional fragmented sectoral approach to water resources management. As defined by the Global Water Partnership, IWRM is

> '*a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystem.*' (GWP, 2000 p. 22)

Since its formal adoption in 1992, progress made in IWRM as a specified policy framework is measured based on four elements. These are:

- a strong enabling environment – policies, laws, and plans that put in place 'rules of the game' for water management that uses IWRM;

- a clear, robust, and comprehensive institutional framework – for managing water using the basin as the basic unit for management while decentralising decision-making;
- effective use of available management and technical instruments – use of assessments, data, and instruments for water allocation and pollution control to help decision-makers make better choices; and
- comprehensive and well-designed investments in water infrastructure with adequate financing available – to deliver progress in meeting water demand and needs for flood management, drought resilience, irrigation, energy, and ecosystem services (Smith & Clausen, 2018).

Water policy design

Public policies are generally formulated, designed, and implemented to obtain a specific policy objective – often a change of institutional, collective, and/or individual behaviour – relating to strategic goals and political decisions. Policies are designed by adopting policy instruments to activate mechanisms to alter the behaviour of people and businesses to motivate them to perform specific actions that are consistent with the achievement of the desired objectives. It can be seen as a set of policy goals and a mix of policy instruments (also called 'policy tools') that are expected to achieve a specific objective (Winter, 2012). Thus, key elements present in water policies are policy instruments and policy goals and objectives.

Policy instruments

Environmental policy instruments can be defined as: '… the set of techniques by which governmental authorities wield their power in attempting to affect society – in terms of values and beliefs, action and organisation – in such a way as to improve, or to prevent the deterioration of, the quality of the natural environment' (Mickwitz, 2003: 419, see also Vedung, 1998: 21). Policy instruments are the means used to achieve policy objectives (Winter, 2012) and can, e.g., be divided into regulatory instruments, economic incentives/market-based instruments (MBIs), voluntary instruments, and information instruments (see Carter, 2007; Hamilton & Macintosh, 2008).

Often the first response by governments to a perceived water policy problem is to regulate (Hepburn, 2009). The government simply specifies what is required by the targets for the regulation and makes it an offence to fail to comply (Hodge, 1995). This approach emphasises sanctioning violations (if they are detected) to achieve greater compliance through deterrence. According to Global World Partnership (2017), the specification of drinking water quality standards, controls over land use and development within catchments and flood plains, control over the quantity and timing of private water abstractions, and controls over the quantity, quality, and timing of waste discharges into the water environment are examples of regulatory instruments in water policies. Others include standards that place limits on the total concentration of pollutants permitted in rivers and lakes and laws which ban or limit the use of some products such as pesticides or harmful chemicals in water like dichlorodiphenyltrichloroethane, commonly known as DDT (Carter, 2007).

Economic instruments also known as MBIs are regulations that encourage behaviour through price signals rather than through explicit instructions on pollution control or resource management levels or methods (Hockenstein *et al.*, 1997). One way to classify MBIs is water charges, subsidies, tradable or marketable permits, deposit-refund systems, which are similar to subsidies, and enforcement incentives for compliance with water regulations (Pearce & Barbier, 2000). Some authors (see Zandersen *et al.*, 2009) classify subsidies, such as voluntary and targeted subsidies, or performance-based contracts, such as Payment for Ecosystem Services, as an economic tool too, where the objective is to increase the delivery of a good that is otherwise under-provided.

Another set of instruments known as voluntary approaches is used to encourage participation with no direct penalties imposed on non-participants but is often supported by regular oversight to verify that environmental performance improves (Hamilton & Macintosh, 2008). Informational measures may be a form of voluntary

approaches. Information campaigns often target a broad audience and use, e.g., social or mass media as a way to reach people. These measures are commonly viewed as an essential part of the environmental policy package and often involve the co-creation of expert knowledge as accessible based on communities of practice (Iyalomhe *et al.*, 2013). With them, water resources protection measures will likely attract the political and community backing that is necessary to secure their success (Hamilton & Macintosh, 2008). Usually, governments focus on the possibility of hybrids of instruments as a more effective approach to achieve goals. Yet, a challenge is still when policies and strategies are to be implemented.

Water policy implementation

The process of policy-making moves to implementation once a policy is designed and agreed upon. Maddison & Denniss (2009) argue that a policy that has not been implemented is less of a policy, and hence the nature, effect, and success of a policy is revealed when realised or practised. At this stage, water policies are translated into action plans that aim to achieve the objectives stated in the policy. These plans may be disaggregated into more specific projects to be administered. Looking at policy implementation in a parallel perspective, this is where appropriate government agencies convert new regulations and commitments into practice (Dye, 2013).

According to Gerston (2015), policy implementation may seem simple, but it is neither simple nor automatic and oftentimes there exist a range of barriers. Policy implementation problems can be identified in the process of designing goals and policy instruments. Beside the exact policy design, the output and outcome of the implementation process depend, for example, on the implementation behaviour of the organisations involved: the management, street-level bureaucrats, and of the target groups for the policy instrument(s) (Winter, 2012). Other barriers to implementation can be identified as inadequate institutional capacity, inadequate legal framework, political influences sidestepping or downscaling the policy issue on political agendas, poor funding, and lack of intersectoral coordination (Carter, 2007; Winter, 2012). Below, we analyse Ghana's water policy and implementation.

According to the UN & OECD (2014), water policies provide the backing for the effective management of water resources. National water policies are important for IWRM because they provide the framework for legislation, planning, and management (African Development Bank, 2000). They provide a sound basis for water resources planning, development, and management, but policy alone may not be enough to ensure effective management of water resources. Also important for water resources management are the political commitment and will, adequate funds for implementation, and public support of policy (African Development Bank, 2000). Ghana like other countries has formulated and implemented national water policies to adequately protect freshwater resources in a context where climate change is creating uncertainty about future water availability. The policies represent the country's plan to attain its vision for water outcomes, which also entail meeting the competing demands of water from different sectors.

METHODS

Study area

Ghana is located along the Gulf of Guinea in West Africa, within longitudes of 3°5′W and 1°10′E and latitudes of 4°35′ and 11°N. It covers an area of about 238,540 km^2 and shares boundaries with Côte D'Ivoire to the west, Burkina Faso to the north, Togo to the east, and the Atlantic Ocean to the south (Water Resources Commission, 2012). With 16 administrative regions, the country has moved from a rural population to urban with more than half (50.9%) of the country's population residing in urban areas in 2010 (Ghana Statistical Service, 2012). Ghana is well endowed with both surface and groundwater resources. Surface water resources are mainly from three river systems, namely the Volta, South Western, and Coastal River systems (Government of Ghana, 2007). The

amount of water available changes markedly from season to season as well as from year to year and the distribution within the country is also not uniform, with the south-western part (rain forest zone) being better watered than the coastal and northern regions (savannah zones) (Water Resources Commission, 2012). The government of Ghana in 1996 established the Water Resources Commission (WRC) by an Act of Parliament (Act 522 of 1996) with a mandate to regulate and manage Ghana's freshwater resources and to coordinate any policy in relation to them. The work of the WRC has been decentralised through the establishment of River Basin Boards (RBBs) in the country's main basins. The municipal and district assemblies, the GWCL, other governmental organisations, and civil society all collaborate to support the management of water resources in the country.

Methodology

To address the first aim which is to identify governance practices, the study applied a review of academic literature on water governance with a focus on policy-making and implementation. To gain insights on significant aspects of water governance in Ghana, the study further used the examined literature to describe the implementation of Ghana's National Water Policy. In the literature review of water governance, IWRM was singled out as a core policy approach, and the literature review directed at the second aim of the study: examining the challenges associated with water governance in Ghana was thus conducted with particular reference to IWRM, which is the water policy directive governing water resources management in the country.

The research is based on a structured review of academic literature and government documents, and thus uses secondary sources. A list of papers was generated based on a full-text search across five main databases, namely JSTOR, ResearchGate, Taylor and Francis Online, MDPI, and Google Scholar. The screening of literature provided >100 papers. Related papers were selected based on their titles. All abstracts of the selected papers were read and the papers were scored according to relevance. In all, 30 papers were scored high in relevance and were selected to be included in the in-depth paper analysis, which forms the centre of the structured review where the contents of these papers were explored more deeply. The structured analysis is based on the above outline of policy instruments and implementation, and these papers provided an input for the study's investigation of conceptual understandings of water governance practices and empirically identified barriers. Furthermore, documents were compiled from books, journal articles, working papers, technical reports, and authorised web pages on environmental policy, water governance, IWRM, and the National Water Policy of Ghana. In addition, reports on water-related issues for organisations, such as the UN, UNDP, OECD, and the Global Water Partnership, were also consulted. An in-depth interview was also conducted with the Water Resources Commission to gather more data on the challenges being faced with the commission's work. Data analysis was informed by the research objective, the water governance framework, and multiple readings and interpretations of relevant documents. Documents were read to identify patterns of meaning and regularities, to identify themes. The analysis draws on extracts from the different relevant documents to provide a vivid description of each theme and subtheme. The themes build on each other and aim at providing a coherent overall story about the water governance situation in Ghana.

RESULTS AND ANALYSIS

Ghana's National Water Policy design

Since the early 1990s, the water sector in Ghana has undergone various reviews on its function and the responsibility of different water management agencies. With the adoption of the Constitution of Ghana in 1992, ownership of water resources is vested in the nation state, represented by the President, for and on behalf of the people. There is therefore no private ownership of water resources in Ghana (Water Resources Commission Act, 1996).

Development of the National Water Policy

The National Water Policy of Ghana was developed in 2007 through a participatory process that involved nationwide stakeholder consultations and inter-ministerial collaboration. Following a series of broad consultations, a draft Ghana Water Policy was prepared by the Water Resources Commission (WRC) in 2002, under the auspices of the then Ministry of Works and Housing. A wider consultative process was initiated in 2004 with the establishment of the Water Directorate of the Ministry to update the policy to include policy directives specific to urban water supply, and community water and sanitation services. The goal of the overall policy is 'to achieve sustainable development, management and use of Ghana's water resources to improve health and livelihoods, reduce vulnerability while assuring good governance for present and future generations' (Government of Ghana, 2007: 13).

Tenets of the National Water Policy

The policy promotes the adoption of an integrated cross-sectoral approach to water resources management by recognising the IWRM concept, a recommendation from the Water Resources Management Study (WARM) initiated by the government of Ghana in early 1996. The National Water Policy has a total of 14 guiding principles of which some are principles of IWRM, which should be adopted in managing water resources in the country. Among the IWRM principles adopted were using the river basin (or sub-basin) as the planning unit; recognising water as a finite and vulnerable resource, given its multiple uses; integrating water resources management and development with environmental management in order to ensure the sustainability of water resources in both quantity and quality; integrating river basin management with the management of the coastal zone and wetlands; and integrating gender equality approaches in IWRM (Government of Ghana, 2007).

The National Water Policy details policy issues and measures related to three sub-sectors: water resources management, urban water supply, and community water and sanitation. However, the focus of discussion is on the water resources management sub-sector, which has 10 focus areas, including IWRM; Access to Water; Water for Food Security; Water for Non-Consumptive and Other Use; Financing; Climate Variability and Change; Capacity Building & Public Awareness Creation; Good Governance; Planning and Research; and International Cooperation (Government of Ghana, 2007).

In implementing the policy directives under these water resources management focus areas, the WRC, which is the sole regulator of Ghana's water resources, has adopted IWRM as the implementation strategy. WRC is to effectively promote water governance related to the political, social, economic, and administrative systems relevant to influence the policy actions/measures directed at the sustained use and management of the country's water resources.

Ghana's National Water Policy implementation

The policy outlines many instruments and measures to ensure the achievement of policy objectives and for effective implementation. These range from regulations to informational measures and institutional capacity building.

The use of policy instruments and measures

Regulatory instruments identified in the policy, which are being implemented, include licensing of water uses (permits), standards for water quality; effluent standards; codes of practice for efficient water use and cleaner production in industrial activities, and specifications for the construction of boreholes and hand-dug wells; and standards for small-town water projects. Ghana Standards Authority sets standards for drinking water quality, for drinking water obtained from packaged water, water supplied by public water utilities, and other sources, which include requirements for contaminants. For effluent standards, the Ghana Environmental Protection

Agency has developed the effluent discharge quality guidelines, which provide permissible effluent discharge standards of a number of parameters into natural water bodies. That notwithstanding, the Water Resources Commission stresses that regulations for wastewater/effluent discharges are inadequate. It is therefore working towards additional regulations on effluent discharge and pollution control (Water Resources Commission, 2012). The Water Use Regulations (L.I. 1692) promulgated in 2001 provides procedures for allocating permits for various water uses[1] (Water Resources Commission, 2012). The WRC has also developed the drilling and groundwater development regulations, which have been adopted by Parliament as the Drilling Licence and Groundwater Development Regulations Legislative Instrument (L.I.) 1827 (2006). The purpose of the LI 1827, among other things, is to license companies that prospect to drill water wells and to regulate in an environmentally sustainable manner the development of Ghana's groundwater resources. There is also the Dam Safety Regulations LI 2236 of 2016 for dam design, construction, operations, maintenance, and decommissioning to ensure uniform and adequate level of safety for all dams in the country (Water Resources Commission, 2020).

The environmental economic principle 'polluter pays' is integrated into the policy and it is to serve as a disincentive to the uncontrolled discharge of pollutants into the environment (Government of Ghana, 2007). As good as this may seem in the country's fight against the pollution of water bodies, this principle is only piecemeal implemented. Economic instruments, such as water tariffs, and charges specified in the policy are all being applied. Tariffs as prescribed by the policy reflect the full efficient cost of water supply. Also, water charges are to be used as a means of regulating water use and defraying costs incurred in maintaining an efficient system for IWRM activities. Water tariffs are set by the GWCL and approved by the Public Utilities Regulatory Commission. Tariffs are adjusted periodically taking into account the foreign exchange rate, the current trend of crude oil prices on the international market, and the cost of generating and producing water, among other things (Resource Centre Network Ghana, 2020). Under the Water Use Regulations 2001 (L.I. 1692), the Commission issues permit for different water uses, and permit holders pay raw water charges which represent the cost of used water resources. So far, the wastewater effluent discharge permits are the economic instrument not in use.

Climate variability and change is one of the core focus areas under the water resources management section of the policy. The policy objectives concerning climate change are (i) to minimise the effects of climate variability and change and (ii) to institute measures to mitigate the effects of, and prevent damage caused by floods and droughts. Among the policy measures to be employed in achieving these objectives are regulations and informational measures. The government was mandated to establish and enforce appropriate buffer zones along river banks and ensure that land-use planning/building regulations are adequate and enforced in respect of waterways and flood-prone areas. In line with this, a Riparian Buffer Zone Policy for managing freshwater bodies has been developed. The policy sets the procedures for managing and controlling activities such as agriculture, mining, and inappropriate disposal of waste along water bodies' banks and catchments, which affect water quality (Government of Ghana, 2013). The problem however is that the policy has not been fully operational because there is no legislative backing to enforce it (Water Resources Commission, 2012; International Water Association, 2021).

The focus area on access to water reflects SDG 6, particularly the part to ensure the availability of water to all. Regarding information and education, the policy promotes the generation and wide dissemination of IWRM information to the public. The use of appropriate technology to provide necessary information for the detection and early warning systems for floods and drought and integrating IWRM into relevant curricula at all levels of the

[1] Including domestic, commercial, municipal, industrial, agricultural, power generation, water transportation, fisheries (aquaculture), environmental, recreational, and underwater wood harvesting.

educational system are other informational strategies contained in the policy. The yearly reports of the WRC indicate radio public awareness campaigns, which were organised to enhance the public's knowledge and appreciation of IWRM-related issues usually at the basin level. One missing ingredient as far as policy measures are concerned is adopting Payment for Ecosystem Services (PES) schemes with a focus on water services, which could be a means to ensure that water is available at all times for life and health. Voluntary agreements for companies are present in the policy in the form of public–private partnerships. However, this is a focus area only under urban water supply. For countries like Ghana which struggle with water pollution, voluntary agreements such as negotiated agreements between government and industry are a feasible policy instrument, due to its potential for promoting greater collaboration between regulators and polluters, which in turn can lead to improved information flows, reduced confrontation, and quicker implementation of pollution control measures (Segerson, 2013). However, in general, the effectiveness of voluntary agreements is sometimes questionable (Carter, 2007).

The policy emphasises the establishment of appropriate institutional structures and capacity building. Concerning institutional structures, from 2003 to 2012, six river basin secretariats have been established with six corresponding functional RBBs (White Volta, Dayi, Densu, Pra, Ankobra, and Tano river basins). Each of the six basins has an IWRM plan which guides the basin board in exercising its mandates. The WRC indicates that there has been substantial capacity building within key institutions involved in water resources management, such as the WRC itself, the Hydrological Services Department, and the Volta River Authority (Water Resources Commission, 2012). The 2012 and the 2014 WRC reports also show that there have been sensitisation of police prosecutors and investigators focused on the enforcement of water laws to strengthen the capacity of law enforcement agencies in the management of water resources.

It is important to note that the 2007 National Water Policy is currently going through a revision process to make it reflect current discourse in the water, sanitation, and hygiene sector. As part of the revision, a number of challenges have been identified with its implementation. These challenges include inadequate institutional capacity, inadequate funding, ineffective enforcement of existing regulations, and lack of adequate data.

Barriers to implementing the policy directive on water resources management

The national IWRM plan and IWRM plans for river basins are implementation plans for the National Water Policy. Ghana has with the 2007 water policy taken steps to implement IWRM but this has not been without some challenges. The key challenges include capacity constraints, financial constraints, enforcement constraints, legislative constraints, and data constraints. (Water Resources Commission, 2012).

Capacity constraints

Inadequate skilled human resources for IWRM at all levels is a setback to implementing the water policy (Water Resources Commission, 2012). This challenge relates to the water organisation component of water governance. There is limited professional staff and this has constrained the execution of planned activities of IWRM. Agyenim & Gupta (2010) assert that decentralised water management units such as the District Assemblies and basin offices responsible for IWRM do not have adequate human resources to carry out their duties. They rely on regional or national offices for personnel (e.g., water engineers) to effectively assess and monitor water infrastructure development. As a result, Laube (2009) argues that river basin offices in Ghana still have a long way to go to become fully operational and to carry out all their responsibilities[2]. One of the reasons for inadequately skilled labour for IWRM is the issue of unattractive conditions of service which makes it difficult to attract and maintain

[2] Including coordinating activities within the basin and initiating campaigns towards managing water resources in the catchment area.

well-qualified personnel in the public sector. According to the Ministry of Environment, Science and Technology (2012), the very few qualified and trained staff are easily absorbed by the private sector leading to weak capacity.

Financial constraints

Findings from in-depth interviews with the Water Resources Commission officials and supported by documentary evidence show that inadequate funding for water resources management coupled with the fact that financial resources are centralised, which affect the implementation of decentralised units at the basin or local level, is a major challenge. Generally, the government Water, Sanitation and Hygiene (WASH) budget has been declining over the years. According to a report by the Ministry of Sanitation and Water Resources, the budget for WASH reduced from USD 278 million (2012) to USD 65 million (2017) representing the government WASH budget of 0.15% of GDP in 2017 down from 0.66% in 2012. In particular, the government's budgetary allocations to the Water Resources Commission have been below 15% of the total annual financial requirements of the Commission (EU Water Initiative – Finance Working Group (EUWI-FWG), 2012). The government's annual budgetary allocations to the WRC are supported by funds from external agencies and the Commission's Internally Generated Funds (IGFs); however, the commission is unable to keep all its IGFs for its activities. From August 2017, the Commission returns 34% of its IGFs to the central government. This means that for every cedi that the Commission is able to generate internally, 34 pesewas is returned to the central government. According to the EU Water Initiative EUWI-FWG (2012), funds from external agencies in the form of grants form the largest funding source of the Water Resources Commission. However, external transfers to the WASH sector have seen a gradual shift from external grants to loans, as Ghana has achieved a middle-income status (Ministry of Sanitation and Water Resources, 2018). Also, as is often the case, external funding is usually tied to specific projects or programmes, which limits the Water Resources Commission options to allocate the funds for alternative needs such as resourcing basin offices (Dillon, 2020).

Enforcement constraints

Another challenge hindering the implementation of IWRM is the ineffective enforcement of existing regulations and water permit conditions. In general, Ghana has a problem with the enforcement of environmental regulations. Tamakloe (2003) asserts that the ineffective enforcement of environmental regulations in Ghana is mainly due to the lack of political will to see the environment as a priority area, the lack of adequate resources for environmental management, and the low capacity of regulators. Political leaders and bureaucrats have shown little commitment to undertake actions that promote conservation and sustainable use of environmental resources such as water and to sustain the costs of those actions over time. According to Srivastava & Pawlowska (2020), water pollution causes significant damage to the country, with costs amounting to about 3% of the GDP, but political leaders dominantly pay attention to short-term economic development that tends to attract the voters, rather than tackling serious environmental problems with long-term benefits of sustainable development such as water pollution. Political leaders in the country tend to pay lip service to environmental problems, while they move on to other matters. Torpey (2012) indicates that despite the fact that environmental protection is mentioned in the manifestos and campaigns of political parties in the country, the manifestos and campaigns are silent on the roadmap to achieve this development objective, unlike how they outline explicit strategies and actions to address economic and social issues. Just like little space is given to environmental management in political manifestos, successive governments pay little attention to environmental problems such as water pollution. Baabereyir (2009) and Torpey (2012) argue that political leaders' lack of commitment to deal with environmental issues has led to worsening environmental conditions in the country. As a result, the key solution to Ghana's grave environmental concerns lies in the prioritisation of environmental issues by political leaders.

Legislative constraints

The challenge of inadequate regulations on control of the discharge of effluent from industrial and domestic sources, conjointly with lack of regulation of the vast activities in river basins that lead to catchment degradation and poor water quality, cannot be overemphasised (Water Resources Commission, 2012). This is a weakness in policy design, where there are inadequate regulations that would enforce compliance with environmental standards. Regulations are particularly lacking in control of the discharge of effluent from industry and sewage outfalls (Water Resources Commission, 2012). The lack of regulations has led to poor industrial and domestic wastewater management. This in turn has resulted in the pollution of most freshwater resources in the country, especially the rivers that flow through urban areas (Tamakloe, 2003). The majority of activities, e.g., agriculture and mining, in river basins leading to catchment degradation have been captured in the riparian buffer zone policy, while the policy is not being implemented due to the lack of legislative backing.

Data constraints

Lastly, there are inadequate data and information on surface and groundwater quantity as well as water quality. Due to a lack of appropriate tools, financial resources, and technical capacities, especially with the water resources commission and the hydrological services department, there is little monitoring of surface water and groundwater quality and quantity (UNESCO, 2019). As a result, data on water quality and quantity are inadequate in the country. As discussed earlier, the national and subnational water resources management institutions lack resources, they can barely afford new and advanced water quality and water quantity monitoring techniques using innovative technologies to produce reliable, accurate, continuous, and systematic data on the quality and quantity of water resources.

The major problems affecting the effective implementation of the 2007 Ghana National Water Policy discussed so far are capacity constraints, financial constraints, enforcement constraints, legislative constraints, and data constraints. Thus far, the study has described Ghana's situation as far as water governance is concerned. The succeeding section shifts the focus from Ghana to discuss water governance in other African countries.

African perspectives

The African Water Vision 2025 aims at 'an Africa, where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation, and the environment.' At the regional level, the vision calls for partnership between countries that share common water basins. At the national level, it requires fundamental changes in policies, strategies, and legal frameworks, as well as changes in institutional arrangements and management practices (Economic Commission for Africa, 2000). The framework for action to achieve this vision includes the implementation of IWRM in African countries (African Development Bank, 2000).

Uganda

Uganda is one of the Eastern African countries. Though well-resourced with freshwater, the country faces depletion and degradation of the available water resources as a result of pollution, urbanisation, and rapid population growth (Rubarenzya, 2008). The government of Uganda developed the National Water Policy adopted in 1999, which promotes the IWRM principles for sustainable water resources management that is beneficial to society. The implementation of the IWRM in Uganda is advanced which began in 1993 and indeed after decades of implementing a number of challenges still exist (Nicol & Odinga, 2016). Lack of awareness and appreciation of water resources issues, financial and human resource capacity challenges, and poverty have been identified, among others, as hindrances to effective IWRM in Uganda (Rubarenzya, 2008).

Burkina Faso

Burkina Faso is a landlocked country bordering Ghana to the north. The country has limited water resources, making water shortage more frequent (The World Bank, 2017). The annual demand for water in Burkina Faso exceeds the available water resources by between 10 and 22% (Savadogo, 2006). In addition to water scarcity, the country is confronted with water management issues, which lead to conflict among water users (Godfrey, 2012). With these issues and others hampering the country's development, Burkina Faso decided to implement IWRM. Petit & Baron (2009) argue that Burkina Faso is among the first countries to reform its water policy to incorporate IWRM. Also, Burkina Faso has been the host of several international conferences on IWRM and IWRM training programmes organised for West African countries. Burkina Faso began the implementation of IWRM in 1998. With over two decades of implementing IWRM, water resources management in the country is still confronted with challenges of enforcement of water regulations and a lack of awareness of water resources issues (Balana *et al.*, 2019). Again, problems with decentralisation in the water sector, particularly the lack of transfer of competencies to local actors and limited funds allocated to local authorities in the water sector, tend to hinder the effective implementation of IWRM (Petit & Baron, 2009). Petit & Baron (2009) again report that environmental issues are often relegated to the background and government together with private agents concentrate more on economic issues.

Uganda and Burkina Faso have been among the first African countries to implement the IWRM principles (Jønch-Clausen, 2004; Petit & Baron, 2009). It appears the challenges being faced by Ghana, Uganda, and Burkina Faso with regard to the integrated management of water resources are quite similar. The challenges confronting Uganda and Burkina Faso have also been identified in Ghana. The most common challenges being limited funds and the fact that environmental issues are mostly relegated to the background by governments. Usually, because issues regarding water resources management have long-term approaches, politicians do not realise the seriousness of degrading the environment. Politicians and citizens are not aware of the link between water supply and water resources management. As reported by Nicol & Odinga (2016), it is often easier for politicians to understand providing a borehole than planting trees to protect water resources.

Overcoming barriers to improve water resources management in Ghana – some suggestions

A wide and substantial range of barriers is placing obstacles in the country's supply of high quantity and quality water. The study's literature review suggests different ways to overcome some of these barriers, which are presented here.

Capacity constraints

Government agencies and local authorities implementing IWRM cannot function optimally without well-trained staff – consequently, human resources should be improved. Hence, resolving the present challenges of implementing IWRM in Ghana should most likely begin with building human and institutional capacity, since this is currently a challenge as demonstrated above. First of all, there should be a human resource assessment of government institutions with a mandate for implementing the water policy. This assessment would produce an inventory of the staff and expertise available, identify gaps, and formulate the elements of a short-term action plan (3–5 years) with a long-term outlook (10–l5 years). For instance, in the short term, the government can proceed with the help of international donors to train and educate people to take up responsibilities in IWRM. Water professionals can be selected and trained to develop a full understanding of the concept of IWRM, its potential benefits, and how best to put it into practice (Bogardi & Hartvelt, 2002). Persons with requisite knowledge can also be employed to fill in the vacancies. In the long term, IWRM can be made to reflect on the whole scope of education, including the formative years of pre-school, primary and secondary educational levels,

vocational training, university, and professional education at undergraduate and postgraduate levels. In the formative years, this is to encourage water literacy and involvement with the environment. This approach can stimulate interest among young men and women in a future career in water-related professions. For undergraduate and postgraduate education, studies in engineering, hydrology, environmental sciences, water resources management, and other water disciplines will produce the leading water professionals of the future (Bogardi & Hartvelt, 2002). There should also be a continuous learning for water professionals to keep up-to-date with the latest developments impacting the water sector.

Financial constraints

Institutional capacity building is to improve critical areas to promote and boost the effectiveness of organisations responsible for water resources management. The focus here is not on establishing new institutions. As has been shown above, there is inadequate funding for water resources management. Central government funds disbursed to the Water Resources Commission for water resources management are largely inadequate. Though this is augmented by the Water Resources Commission's IGFs, the water resources sub-sector remains underfunded. The IGFs come from four main sources, namely administration fees, application fees, raw water abstraction fees, and drillers' licensing fees (EUWI-FWG, 2012). To solve this problem, basic economic instruments with social considerations should be introduced to improve efficiencies in various water uses. As one of the economic instruments in the National Water Policy, the introduction of effluent charges collected by the Commission is one key way of financing the water resources management sub-sector. The central government can revert to allowing the Commission to have 100% of its IGF for water resources management. The government can again implement 'the polluter pays' principle to raise revenue and earmark the revenue for water resources management. By applying 'the polluter pays' principle, Ghana's government can surcharge domestic and commercial water users with, e.g., sewer and sewage treatment costs, which will be a component of their water supply bills. This can be charged on the basis of the volumetric rates of water consumption and the revenue raised used for managing the water resources. At the local level, basin organisations, which have been delegated to carry out water resources management, should receive some portion of the WRC's IGFs for stewardship of the basin.

Legislative constraints

The genuine recognition and backing of the activities of water resource management institutions are significant for the institutions to perform their functions effectively. To protect water resources against pollution, there must be regulation on the control of effluent. Industrial and domestic activities are among the critical sources of water pollution in Ghana (United Nations Industrial Development Organisation, 2019), though the regulations guiding pollution control from these sources are inadequate. Effluent from these sources may contain pollutants at levels that degrade the quality of receiving waters, as well as the aquatic ecosystem. A viable way to address this is through conducting a review of and adjustment of current regulations on the industrial and domestic discharge of effluent to adapt to the changing socio-economic development of society. If there are specific aspects of the existing regulations that should be modified or updated, this should be done to make them work better. New regulations can be added. Also, bridges should be built among regulations by the WRC and EPA and relationships fostered among the relevant regulatory and supporting agencies for the development and administration of regulations on wastewater/effluent discharges for pollution control.

Enforcement constraints

Once environmental requirements like regulations on the discharge of effluents, water permits conditions guidelines, and procedures have been made, they have to be enforced to ensure compliance. Achieving compliance with the said environmental requirements includes monitoring and inspection by environmental authorities.

Moreover, the enforcement of compliance with the stipulated regulations is significant, also including consequences when infringement is proved (LoGo Water, 2008). There should be effective sanctions for non-compliance. Much funds are needed for monitoring IWRM activities. The literature suggests that environmental inspectors from government agencies may have the right to enter into sites to take samples, collect relevant evidence, but lack critical powers of effective enforcement, such as to detain or arrest violators. One option to tackle this problem of enforcement of regulations is for the Environmental Protection Agency and the Water Resources Commission to collaborate with local police forces, and other related enforcement agencies to conduct environmental inspections, or conduct cross-sectoral or targeted inspections, and run enforcement campaigns. In fact, it would be useful to include water management and regulation in the curriculum of security agencies, especially the police to improve the knowledge needed for enforcement. Such joint approaches can help to enhance the effectiveness of water enforcement actions.

Data constraints

Accurate, continuous, and systematic data on the quality and quantity of water resources are necessary for sound decision-making and the plan and implementation of effective pollution control measures. Water quantity data and information are used to determine how much water is available for various uses such as irrigation and industrial and domestic uses, to make trans-boundary water allocation decisions, and for flood forecasting (Commissioner of the Environment and Sustainable Development, 2010). Effective monitoring of water quantity and the quality of water in groundwater and surface water systems will thus support efficient IWRM. To be able to do this, the Water Resources Commission of Ghana needs resources, provided by, e.g., the central government to develop a water monitoring programme that will run in the long term. The Water Resources Commission could support this through the allocation of a percentage of their yearly budget to its long-term water quality and quantity monitoring component to keep it running. The WRC can also institute basic water smart systems that gather meaningful and actionable data on the flow, pressure, and distribution of water supply systems. Again, the WRC can enhance collaboration with other water sector actors like CSIR, universities, and international organisations that receive grants to work in river basins, with specific funds to improve data collection and monitoring networks.

STUDY IMPLICATIONS AND FUTURE WORKS

Using mainly secondary data, this study has shown that water resources management in Ghana is handled by the public sector. However, the government's commitment towards water resources management is limited. Future research could focus on water resources management in the public domain by using in-depth stakeholder interviews to explore the areas where the private sector can support the activities of the government.

This study has revealed that water resources management in Ghana is mainly in the domain of the central government. Additionally, the study shows that local-level water resources management offices have a low capacity to carry out their delegated functions. As a result, it is safe to say that water resources management in Ghana still remains relatively centralised. Also, it is clear that water resources management and for that matter IWRM require governments to ensure permanent funding. The study has revealed limited knowledge of available water resources in the country. It seems plausible that water policy initiatives, especially water resources management strategies, have so far been supported by little data and information. This certainly affects the efficiency and effectiveness of the management of water resources in Ghana.

Finally, the study has identified the obstacles to the implementation of water resources policies, such as insufficient capacity, lack of funds, and lack of data. Further research is needed to move the discussion forward and provide more in-depth analysis and information that will cover issues such as what causes such obstacles?

What problems can be solved under the current system and development level in Ghana? And what cannot be solved?

CONCLUSIONS

This paper presents a review of water governance practices in Ghana and reveals challenges in implementing the country's national water policy. Ghana has adopted the IWRM approach to managing its water resources which emphasises decentralising decision-making in water resources management to the basin level. Through IWRM, a national water policy has been developed, which has supporting pieces of legislation and action plans to facilitate its implementation. As a developing country with many needs but limited resources, funding seems to be a key factor that contributes to inadequate implementation in the country. In addition to inadequate funding, weak institutional capacity, ineffective enforcement of existing regulations, inadequate legal framework, and lack of adequate data on water resources have all posed constraints to effectively implementing the country's national water policy.

The study demonstrates how resolving the problems associated with achieving IWRM in Ghana requires building both the human and institutional capacity required for water resources management. Though acquiring knowledge and skills on IWRM through education and training is necessary, it is equally important for the water sector to have attractive conditions of service to attract and maintain skilled personnel for water management.

Furthermore, water management institutions need to be equipped and provided with the necessary tools to carry out their mandates. Beside funding from central government, internally generated revenue, especially effluent charges, has been identified as an important and promising source of revenue to both change behaviours related to water use and raise revenue earmarked for water resources management. Given the political and social sensitivity of water charges in many countries, public awareness campaigns could be organised to explain the cost and cost recovery mechanisms of protecting water resources and supplying potable water.

For institutions to function effectively, there is the need to provide legal backing to their activities. A collaboration between water authorities and other relevant agencies is also needed to improve compliance and enforcement of water regulations. Also critical is to have a government that will make the environmental and sustainability issues a general and high priority for the present government.

Taken together, these elements reflect a holistic approach to addressing challenges with IWRM. Well-trained staff would be better equipped to function in a modern institution with adequate financial resources. Institutions and staff have the potential to achieve their full potential within an enabling legal environment supported by better policy frameworks.

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All relevant data are included in the paper or its Supplementary Information.

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