

Towards sustainable utilisation of water resources: a comprehensive analysis of Ghana's National Water Policy

Isaac Monney^a and Kafui Ocloo^b

^aCorresponding author. Department of Environmental Health and Sanitation Education, University of Education Winneba, P.O. Box M40, Mampong-Ashanti, Ghana. E-mail: monney.isaac@gmail.com

^bDepartment of Planning, Kwame Nkrumah University of Science and Technology, PMB, Kumasi, Ghana

Abstract

In the years ahead, meeting the challenges of food security in a water scarce world will require drastic changes in the way water resources are managed. Accordingly, Ghana's water sector has seen tremendous changes over the years culminating in the 2007 National Water Policy. This paper evaluates the policy to highlight its strengths and weaknesses, to inform possible future review and guide new policy development in developing countries or troubleshoot existing policies. It draws on a framework based on three thematic areas distilled from global water policy development guidelines. Using a 3-point Likert scale, sub-thematic components are ranked and used to quantitatively compute the theme-specific scores (TSS) and the overall performance (OP) of the policy. Per the study findings, cross-cutting water policy issues including integrated water resources management, climate change adaptation and gender mainstreaming are more highlighted (TSS = 67%) than country-specific water management issues (TSS = 50%). Specifically, the policy neglects key national issues including protection of coastal regions from the onslaught of sea waves, and water resource protection against oil spills, and its institutional framework for implementation excludes key sector institutions. Generally, the policy addresses most pertinent issues in the water sector (OP = 64%) and areas for improvement are further discussed in the paper.

Keywords: Ghana; Policy analysis; Water policy; Water resources management; Water supply

1. Introduction

'There is a water crisis today. But the crisis is not about having too little water to satisfy our needs. It is a crisis of managing water so badly that billions of people – and the environment – suffer badly' (World Water Council, 2000).

This is an Open Access article distributed under the terms of the Creative Commons Attribution Licence (CC BY 4.0), which permits copying, adaptation and redistribution, provided the original work is properly cited (<http://creativecommons.org/licenses/by/4.0/>).

doi: 10.2166/wp.2017.114

© 2017 The Authors

Water is vital for human survival, health and dignity. It is an indispensable and irreplaceable resource for development. In fact, the welfare of every society is inextricably linked to the sustainable exploitation of water resources (Bear, 2000). Globally, the demand for this vital resource has soared considerably owing to rapid economic development and increased population growth, among others (Gleick, 2004; Zhong *et al.*, 2016). With the rise in population across the globe comes the need to grow more food and thus the need for more water for agricultural purposes (UN-Water, 2007). This has translated into overexploitation of water resources in some parts of the world over the years resulting in depletion of surface and groundwater resources in some instances – China and Saudi Arabia being classical examples (Lu *et al.*, 2008; Brown, 2013). Estimates provided by the recently published World Water Development Report point out that, about three quarters of the Arab population live below the water scarcity level of 1,000 m³ per capita per year owing to population growth and increasing socio-economic pressures (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2015).

The situation is however not limited to these countries alone. Worldwide, projections by the World Water Council indicate that about half of the world's population will live in countries with high water stress by 2025 (World Water Council, 2000). Pressure on water resources is expected to increase tremendously, particularly in large areas of Africa, Asia and Latin America (World Water Council, 2000). Competition for scarce water resources is therefore predicted to induce conflict between riparian countries and even within countries (Carius *et al.*, 2004; UN-Water, 2007). Besides this, climate change is also predicted to have a telling effect particularly on the spatial and temporal distribution of water (Boko *et al.*, 2007; UNESCO, 2014). Changes in regional precipitation and evapotranspiration are expected to significantly influence discharge regimes in rivers resulting in either drastic increases or reductions (Middelkoop *et al.*, 2001). A paradigm shift is therefore urgently needed in the way water resources are managed globally in order to address the current and future water crisis. To achieve this, national governments need to set attainable targets in national policies that are supported by financing provisions and strong political commitment (United Nations Development Programme (UNDP), 2006).

For many years, Ghana's economy has relied mainly on agricultural activities contributing at least a third of the country's Gross Domestic Product and employing close to two thirds of the workforce (Mawunya & Adiku, 2013). Therefore, ensuring sustainable management of water resources is absolutely necessary to sustain the agricultural sector and the economy as a whole. In response to this, Ghana launched a National Water Policy about a decade ago to consolidate all existing strategies in water management. The policy charts the course for dealing with current and future challenges related to water management in the country. However, since its adoption, little effort has been made to comprehensively assess and highlight its strengths and weaknesses in addressing the challenges confronting the water sector. This paper analyses Ghana's National Water Policy in the context of pertinent global and country-specific water issues which need to be addressed by the policy. The outcomes of this paper are intended to provide a point of departure for a possible future review of the policy to make it respond appropriately to current and imminent national water management issues. It will also be useful for the development of national water policies in other developing countries and inform review of existing water policies based on contextual national issues pertaining to the country.

1.1. Overview of Ghana's National Water Policy

Ghana's 2007 National Water Policy was distilled from three main development agenda. At the global level, the policy draws inspiration from the Millennium Development Goals (MDGs) whilst at the

regional and national levels, it is underpinned by the African Water Vision 2025 of the New Partnership for Africa's Development (NEPAD) and the Growth and Poverty Reduction Strategy (GPRS) II, respectively (Figure 1).

The MDGs comprised eight goals and 18 measurable, time-bound targets adopted by 189 national governments in 2000 to tackle, among others, extreme poverty, disease and hunger (United Nations, 2014). Among the targets, Target 7c of MDG 7 was to halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation. Achieving this target requires proper planning and political commitment thereby influencing the development of a national water policy to direct efforts in this regard. The target therefore constitutes a crucial pillar of Ghana's National Water Policy.

The African Water Vision 2025 is based on a shared vision for an equitable and sustainable use and management of Africa's water resources for poverty alleviation, socio-economic development, regional cooperation, and the environment (United Nations Economic Commission for Africa/Africa Union Commission/African Development Bank, 2003). This is to ensure an integrated approach to the development and management of water resources on the continent on a regional scale to stimulate and sustain growth in the region's economic development and social well-being. The development of such a vision is crucial considering Africa's numerous transboundary basins which could bring potential conflicts if riparian countries do not adopt an integrated approach to sustainably manage these basins. Adopting such a management strategy could contribute to ensuring peace and security which are key requisites for sustained development (United Nations Economic Commission for Africa, African Union, African Development Bank and United Nations Development Programme, 2014). In fulfilment of this, the integrated water resources management (IWRM) approach constitutes one of the crucial pillars of the Ghana National Water Policy (GNWP).

The GPRS is a series of two consecutive development frameworks implemented between 2003 and 2009 with the overarching goal to reduce poverty and improve the welfare of all Ghanaians (Vordzorgbe & Caiquo, 2001; National Development Planning Commission, 2005). The first phase, referred to as GPRS I was implemented between 2003 and 2005 to ensure the attainment of macroeconomic stability while GPRS II sought to accelerate economic growth and poverty reduction between 2006 and 2009. To

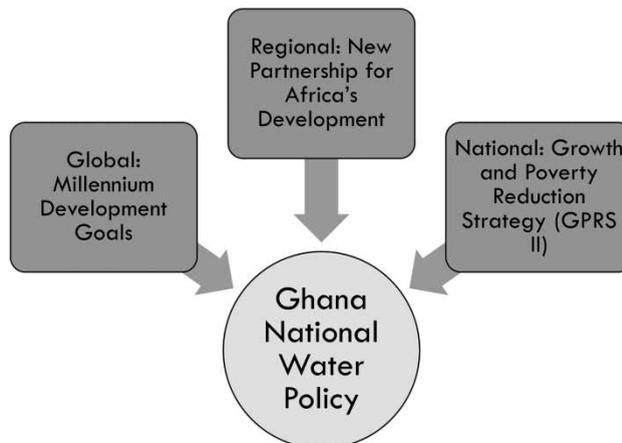


Fig. 1. The underpinnings of Ghana's National Water Policy.

achieve these outcomes, the strategy recognises improvement in access to water and sanitation as crucial. It is regarded as a cross-cutting issue fundamental to facilitating economic growth and sustaining poverty reduction. Strategic actions for improving access to water and sanitation are therefore highlighted in both the GPRS I and the GPRS II which contributed to the development of the GNWP. Developing the water policy based on the global development agenda (MDG), the regional development agenda (Africa Water Vision 2025) and the national development agenda (GPRS II) related to water is remarkable. This ensures that developments in the water sector in Ghana are not isolated from the regional and global aspirations towards effective water management.

This notwithstanding, changes in the international and national development agenda over the years have rendered Ghana's National Water Policy inadequate to address new developments in the water sector. Currently, on the global scale, the Sustainable Development Goals (SDGs) have replaced the MDGs. The SDGs come with entirely different sets of targets for water management compared to the MDGs. Whilst the target for water supply in the MDGs was to halve the proportion of people without access to safe drinking water and sanitation, that of the SDGs pushes for universal water and sanitation coverage by 2030. Undoubtedly, the target set out by the SDGs requires an entirely different level of planning and resource allocation if it is to be achieved. Moreover, Ghana's national development agenda has, since 2014, been changed. The GPRS II on which the water policy was founded expired in 2009 and was succeeded by the Ghana Shared Growth and Development Agenda (GSGDA) I 2010–2013. Currently, the national development agenda is based on the Ghana Shared Growth and Development Agenda (GSGDA) II which spans 2014 and 2017. This present Development Agenda, for instance, sets out specific strategies for managing marine and coastal ecosystems which were completely absent in the GPRS II on which the National Water Policy is founded. The National Water Policy failed to address these pertinent issues and others now available in the GSGDA II.

The policy is organised into three main sections: Introduction and policy context; Strategic actions of the policy; and Policy implementation arrangements. The introduction and policy context section provides a background of the policy and defines its purpose. Among others, the section also outlines the water resource potential of the country, the development issues and the guiding principles of the policy. Under the strategic actions of the policy, three main sub-sectors have been identified: Water resources management; Urban water supply; and Community water and sanitation. Each of these sub-sectors have specific focus areas under which the principles and challenges; the policy objectives; and the policy actions to address the challenges are clearly defined. Finally, the policy, among others, gives an outline of the institutional, legal and regulatory framework as well as the financing arrangements under the policy implementation framework section.

2. Methodology

2.1. Framework for assessing Ghana's National Water Policy

For policies regarding the water sector, a number of guidelines have been developed to guide managers in the sector towards developing appropriate policies for managing water resources. These include the Food and Agriculture Organization of the United Nations (FAO)'s publications on 'Reforming water resources policy – A guide to methods, processes and practices' and 'Water sector policy review and

strategy formulation: a general framework' both of which spell out, among others, international best practices for water planning and allocation (FAO, 1995). Moreover, a publication by Abrams (2000), provides a guide for the preparation of water policies. The framework for assessing Ghana's water policy (Table 1) is therefore coined from these and other guidelines for water policy development. This review is based on an electronic copy of Ghana's National Water Policy retrieved from the website of the Public Utilities Regulatory Commission of Ghana (www.purc.com.gh).

The framework categorises all aspects of the policy into three thematic areas, namely, style/formatting; global/cross-cutting water policy issues; and country-specific water policy issues. Under each of these thematic areas, some key sub-thematic components have been selected and ranked on a 3-point Likert scale – 0, 1 and 2 (Table 1). Components that have been sufficiently addressed in the policy documents are awarded the highest score of 2 while those that have been totally omitted are ranked as 0. Under thematic areas two and three, those sub-thematic areas ranked 2 are also those crucial aspects of water management that are singled out as priority areas in the policy and the requisite policy actions are outlined accordingly while those ranked 0 are the exact opposite. Moreover, those aspects that are present in the policy but need to be singled out as a key priority area or are insufficiently addressed are ranked as 1.

Table 1. Assessment framework for Ghana's National Water Policy.

Thematic area	Key components	Likert scale		
		0	1	2
1. Style based/formatting aspects ¹	1.1 Clearly explained in ordinary language			✓
	1.2 Attractively presented and laid out in an easy-to-read format		✓	
	1.3 Short and concise as possible			✓
	1.4 Comprised of executive summaries, chapter summaries and conclusions		✓	
2. Cross-cutting water policy issues	2.1 Overall policy goal and guiding principles ²			✓
	2.2 IWRM ³			✓
	2.3 Gender mainstreaming ³			✓
	2.4 Water for food security ³			✓
	2.5 Efficient water use ³			✓
	2.6 Climate change adaptation ³			✓
	2.7 Pollution control ⁴			✓
	2.8 Institutional and financing framework for implementation ²		✓	
	2.9 Policy monitoring and evaluation ⁵		✓	
	2.10 Timelines for policy review stated ⁵	✓		
	2.11 Indicators for policy monitoring and evaluation ⁵	✓		
3. Country-specific water policy issues	3.1 Transboundary water resources management			✓
	3.2 Flood control			✓
	3.3 Equity/Private sector participation in water supply		✓	
	3.4 Coastal protection	✓		
	3.5 Water resource protection against oil spills	✓		

¹Abrams (2000).

²The World Bank (1994).

³UNESCO (2009).

⁴FAO (1995).

⁵UNEP (2007).

Scores from the Likert scale are summed to compute theme-specific score (TSS) and expressed as a percentage from the equation below:

$$TSS_i = \frac{\sum_{j=1}^n S_j}{c_i \times 2} \times 100\%$$

TSS_i = Theme-specific score for the i th thematic area

S_j = Likert score of sub-component j of the i th thematic area

c_i = Number of components under the i th thematic area

The overall performance (OP) of the policy based on the framework is also computed as shown below:

$$OP = \frac{\sum_{i=1}^n TSS_i}{t}$$

TSS_i = Theme-specific score for the i th thematic area

t = Number of thematic areas

3. Results and discussion

The study results are presented and further discussed under this section. It analyses the structure of the GNWP such as the formatting style, clarity of language and attractiveness. Additionally, it discusses key global and country-specific water management issues in the policy and points out its strengths and weaknesses compared to other existing water policies.

3.1. Analysis of policy structure

Generally, the GNWP is well crafted to address major issues facing the water sector. It articulately maps out existing challenges facing each of the three sub-sectors: water resources management, urban water supply and community water and sanitation, and correspondingly outlines policy objectives and actions to address such challenges. This unique approach is commendable and constitutes a key strength of the policy. It ensures that appropriate solutions are developed for the various challenges under each sub-sector. The policy also defines clearly its overall goal and guiding principles which, per [The World Bank \(1994\)](#), are key requisites of any national water policy.

The policy is conveyed in a clearly understandable language as required and, in line with similar policies on the continent, goes further to define all acronyms and a glossary of keywords used in the policy document. It also packs an impressively succinct and informative outline of salient and cross-cutting issues in all the three sub-sectors in the water sector. This notwithstanding, the policy cannot be said to be designed in an attractive manner. Pictures are poorly formatted in size and position and typographical errors are not utterly uncommon in the document. The policy also presents only a foreword,

lacking an executive summary and a conclusion. It shares this weakness with the National Water Policy of Tanzania (Ministry of Water and Livestock Development, 2002) and the Rwanda National Policy for Water Resources Management (Ministry of Natural Resources, 2011). The latter however has a section dedicated to conclusion and the way forward. An executive summary, in particular, is essential since it presents in a concise form, the salient aspects of a write-up to a reader (United Nations Children's Fund (UNICEF), 2002).

3.2. Analysis of cross-cutting water policy issues

Globally, there is no single approach to the management of water resources. National water policies are rather adapted to suit the geographical, historical, cultural and economic context in a particular country (The World Bank, 1993). Nonetheless, there are customary water management principles that are expected to be present in any policy for water management. The emergence of new paradigms has necessitated a shift from the traditional approaches to water management which were focused on only the water sector (Hooper, 2003). Water managers, decision-makers and politicians all over the world have now recognised and adopted an all-inclusive, eco-system based approach to managing water resources – IWRM (UNESCO, 2009). This approach, in principle, considers in a holistic way, all the different perspectives of water resources, generally classified into four: the water resources; the water users; the spatial distribution and management scales; and the temporal variation in water demand and availability (Savenije & van der Zaag, 2002). The approach also hinges on the 1992 Dublin Principles which recognise water as a finite and vulnerable resource; participatory approaches to water management; women's central role in water management; and water as an economic good. Commendably, Ghana's national water policy sufficiently addresses all these IWRM-related issues and provided the impetus for the development of the National IWRM Plan in 2012 and the National Climate Change Policy in 2013. This justifies the maximum scores given to these components.

Despite the fact that IWRM integrates land use and water resources planning and management and promotes a participatory approach (Bandaragoda, 2000), Ghana's water policy astoundingly, does not recognise certain key institutions in charge of land administration in the institutional framework for implementation. Notably, the Ministry of Lands and Natural Resources and the Lands Commission, which play crucial roles in land administration, are excluded from the framework. However, the Ministry has overall responsibility for land issues as well as mines and forestry while the Lands Commission gives approval for lands to be given out for development. Additionally, the Minerals Commission is unpardonably missing from the institutional framework for water resources management. This commission is, among others, responsible for regulation and management of the utilisation of mineral resources in Ghana. Considering the direct bearing of mining activities on water resources, this commission cannot be excluded in decision making and planning towards water resources management. Perhaps, the absence of these major institutions in the water resources management framework explains why the activities of mining companies and illegal miners continue to wreak heavy environmental havoc in Ghana, particularly on water resources (Amponsah-Tawiah & Dartey-Baah, 2011; Appiah & Buaben, 2012). Evidence provided by these studies points to widespread contamination of water resources in mining communities.

Worse still, traditional authorities (Chiefs) are excluded from the institutional framework for water resources management. Meanwhile, in Ghana, these leaders play a critical role in land administration, affectionately called the custodians of the land (Kessey, 2006). About 80% of Ghana's land area is

owned by traditional leaders who are responsible for the allocation, administration and management of these lands (Ministry of Lands and Natural Resources, 2011). How then can water resources management strategies be implemented effectively without involving these institutions? Unless this is an oversight on the part of the policy makers, excluding these vital institutions from Ghana's water policy is inimical to its effective implementation and constitutes an inexcusable blunder. This is due to the fact that any reckless decision on their part can significantly affect water resources and this is already beginning to manifest. Justifiably, the institutional framework for implementation, although defined in the water policy, does not pass for a full 2-point ranking considering the exclusion of vital institutions involved in water resources management.

National water policies need to be monitored and evaluated periodically to assess progress towards the defined policy goals and determine whether there is the need to adapt strategies for effective implementation (MacKay *et al.*, 2003). Moreover, considering the ever-changing nature of challenges that confront the water sector, water policies need not be cast in stone. They must be revised periodically to address emerging challenges (Abrams, 2000). Ghana's National Water Policy however fails to define a clear road map for policy review. The policy is 'open-ended' and gives no clue as to when it would be reviewed. In contrast to this, the UNEP, sets clear expiration and review timelines for its Water Policy and Strategy; a good practice which policy makers can draw inspiration from. It provides a two-year period prior to the expiration of the policy for revision of the policy which would subsequently last for six years.

Although the water policy provides specific sub-sector policy actions for monitoring and evaluation, these actions are not directed at any institution, as recommended by The World Bank (1994), but rather puts the Ministry of Water Resources Works and Housing in charge of overall policy monitoring and evaluation. Additionally, it does not provide the necessary indicators by which progress would be measured. Indicators are essential tools to measure and calibrate progress towards goals, identify challenges and examine implementation and results (United Nations Department of Economic and Social Affairs (UNDESA), 2001; Jønch-Clausen, 2004). The outcomes from the water policy cannot therefore be assessed to determine whether they have contributed to the achievement of the policy goals. Particularly, in view of the lack of harmony in water coverage figures churned out by various institutions as reported by UNDP, Ghana & National Development Planning Commission (NDPC)/Government of Ghana (GOG) (2012), the policy should have clearly defined indicators for monitoring progress in rural and urban water coverage. This would ensure uniformity in measuring improvements in the water sector.

Also, conspicuously missing in the policy are strategies for protecting forests and sensitive environmental areas including wetlands. Meanwhile, these are critical components of the environment which enhance conservation of water and cannot be ignored in water management. Due to lack of a policy direction on their protection, wetlands in urban centres across the country are being converted into residential areas.

3.3. *Analysis of country-specific water policy issues*

Transboundary water management issues cannot be left out of Ghana's National Water Policy, considering that the country shares its major source of water supply (the Volta River) and other crucial water basins with other riparian countries. Generally, managing water resources across international borders poses a potential source of conflict among riparian countries (Pimentel *et al.*, 2004). This, therefore

requires the development of comprehensive transboundary agreements and increased cooperation among riparian countries. The national policy, in view of this, recognises international cooperation as a crucial factor in sustainably developing its shared water basins and adequately outlines strategies to pursue this. It has strategies to ensure exchange of information, sharing of the benefits of water resources and a common vision for water resources development among riparian countries.

Floods are among the most destructive natural disasters in Ghana. It has come to be accepted as an annual ritual wreaking havoc across the country, especially in the national capital, Accra (Xeflide & Ophori, 2008). This is due to the fact that attempts to forestall this problem have generally not yielded the desired results and thus the country continues to grapple with this issue each year. Meanwhile, the water policy clearly spells out practical measures to address this problem. These include enforcement of land use planning regulations, construction of flood protection structures and early warning systems for floods. Apparently, the annual recurrence of floods even after the development of the national water policy shows inadequate commitment to implementation of these policy actions.

The water policy also gives a clear-cut direction on private sector participation in urban water supply. Specifically, the policy seeks to ‘introduce private sector participation in the operations and management of urban water supply’ and ‘encourage the private sector to participate in the share-holding of the management of Ghana Water Company Limited’. This, per the policy, is to improve access water. However, water service privatisation contradicts the principle of human right to water which is the first guiding principle of Ghana’s National Water Policy. It is also against equitable allocation and supply of potable water. Generally, it is argued that private sector involvement is a key challenge to the realisation of the human right to water (Gowlland-Gualtieri, 2007; Ogendi & Ong’oa, 2009). This is against the background that private service providers are keen on maximising their economic profits to the detriment of the poor. A classic example is the privatisation of water service in South Africa which resulted in the poor being denied access to this essential resource (Gowlland-Gualtieri, 2007). Therefore, despite the policy clarifying the national stance on water privatisation, it threatens the foremost underlying policy principle of human right to water. The FAO (1995) argues that, equitable water allocation cannot also be assured when water supply is privatised because this will favour more affluent consumers resulting in inequalities in water consumption.

The policy also falls short of defining strategies for key country-specific water issues such as coastal protection and pollution against oil spills. Ghana’s coastal communities have over the years experienced an onslaught by sea waves resulting in extensive shoreline erosion. Estimates from quantitative analyses of shoreline changes indicate that coastal erosion rates range between 2 m and 16 m per year along Ghana’s shore line (Apeaning-Addo, 2009; Olympio & Amos-Abanyie, 2013) and this has necessitated the construction of sea defence walls in some coastal zones including Keta (Anim *et al.*, 2013). Unfortunately however, the National Water Policy does not give any policy direction on how to effectively deal with this menace head-on. However, management of coastal zones and wetlands forms part of the key guiding principles of the policy. The changing global climate is predicted to have a telling effect on coastal zones across the world due to increasing sea levels (Olympio & Amos-Abanyie, 2013) and Ghana, as a coastal country, needs to institute practical strategies to address this phenomenon.

According to the Petroleum Commission of Ghana (2015), oil exploration activities have been ongoing in Ghana since the 19th century and have intensified over the years in the Keta and Volta basins. This puts adjoining water resources at risk of oil spills which could cause severe environmental harm. Yet, no national strategy has been developed to protect water resources against oil spills despite glaring evidence of the ugly side of the oil exploration reported in nearby Nigeria (Inoni *et al.*, 2006).

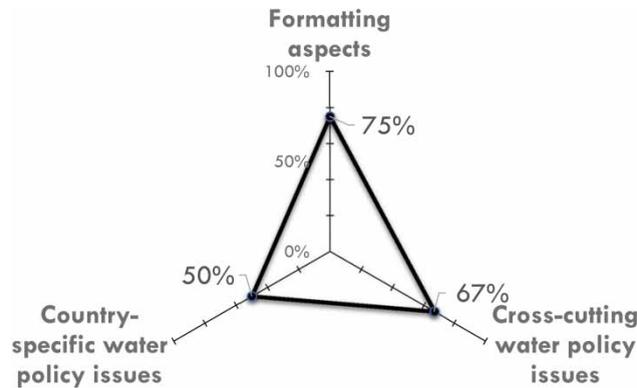


Fig. 2. Theme-specific performance of Ghana's National Water Policy.

The National Water Policy has no proactive strategy for oil pollution prevention, as recommended by Chang *et al.* (2014). Particularly, now that extensive oil exploration has been permitted in the Volta and Keta basins (Ghana News Agency, 2016), protection of water resources against oil spills is paramount in order not to repeat the gloomy occurrences in the Niger delta in Ghana.

Overall, Ghana's National Water Policy can be said to be fairly good; OP of 64%. It however needs to be tailored to meet critical country-specific water policy issues in the years ahead and also address certain cross-cutting water policy issues expected to be included in a national water policy (Figure 2).

4. Conclusions

Sustainable management of Ghana's abundant water resources is crucial for sustained economic development. The development of the National Water Policy in this regard is a commendable effort. Undeniably, the policy is well crafted and has a unique structure. The policy's vision draws on global, regional and local development agenda and is guided by internationally accepted water management principles such as the Dublin Principles and the Rio Declaration. It articulately maps out existing challenges facing each of the three water sub-sectors: water resources management, urban water supply and community water and sanitation, and outlines policy objectives and actions to address such challenges correspondingly.

This analysis lays bare the key strengths and weaknesses in the policy document. Generally, the policy does so well in outlining strategic actions for IWRM, climate change adaptation, gender mainstreaming and transboundary water resources management, it neglects key generic and country-specific water management issues. The institutional framework for implementation has no place for institutions responsible for land management and mining – possibly explaining why mining activities continue to pollute water resources in the country. Timelines for policy review and update are absent and there are no indicators for monitoring progress towards the policy goals. The policy is founded on defunct global development agenda; MDGs and national development agenda (GPRS II). The policy highlights cross-cutting water policy issues, including IWRM, climate change adaptation, and gender mainstreaming, are more highlighted (TSS = 67%) than country-specific water policy issues (TSS = 50%).

Moving forward, a review of the National Water Policy is needed to reflect current global and national development agenda. The policy, in principle, contradicts itself by pushing for privatisation

of water and also supporting equitable access to water which cannot coexist in a future water policy. Monitoring and evaluation of the policy should be based on measurable indicators and strategic policy actions should not be vaguely outlined but must be allotted to institutions who would be made accountable for such actions. This will require, among others, harmonising the indicators for monitoring water coverage countrywide. A future policy should provide a timeline for review so that it can be adapted to meet imminent challenges. Traditional leaders, and land and mining institutions must be recognised as key stakeholders in the water resource management implementation framework. Coastal protection and water resource protection against oil spills must be highly prioritised in a future National Water Policy.

Further study is required to assess the level of implementation of strategic actions contained in the National Water Policy to determine if the policy has achieved the needed impact.

Acknowledgement

The authors acknowledge the support of the Regional Water and Environmental Sanitation Centre, Kumasi under the African Centres of Excellence Project of the World Bank for this study.

References

- Abrams, L. (2000). *Water Resource Management Policy: Guidelines for the Preparation of a Water Policy Document*. Water Policy International URL: http://www.africanwater.org/policy_doc_prep.htm (accessed 1 April 2016).
- Amponsah-Tawiah, K. & Dartey-Baah, K. (2011). The mining industry in Ghana: a blessing or a curse. *International Journal of Business and Social Science* 2(12), 62–69.
- Anim, D. O., Nkrumah, P. N. & David, M. N. (2013). A rapid overview of coastal erosion in Ghana. *International Journal of Scientific & Engineering Research* 4(2), 1–7.
- Appeaning-Addo, K. (2009). Detection of coastal erosion hotspots in Accra, Ghana. *Journal of Sustainable Development in Africa* 4(11), 253–258.
- Appiah, D. O. & Buaben, J. N. (2012). Is gold mining a bane or a blessing in Sub-Saharan Africa: the case of Ghana. *International Journal of Development and Sustainability* 1(3), 1033–1048.
- Bandaragoda, D. J. (2000). *A Framework for Institutional Analysis for Water Resources Management in A River Basin Context*. Working Paper 5. International Water Management Institute, Colombo, Sri Lanka.
- Bear, J. (2000). *Seawater Intrusion in Coastal Aquifers – Concept, Methods and Practices*. Kluwer Academic Publisher, The Netherlands.
- Boko, M., Niang, I., Nyong, A., Vogel, C., Githeko, A., Medany, M., Osman-Elasha, B., Tabo, R. & Yanda, P. (2007). Africa. climate change 2007: impacts, adaptation and vulnerability. In *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J. & Hanson, C. E. (eds). Cambridge University Press, Cambridge, UK, pp. 433–467.
- Brown, L. (2013). *The Real Threat to Our Future is Peak Water*. Retrieved from <http://www.theguardian.com/global-development/2013/jul/06/water-supplies-shrinking-threat-to-food> (accessed 13 March 2016).
- Carius, A., Dabelko, G. D. & Wolf, A. T. (2004). *Water, Conflict, and Cooperation*. The United Nations and Environmental Security. Policy Brief. ECSP Report, 10, pp. 60–66.
- Chang, S. E., Stone, J., Demes, K. & Piscitelli, M. (2014). [Consequences of oil spills: a review and framework for informing planning](http://dx.doi.org/10.5751/ES-06406-190226). *Ecology and Society* 19(2), 26. <http://dx.doi.org/10.5751/ES-06406-190226>.
- FAO (1995). *Reforming Water Resources Policy – A Guide to Methods, Processes and Practices*. FAO Irrigation and Drainage Paper 52. Rome, Italy.

- Ghana News Agency (2016). *Ghana Issues First Onshore Oil Exploration License*. Retrieved from: www.ghananewsagency.org/economics/ghana-issues-first-onshore-oil-exploration-license--102390 (accessed 17 May 2016).
- Gleick, P. H. (2004). *Global freshwater resources: soft-path solutions for the 21st century*. *Science* 302, 1524–1528.
- Gowlland-Gualtieri, A. (2007). *South Africa's Water Law and Policy Framework. Implications for the Right to Water*. International Environmental Law Research Centre, Geneva, Switzerland.
- Hooper, B. P. (2003). *Integrated water resources management and river basin governance*. Universities council on water resources. *Water Resources Update* 126, 12–20.
- Inoni, O. E., Omotor, D. G. & Adun, F. N. (2006). *The effect of oil spillage on crop yield and farm income in delta State, Nigeria*. *Journal of Central European Agriculture* 7(1), 41–48.
- Jønch-Clausen, T. (2004). *Integrated Water Resources Management (IWRM) and Water Efficiency Plans by 2005: Why, What and How? Global Water Partnership*. Elanders Infologistics Väst AB, Sweden.
- Kessey, K. D. (2006). *Traditional leadership factor in modern local government system in Ghana: policy implementation, role conflict and marginalization*. *Journal of Science and Technology* 26(1), 76–88.
- Lu, W. Q., Xie, S. H., Zhou, W. S., Zhang, S. H. & Liu, A. L. (2008). *Water pollution and health impact in China: a mini review*. *Open Environmental Sciences* 2, 1–5.
- MacKay, H. M., Rogers, K. H. & Roux, D. J. (2003). *Implementing the South African water policy: holding the vision while exploring an uncharted mountain*. *Water SA* 29(4), 353–358.
- Mawunya, F. D. & Adiku, S. G. K. (2013). *Implications of Climate Change for Agricultural Productivity in Ghana*. Ghana Policy Journal Special Edition on Climate Change. The Institute of Economic Affairs, Accra, Ghana.
- Middelkoop, H., Daamen, K., Gellens, D., Grabs, W., Kwadijk, J. C. J., Lang, H., Parmet, B. W. A. H., Schädler, B., Schulla, J. & Wilke, K. (2001). *Impact of climate change on hydrological regimes and water resources management in the Rhine Basin*. *Climatic Change* 49, 105–128.
- Ministry of Lands and Natural Resources (2011). *Land Administration Project Phase Two: Project Implementation Manual*. Ministry of Lands and Natural Resources, Accra, Ghana.
- Ministry of Natural Resources (2011). *National Policy for Water Resources Management*. Ministry of Natural Resources, The Republic of Rwanda.
- Ministry of Water and Livestock Development (2002). *National Water Policy*. Ministry of Water and Livestock Development, The United Republic of Tanzania.
- National Development Planning Commission (2005). *Growth and Poverty Reduction Strategy (GPRS) II. 2006–2009*. Government of Ghana, Accra, Ghana.
- Ogendi, G. M. & Ong'oa, I. M. (2009). *Water policy, accessibility and water ethics in Kenya*. *Santa Clara Journal of International Law* 7(1), 177–196.
- Olympio, G. F. A. & Amos-Abanyie, S. (2013). *Effects of shoreline erosion on infrastructure development along the coastal belt of Ghana: case of Nkontompo community*. *Journal of Science and Technology* 33(3), 39–50.
- Petroleum Commission of Ghana (2015). *Exploration History*. Retrieved from: www.petrocom.gov.gh/exploration-history.html (accessed 17 May 2016).
- Pimentel, D., Berger, B., Filiberto, D., Newton, M., Wolfe, B., Karabinakis, E., Clark, S., Poon, E., Abbett, E. & Nandagopal, S. (2004). *Water resources: agricultural and environmental issues*. *BioScience* 54(10), 909–918.
- Savenije, H. H. G. & van der Zaag, P. (2002). *Water as an economic good and demand management, paradigms with pitfalls*. *Water International* 27(1), 98–104.
- The World Bank (1993). *Water Resources Management*. The World Bank, Washington, DC, USA.
- The World Bank (1994). *A Guide to the Formulation of Water Resources Strategy*. World Bank Technical Paper Number 263. Washington, DC, USA.
- UNDESA (2001). *Indicators of Sustainable Development: Framework and Methodologies*. Background Paper No. 3. Commission on Sustainable Development, UNDESA, New York, USA.
- UNDP (2006). *Human Development Report 2006*. Beyond scarcity: Power, poverty and the global water crisis. United Nations Development Programme, New York, USA.
- UNDP, Ghana & NDPC/GOG (2012). *2010 Ghana Millennium Development Goals Report*. Accra, Ghana.
- UNEP (2007). *Water Policy and Strategy of UNEP*. UNEP, Nairobi, Kenya.
- UNESCO (2009). *Integrated Water Resources Management in Action*. The United Nations World Water Assessment Programme Dialogue Paper. Savas Printing, Turkey.

- UNESCO (2014). *The United Nations World Water Development Report 2014: Water and Energy*. United Nations World Water Assessment Programme, Paris, France.
- UNESCO (2015). *The United Nations World Water Development Report: Water for a Sustainable World*. Dimensione Grafica, Italy.
- UNICEF (2002). *Evaluation Technical Notes. No. 3*. UNICEF Evaluation Office.
- United Nations (2014). *The Millennium Development Goals Report 2014*. New York, USA.
- United Nations Economic Commission for Africa, African Union, African Development Bank and United Nations Development Programme (2014). *MDG Report 2014: Assessing Progress in Africa toward the Millennium Development Goals*.
- United Nations Economic Commission for Africa/Africa Union Commission/African Development Bank (2003). *Africa Water Vision for 2025: Equitable and Sustainable use of Water for Socioeconomic Development*. Economic Commission for Africa, Addis Ababa, Ethiopia.
- UN-Water (2007). *Coping with Water Scarcity – Challenge of the Twenty-First Century*. World Water Day 2007. <http://www.unwater.org/wwd07/downloads/documents/escarcity.pdf> (accessed: 14 June 2016).
- Vordzorgbe, S. D. & Caiquo, B. (2001). *Report on Status Review of National Strategies for Sustainable Development in Ghana*. OECD/DAC Dialogues with Developing Countries on National Strategies for Sustainable Development. DevCourt Ltd, Accra, Ghana.
- World Water Council (2000). *World Water Vision: Making Water Everybody's Business*. Earthscan Publications Ltd, London, UK.
- Xeflide, S. & Ophori, D. (2008). Return period analysis as a tool for urban flood prediction in the Accra plains, southern Ghana. *Journal of Environmental Hydrology* 16(8), 1–8.
- Zhong, Y., Tian, F., Hu, H., Grey, D. & Gilmont, M. (2016). *Rivers and reciprocity: perceptions and policy on international watercourses*. *Water Policy* 18(4), 803–825. doi:10.2166/wp.2016.229.

Received 30 July 2016; accepted in revised form 15 December 2016. Available online 17 February 2017