Ecological modernization and water resource management: a critique of institutional transitions in Ghana

Gerald Atampugre, De-Valera N. Y. M. Botchway, Kobina Esia-Donkoh & Stephen Kendie

GeoJournal
Spatially Integrated Social Sciences and Humanities

ISSN 0343-2521

GeoJournal
DOI 10.1007/s10708-015-9623-9

Springer

GeoJournal
DOI 10.1007/s10708-015-9623-9

Ecological modernization and water resource management: a critique of institutional transitions in Ghana

Gerald Atampugre · De-Valera N. Y. M. Botchway · Kobina Esia-Donkoh · Stephen Kendie

Abstract Ghana is endowed with surface and ground water resources. These resources prior to the colonial era were managed by traditional societies through various conventional methods embedded in their cosmovision. However during the colonial and postcolonial regimes, in response to climate change, economic globalization, and population pressure, there has been a conscious shift from customary water management systems towards paradigms cast in the contemporary mould (legislation, policies, and institutions). These modern approaches have been shown over the years to be insufficient in ensuring water sustainability. This insufficiency manifests itself in the increasing water scarcity through anthropogenic-induced water resources degradation and severe climatic variability. Using content analysis, this paper reviews this transition, first to fully understand the intricacies of the evolution and second to draw lessons for better water resources management in Ghana. This paper contends that although Ghana's water related institutions, laws, and policies are undergoing significant reforms, implementation and practice remains embedded in weak ecological modernization (EM). Institutionalizing a narrow conception of EM will only perpetuate 'organized irresponsibility' and permit the continued production of ecological problems, leaving open the question of whether modernization is compatible with ecological sustainability. Though customary water management approaches are not entirely devoid of limitations, simply branding them as obsolete may obviate an important vehicle for water sustainability. In the spirit paradigmatic complementarity, ecosystem-friendly indigenous approaches must be integrated with contemporary management systems for the long term goal of sustainability.

Keywords Water resource management · Ecological modernization · Institutional transitions · Sustainability · Ghana

G. Atampugre (✉)
Department of Geography and Regional Planning, University of Cape Coast, Cape Coast, Ghana
e-mail: gerald.atampugre@ucc.edu.gh

D.-V. N. Y. M. Botchway
Department of History, University of Cape Coast, Cape Coast, Ghana
e-mail: jahiital@yahoo.com

K. Esia-Donkoh
Department of Population and Health, University of Cape Coast, Cape Coast, Ghana
e-mail: braabrother@yahoo.co.uk

S. Kendie
Institute for Development Studies, University of Cape Coast, Cape Coast, Ghana
e-mail: skendie@ucc.edu.gh

Introduction

Ghana is endowed with perennial rivers and groundwater (Fig. 1). The country is drained by three main

Published online: 05 February 2015

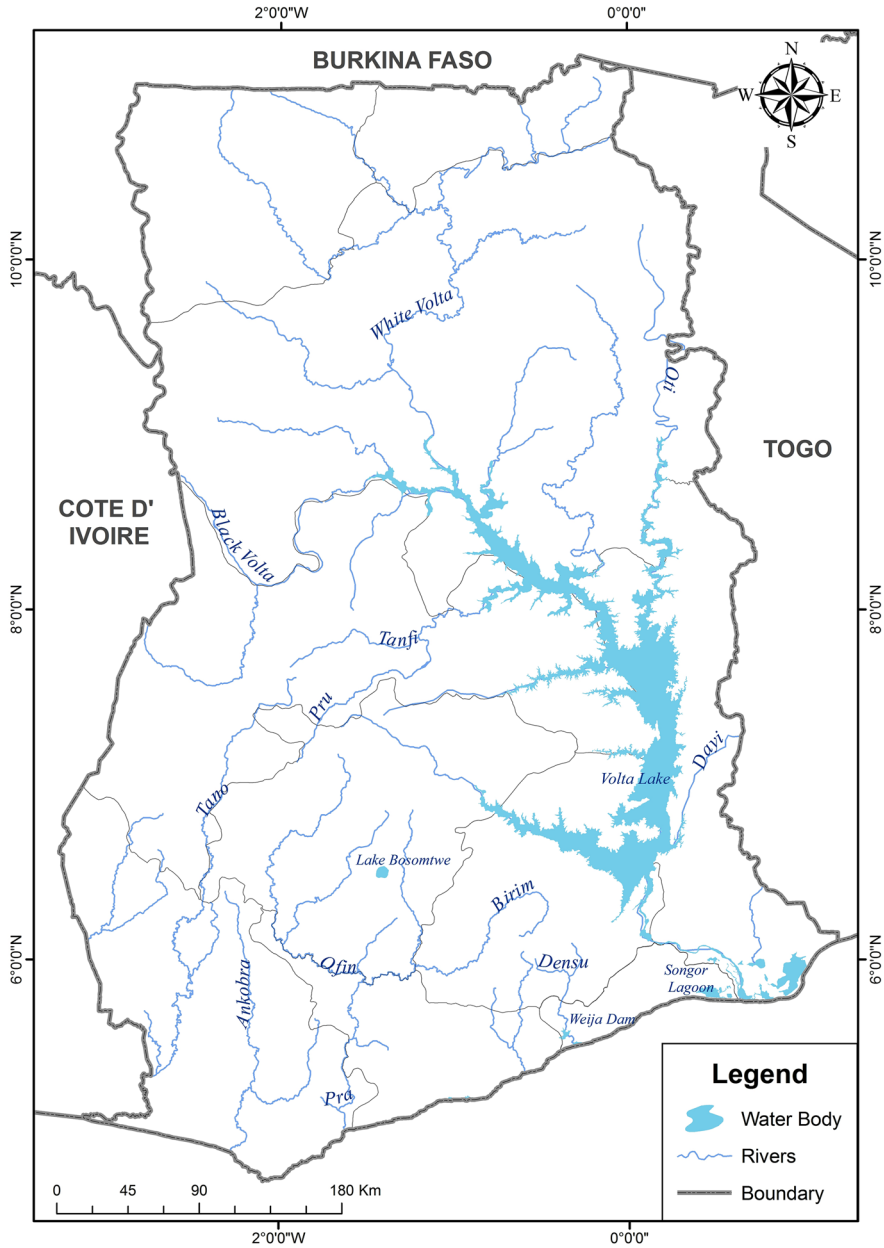

Fig. 1 Water resource map of Ghana. *Source*: adopted from FAO-AQUASTAT (2005)

river systems. The Volta river system basin, consisting of the Oti, Daka, Pru, Sene and Afram rivers as well as the White and Black Volta rivers, covers 70 % of the country's area. Another 22 % of Ghana is covered by the southwestern river system watershed comprising the Bia, Tano, Ankobra and Pra rivers. The coastal river system watershed, comprising the Ochi–Nawoka, Ochi Amissah, Ayensu, Densu and Tordzie rivers, covers the remaining 8 % of the country. The total annual runoff of the river basins is 56.4 billion m^3 (Water Resources Commission 2012).

The groundwater resources of the country are found in two main rock formations (Water Resources Commission 2012). The first is the sedimentary formation made up of mainly Voltaian origin. It occupies about 43 % of the total area of the country. It has yields of 1.0–12.0 m^3/ha at depths of 20–80 m. The second is the non-sedimentary formation made up

mainly of the crystalline basement complex of pre-Cambrian origin, and occupies 57 % of the total area of the country with yields of 1.5–32.0 m^3/ha at depths of 20–100 m. Falling groundwater levels have been observed in the Upper Regions where over 2,000 boreholes have been drilled since the early 1970s in the rural areas to provide potable water to communities (Ministry of Works and Housing, Ghana 2007). All recharge to water resources is through precipitation. Rainfall in Ghana is between March and November. An annual rainfall of 2,240 mm is recorded in the extreme south-west and reduces to 800 mm at the south-eastern part. It then increases to 970 mm at the north-eastern part of the country.

The main uses of water in Ghana are household water consumption (33 %), irrigation and livestock watering (45 %), and hydro power (10 %). Surface water resources alone are sufficient to meet present and future consumptive water demand (Water Resources Commission 2012). Ghana's water demand for 2020 has been projected to be 5 billion m^3, which is equivalent to about 12 % of the total surface water resources (Mensah 2010). One major issue that could prevent the country from meeting this demand is poor water use practices and ineffective management systems which could lead to increased pollution and drying up of water bodies. All these, in the midst of climate change, economic globalization, and population pressure could potentially worsen the country's water situation.

Water, among all the indigenous groups in Ghana (formerly known as Gold Coast during the colonial era), was not only deemed a physical resource but an expression of the divine, its love and gift to earth, and its character as a sustainer to life (White 1965). Consequently, these societies had indigenous ways of protecting water and evolved various rules (taboos and code of conducts) for governing the water resources that veined their land (Sarpong 2004). However, with colonialism and the advent of the modern nation state, the traditional uses of water, primarily for domestic and agricultural purposes have been complemented by other uses, particularly in industry (as sources of electricity, irrigation and medium for transportation) (Water Resources Commission 2012). However, climatic and ecological changes coupled with population pressure and their attendant requirements for water have sharply reduced this vital resource (Sarpong 2004). Notwithstanding the availability of water to meet water supply, there are deficits in coverage. While urban water supply coverage is estimated at 55 %, the rural and small town coverage is 51.6 %. Today, it is estimated that about five million people living in Ghana experience water stress or scarcity (Mensah 2010). Faced with the phenomenon of water scarcity, various central governments intervened to regulate the water sector through legislation and other policy measures. Customary rules governing the use of water have thus been either poorly enhanced or supplanted by modern statutory norms in line with changing socio-economic and political conditions. However, these modern approaches have been shown over the years to be insufficient in ensuring water sustainability (Mensah 2010; Lautze et al. 2008; Opoku-Agyemang 2001a; Odame-Ababio 2002). This insufficiency manifests itself in the current water scarcity. This raises the question of whether modern paradigms are *conditio sine qua non* for water related development in Ghana. Thus, it becomes imperative to review these transitions, first to fully understand the intricacies of the evolution and second to draw lessons for better water resources management in Ghana. The main thrust of this paper, thus, is to review the institutional transitions in Ghana's water sector, with emphasis on the integration of indigenous knowledge at the various levels of water resources management. Using content analysis, review of both published and unpublished literature was undertaken in a bid to establish the intricacies of the institutional transitions and how indigenous institutions were involved in these transformations.

Theoretical perspective

Sustainable development and ecological modernization (EM) have been the dominant paradigms in environmental policy since the 1980s (Wright and Kurian 2009). Both remain ambiguous and heavily contested concepts, lending themselves to multiple interpretations by environmental scholars, policymakers, and activists (Redclift 2005). As described by the World Commission on Environment and Development (WCED) (1987), sustainable development:

> …requires meeting the legitimate and just needs of the world's poor and of future generations, while recognizing the idea of 'ultimate limits'

> imposed by available technologies on the ability of the environment to meet present and future needs (WCED 1987, p. 43).

Thus, the ideas of social justice, equity, and ecological sustainability on a global scale are fundamental to the paradigm of sustainable development (Dryzek 2005; Langhelle 2000). The sustainable development agenda invokes a broad range of ethical, socio-cultural and political-economic issues. These include, for example, the Bellagio Principles (see Hilden and Rosentrom 2008, p. 239) that call for *openness, communication, broad participation, iterative processes, sufficient institutional capacity* and the need for a *coherent framework* to bring about sustainable development.

Regardless of the form it manifests, sustainable development tends to endorse capitalist economic growth (see Doyle and McEachern 2008). Given its fluidity, sustainable development is viewed with some cynicism by scholars who see it in its reformist guise as a discourse chosen by economic and political elites to get on with "business as usual" (Doyle and McEachern 2008). Yet, as a normative concept, it continues to retain a broad moral and political appeal, which has allowed for greater public participation in environmental management, and served to internationalize environmental policy making (Meadowcroft 2000). Thus, both as an ideal and as goal of policy, the discourse of sustainable development lends itself to fulfilling the ends that environmentalists' desire.

In contrast to the breadth and scope of sustainable development, EM emerged in the context of First World states in the 1980s as a:

> Modernist and technocratic approach to the environment that suggests there is a techno-institutional fix for the present problems (Hajer 1995, p. 32).

Ecological modernization, its effectiveness and applicability, strengths and limitations, remains a dynamic and contentious area of social science research and policy discourse (Wright and Kurian 2009).

For governments confronting the dilemma of the assumed conflicting relationship between economic growth and environmental protection, EM has become the policy approach of choice in interpreting and implementing the goal of sustainable development (Jackson and Dixon 2007; Murphy 2000; Huber 2000). The discourse of EM suggests that by judiciously mixing regulations and market-based instruments to correct market failure, EM will lead to both economic growth and environmental protection (Dryzek 2005). Central to EM is the view that the era of modernity offers promise that industrialization, technological development, economic growth, and capitalism are not only potentially compatible with ecological sustainability but also may be key drivers of environmental reform (Mol 2002; Mol and Sapaargaren 2002). EM is, therefore, a distinct counterpoint to theories from political economy (O'Connor 1994) and "de-modernization" perspectives (Devall and Sessions 1985). EM suggests the possibility that inherent in the process of modernization are self-referential mechanisms (such as the need to internalize environmental impacts in order to ensure future production inputs) that have the potential to lead to ecological sustainability (Wright and Kurian 2009). Some proponents of EM highlights the potential of attaining sustainability from within (the greening of "business as usual"), thereby avoiding such challenging alternatives as radical structural or value changes in society (Cohen and Murphy 2001; Cohen 1997).

As an ideology and a policy response, EM facilitates greater governmental intervention through stronger regulation in ensuring environmental protection while leaving untouched the functioning of a capitalist market economy. Hence, central to EM are policy measures and principles such as polluter pays, mandatory environmental impact assessment, the precautionary principle, and the principle of the scientific burden of proof (O'Riordan et al. 2001). Such policy responses (essentially a design response to environmental degradation ensuing from industrialization) are a way of internalizing or preventing environmental costs, ensuring on-going economic competitiveness in a global economy (Orsato and Clegg 2005).

EM theorists argue that by pursuing greener growth through a process of continually improving environmental productivity by means of new technologies, a close-looped eco-efficient production system could be developed, decoupling in the process economic growth and environmental deterioration (Eckersley 2004). This approach has been adopted particularly by developed nation states as a means of mitigating or reducing environmental impacts in the short to medium term as a means of moving towards the

Table 1 Types of ecological modernisation

Weak ecological modernization (supply side)	Strong ecological modernization (demand side)
Economic	Ecological
Technological (narrow)	Institutional/systemic (broad)
Instrumental	Communicative
Technocratic/neo-corporatist/closed	Deliberative/democratic/open
National	International
Unitary (hegemonic)	Diversifying

Source: adopted from Christoff (1996)

sustainability goal (Milanez and Bührs 2007; Dryzek 2005; Eckersley 2004). In essence, EM is primarily concerned with means (greener growth) rather than ends, and could be easily administered by technocratic policy makers within traditional regulatory regimes, and through industries using such instruments as voluntary accords (Eckersley 2004).

Hajer (1995) and Christoff (1996) distinguish between a techno-corporatist/weak and reflexive/strong EM (see Table 1). They suggest that there is a continuum between the weak and the strong EM which reflects the range of approaches rather than the binary suggested by the two terms. It is important to note that weak and strong features of EM are not always mutually exclusive binary opposites (Christoff 1996, p. 491).

Drawing on a comprehensive survey of EM scholarship, Milanez and Bührs (2007) offer a more narrowly delineated definition of EM, identifying its core elements, with a focus on material impacts as follows:

> EM can be understood as the implementation of preventative innovation in production systems (processes and products), that simultaneously produces environmental and economic benefits (Milanez and Bührs 2007, p. 573).

With the above definition, EM may well be achieved without public participation in decision making. Similarly, the presence of public participation does not in itself guarantee that EM will occur. In addition, it is evident from literature (Wright and Kurian 2009; Milanez and Bührs 2007; Oelofse et al. 2006) that for EM to take place, experts are relied on for technocratic risk analysis that informs environmental decision making, and a primary focus is given to cooperative relationships between the state and industry with a strong reliance on transparent regulatory frameworks that clearly outline rules and responsibilities.

One of the major limitations of EM, particularly in developing countries, is that the assumed conditions for this approach, such as the availability of advanced technology, capital, democracy, and capacity are not in place. EM has been successful in the Netherlands and Australia largely because of the technological and institutional capacity (Buttel 2000; Gouldson and Murphy 1996; Andersen 1993). According to Andersen (1993), a country's achieved level of institutional and technological problem solving capabilities are essential to achieving effective environmental protection and transformation towards more sustainable structures of production. In the case of Ghana, we ask to what extent the country's water-related institutional transitions reflect EM? Is modernization compatible with ecological sustainability? Addressing these questions allows us to examine whether in the case of water resource management in Ghana, EM can be a pathway to sustainable water resource use. We also ask whether EM, as Beck (1995, p. 69) suggests, only perpetuates 'organized irresponsibility' and permits the continued production of ecological problems because it is still working within the economic and bureaucratic structures which generated the problems in the first place?

Transitions in water resource management in Ghana

Prior to the colonial regime in Ghana, customary institutions and laws, also known as Indigenous Knowledge Systems (Kuupole and Botchway 2010), existed for the management of water resources among indigenous societies (e.g. traditional protected areas, Ploughing, contouring, claypots for storage, wells, homestead ponds, rainwater harvesting, taboos/totems, etc.). These customary water management approaches epitomised the practices of ethnic groups which pre-

existed the superimposition of modern nation states (Lautze et al. 2008). In this paper we have deliberately used the designation customary water management in order to convey the sense of locally inspired, probably informal (i.e. outside existing statutory arrangements), and active arrangements for water management. Customary institutions are considered as humanly devised constraints or complexes of norms and behaviours that are accepted by the community and persist over time by serving collectively valued purposes (Uphoff 1990; White 1965). The laws developed by customary institutions are based on society's implicit understanding (Nkonya 2006). These include community's perceptions about the world, the accumulated wisdom of the past, and a current set of values. Thus, customary laws are part of a community's heritage or culture (Pejovich 1999; Maganga 2003). These unwritten laws are maintained from one generation to another through various methods such as imitation, oral tradition, and teaching. Examples of customary laws include sanctions, taboos, cultural norms, beliefs, values, social networks, kinship ties and codes of conduct.

Most indigenous Ghanaian communities related their customary water management to certain religio-cultural concepts that were enshrined in their *cosmovision*. According to their general beliefs, water bodies possessed inherent supernatural life energies (spirits). The protection to water was based on reverence and compassion, i.e. human reverence for the transcendent sacred within the environment, and compassion for the fragility of the environment and its limited resources (Botchway and Agyemang 2012).

These spirits, which inhabited the ecosystems, were said to be harmful to anybody or groups of people who abused them. In that light of thought, the spirits rewarded those who protected water resources with bounties such as good health, high farm yields, potable water, and material prosperity. They punished those who utilised the water resources unsustainably. Such punishment could even extend to the families and communities of individual culprits. It was therefore the responsibility of families and the entire society to insulate them by ensuring that individuals do not transgress by acting irresponsibly towards water resources or the environment. Though water bodies were regarded as community property, the control over the water resources was entrusted to the chiefs and priests (who acted as representatives of the ancestors or spirits). Their duty was to promote sustainable extraction paths which were beneficial to the environment and surrounding communities (Opoku-Agyemang 2001a; Odame-Ababio 2002). Chiefs and priests were in charge of enforcing customary laws intended to protect and regulate use of water resources. Rivers, in general, were considered resting abodes for river gods and their children and desecration in or around rivers, as well as farming on riverbanks, was prohibited (Lautze et al. 2008). Some of the rules enforced by these chiefs and priest included the demarcation of particular forest as sacred groves where anthropogenic activities were not allowed.[1]

Furthermore, water gathering was only allowed at the upstream, while other activities that had implication for water quality were allowed downstream. The extraction of water resources for purposes other than drinking was not allowed on particular days of the week[2] (Odame-Ababio 2002). According to FAO (1996) and Lautze et al. (2008), adherence to these rules meant that every local had the right to extract the water resource in as much as it did not affect other users and the water system. Nevertheless, it should be recognized that customary water management practices and institutions vary spatially and temporally. In the context of Ghana, the traditional water management practices the British encountered when they arrived have not simply remained static over subsequent years; neither could it be assumed that these customs were stagnant in the years prior to the colonization.

While it could be assumed that the customary water management practices and institutions evolved relatively independently for centuries, the British colonial incursions substantially altered the country's geographic and institutional landscape. In the Gold Coast, colonial legislation relating to water consisted primarily of two key documents (Ministry of Works and Housing 1998b). The first of these is the 1903 River Ordinance. Although the document was concerned with river navigation, it regulated use of water by declaring that the colonial government must approve water use for irrigation, mines and power generation (Opoku-Agyemang 2001a; Odame-Ababio 2002). A second piece of colonial legislation, the 1949

[1] Which helped to minimizing deforestation and soil erosion.

[2] This implicitly was to allow the ecosystem to replenish itself.

Table 2 Legal enactments for setting up major water-related institutions

Institutions	Responsible ministries	Legal enactment
Ghana Water Directorate	Works, Water Resources and Housing	Administrative, 2004
Water Resource Commission	Environment, Science, and Technology	Act 522 of 1996
Ghana Water and Sewage Cooperation	Water and Housing	Act 310 of 1965
Ghana Irrigation Development Authority	Food and Agriculture	SMCD 85 of 1977
Volta River Authority	Mines and Energy	Act 46 of 1961
Community Water and Sanitation Agency	Water and Housing	Administrative, 1998

Forests Ordinance, was primarily intended for protection of forests. However, the ordinance stipulated that the forest management institutions must approve construction of a dam or weir in any river and such a construction should not obstruct the flow of water in any forest reserve (Opoku-Agyemang 2001b).

As a British colony, the Gold Coast was subject to a common law legal system. The owner(s) of land contiguous to a source of water were entitled to access and withdraw water from that source (Opoku-Agyemang 2001a). In essence, then, a British colonial legislation relating to water management and indigenous water management were concurrently practised. It appears these systems existed more in parallel than in conflict, as British colonial policies allowed for the persistence of certain levels of tradition (Odame-Ababio 2002). In areas in which traditional land and water management practices persisted, such practices often underwent a process of modification owing to outside influences. Though priests and chiefs continued to regulate water resource use in their constituencies, introduction of exogenous cultural concepts such as Christianity, Islam, western education and its scientific ideas about nature, and European land tenure paradigms began to produce changes by the end of the colonial period.

In post independent Ghana, several institutions were created with the objective to sustainably modernize Ghana's water sector. These institutions were the Volta River Authority (VRA), the Ghana Water and Sewerage Cooperation (GWSC), now Ghana Water Company Ltd (GWCL), and Ghana Irrigation Development Authority (GIDA) (see Table 2). With the responsibility of hydropower generation, and the development and maintenance of the Akosombo Dam and the Volta Lake, the VRA, created in 1961, was given the authority to regulate water extraction from the basin for purposes other than domestic use (e.g. electricity generation, irrigation, etc.) (Ministry of Works and Housing 1998a).

The second major institution was the GWSC. Created in 1965, it was charged with provision, distribution and conservation of the nation's water resources for public, domestic and industrial purposes. Even though the GWSC was given the mandate to of managing the countries water, VRA maintained its exclusive authority over the Volta Lake/Dam (Ministry of Works and Housing 1998b). This overlap in responsibilities is clear example of the sub-sectoral approach to water management which has been shown to be inefficient (compared to cross-sectoral approach). The last major institution established during this period, i.e., from the early 1960s to late 1970s, was GIDA (GIDA 2001). Its focus was the development of irrigation for farming, livestock improvement and aquaculture (GIDA 2001). According to Lautze et al. (2008) and Mensah (2010), although GIDA undertook water diversion projects to fulfil its objectives, which may have had implications for the efforts of the other water management bodies, there was little cooperation among the three bodies. Though theoretically there was a hierarchy between these water management institutions, there was virtually no practical integration (Lautze et al. 2008). It should be mentioned, however, that these establishments, all in the name of avoiding ecological crises, failed to completely remove pre-existing customary rights.

Since the 1990s, especially after the Dublin conference,[3] Ghana underwent an Integrated Water Resource Management-oriented review and restructuring (Mensah 2010). These restructuring enabled the government to undertake a number of reforms (see

[3] For more information on the Dublin Principles see Pena 2011; Xie 2006; Global Water Partnership Technical Advisory Committee, 2000.

Water Resources Commission 2012). Among these are: (1) a rural water and sanitation strategy based on community ownership and management; (2) the restructuring of the urban water sector to bring in private sector participation in urban water delivery; (3) preparation of the national environmental action plan; and 4) strengthening of water resources information agencies.

Another major milestone towards reforms in the Ghana Water sector was the launch of the Water Resource Management (WARM) study in 1996. The study was carried out through consultative workshops with stakeholders from the public and private sectors, research scientists, media personnel, and the general public. The WARM study gave an overview of the major water resource issues which included water distribution efficiency and water resource degradation (Ministry of Works and Housing 1998b). The findings and recommendations of the study in conjunction with support from the World Bank provided the elements for the restructuring of the institutional frameworks for the implementation of IWRM (Water Resources Commission 2012). After the institutional reforms, all laws applying to Ghanaian waters were repealed and riparian rights were no longer recognized. Ghana's territorial waters were entrusted to the President of the Republic and permits were required for their use (Ministry of Works and Housing 1998a). There was also a formal acceptance of the commoditisation of water on the principle that water was an economic good and there should be a cost and profit associated with its use (Mensah 2010; Opoku-Agyemang 2001a).

To coordinate the activities of the other institutions, the Water Resource Commission (WRC) was established 1996 (Opoku-Agyemang 2001b). This was a significant step towards addressing the diffused state of functions and authority in water resources management in Ghana. The WRC was given the overarching mandate of regulating, managing, and coordinateing government policies in relation to water resources in Ghana (Mensah 1999). The commission is comprised of the major regulators and users in the water sector and is meant provide an institutional framework for the integration and balancing of different interests in the water sector.

The Community Water and Sanitation Agency (CWSA) was launched in 1998 to extend domestic water supplies into and within rural areas (CWSA 2001). To facilitate this process, villages were expected to form Water and Sanitation (WATSAN) Committees to partner with District Water and Sanitation Teams (DWST). This new programme of action was much more effective in extending water supplies and this was partly due to increased external support from the World Bank and International Monetary Fund (Ministry of Works and Housing 1998b, Ministry of Water Resources, Works, and Housing 2005). Prior to the creation of the Ghana Water Directorate (GWD), these sector-specific institutions managed, controlled and regulated their own activities with respect to water management, with little coordination. The GWD was the last institutional setup to be established in 2004. Its core responsibility was to provide an overall policy focus for the Ghanaian water sector, representing Ghana's water interest on the global stage, and to ensure coordination among institutions (Ministry of Water Resources, Works, and Housing 2007). It is important to note that all these major institutions were set up using new legal enactments rather than the pre-existing colonial legal instruments.

Enlivening sustainable water resource management in Ghana

Sustainable development is now widely accepted as a policy framework in planning and development, both internationally and in Ghana. Within sustainability framework, technocratic and scientific approaches to water management, which are reflective of weak EM, have dominated environmental practices. The environment in the context of EM is conceptualized as a management problem (Milanez and Bührs 2007; Mol 1996), of which the solution is to bring a range of new stakeholders into the environmental debates and engaging them in developing policies and management strategies. EM works to build coalitions between a wide range of actors who have different concerns and different modes of expressing and articulating environmental problems (Hajer 1995). Around these coalitions, a series of discursive practices develop which seek to gain influence over environmental politics, to create new institutions for environmental management, to redefine environmental problems in ways that allow for specific technical solutions and political interventions, and bring about social and institutional restructuring. These coalitions, in the

context of Ghana, have not fully integrated or involved indigenous stakeholders in the water sector (Amonor 2002).

EM is criticized as a discourse that explicitly avoids addressing social contradictions (Fisher and Freudenburg 2001). In Ghana, there is too much reliance on science and technology for assessing environmental impacts and creating solutions. As a result ethical and socio-cultural issues are side-lined since they are difficult to conceptualize and measure. In this regard EM does not adequately incorporate the social questions related to assessing who benefits from and who bears the impact of development processes. Again, until the recent Ghana National Water Policy, there was little or no local level participation by indigenous stakeholders (Water resources Commission 2012). Inequalities in wealth and power form a barrier to the creation of partnerships and cooperation in water-related decision-making, especially at the national level. Though the country's water related institutions, laws, and policies are undergoing reforms (Mensah 2010), implementation and practice remain embedded within a weak EM. Institutionalization of a narrow conception of EM can obviate real dedication to the long term goal of sustainability in Ghana. In this regard, EM will only permit the continued production of ecological problems, *leaving open the question of whether modernization can lead to ecological sustainability*.

Traditional institutions of various forms are increasingly pushed to periphery when it comes to water resource management in many rural areas in Africa (Briggs 2013; Kuupole and Botchway 2010; Adams and Anderson 1988). These institutions represent established local systems of authority derived from the socio-cultural and historical processes of a given society. They originate from local cultures, have firm roots in the past and are mostly referred to as informal institutions (Botchway and Agyemang 2012; Appiah-opoku and Hyma 1999). In this paper, traditional institutions (social, religious, political, judicial and economic) are referred to as those structures that form the units of organization in the community in the management of water resources. In Ghana, traditional authorities include Chiefs, Tindanas, Clan heads, "Magazias" or women leaders, Family heads, Soothsayers, and Rainmakers as well as the societal norms, values, beliefs, cosmovision and practices that ensure community natural resource management. They are self identified human groups and structures characterized by peculiar socio-political systems, languages, cultures, values and beliefs, by a close relationship with the land and natural resources as a whole in their territory (Bonye and Millar 2004; Goodin 1996).

The philosophy underlying these traditional institutions is aimed at the perpetuation of natural resources (Bonye and Millar 2004). Their collective environmental wisdom and ethics are expressed through religious beliefs and a range of sacred and cultural practices. For instance the belief that the earth has a power of its own which is helpful if propitiated and harmful if neglected, is a powerful moral sanction against the wanton destruction of resources in Ghana (Awedora 2002). Similarly, the belief that lesser gods or spirits dwell in such natural resources as water, trees, hills, rocks and certain animals is tantamount to attaching intrinsic value to all objects.

Building relationships with customary institutions could lead to the establishment of a form of cooperation and respect and represent important gates or entry points to indigenous communities (Bonye and Millar 2004). These institutions are imperative for water resource management since they influence the selection and integration of modern/external interventions into the local practices. This role has been incapacitated by colonial and post-colonial regimes, limiting the capacities of rural people to solve their own problems and developing technologies and skills that serve their own needs (Haverkort and Millar 2004). Increased discrimination of rural communities, introduction of formal institutions, legal and administrative frameworks, individualism injected by market forces are all major factors militating against adjustment mechanisms that derive their strength from social sanctions and community's collectiveness.

Traditional institutions have been rarely involved in plans and policies of modern development paradigms (Achim and Gonzalo 2004; Marcussen 1994). Policy makers and planners have mostly trivialized the potential for collective action that inheres within these institutions, partly because of ignorance and partly also because modernization which is often regarded as antithetical to tradition in any form. However sincere the intention of government agencies (formal institutions) in water resource management may be, it is a fact that indigenous control, use, and management over these resources, which stood the test of time, has been and continue to be systematically diminished (Briggs 2013).

On the other hand, leaders of traditional institutions have been reluctant to adapt to new concerns (Millar 2003). The incursion of alien management systems or forms of governance is often seen as challenging the prerogatives of these institutions. Thus, while some indigenous peoples and institutions may be willing to enter into management partnerships with government agencies, others understandably remain reluctant to any type of external influence on their livelihoods and environments. They prefer to hold to their ancestral land rights and management systems without interfacing or compromising with other systems. This may be a decision of cultural survival (Bonye and Millar 2004), especially where traditional knowledge systems are already fragile because of strong external influences.

Current water reforms in Ghana focus on the use of statutory legal systems to regulate the use of water resources. But do these reforms really build upon what already exists? Not only are there opportunities to build upon the existing institutions, but even more importantly, to build upon existing indigenous institutions. Most of these customary institutions already encapsulate the knowledge, experience and practice needed to manage water effectively in their specific context. In poor rural parts of Ghana, diverse customary water institutions and laws are often as important as statutory law and are relied upon in developing access to natural resources and resolving conflicts.

Within the customary landscape of Ghana, local peoples understanding of the intricate power relations at work between relational spheres are the substance of everyday life which everybody can engage in. Yet this reality is embedded in official discourses in favor of contemporary paradigms, mostly sectorally based, that have the tendency to estrange the very people it is supposed to benefit. It is important to recognize that full engagement within a diverse society is enabled when local people are able to draw on and activate their own understandings of power based in customary processes (Palmer 2011). This opens up political spaces for the negotiation of local development (Gibson-Graham 2006), particularly Integrated Water Resource Management. As water becomes scarcer, it is becoming increasingly inefficient to manage water without recognizing the complementarities of customary water management systems and contemporary water management methods.

Conclusion

There is an ever increasing concern for sustainable solutions to eco-degradation and its ramifications like global warming, pollution from industrialised agriculture, loss of biodiversity, rapid desertification, and pollution of water bodies. The limitations of Western culture, scientific and technological values have proved that these know-hows are not the *conditio sine qua non* for dealing with environment related problems. It is also true that many customary water management approaches in Africa have been locally and geographically specific and provide no direct guidelines for how traditional uses and management of water can be integrated with more modern goals (Briggs 2013; Homann et al. 2008). Nevertheless, any simple or complex branding of indigenous approaches of aboriginal societies in Ghana, and by extension Africa, as anachronistic may obviate a potentially important vehicle for effecting desired changes. While customary water management approaches are quite often neither democratic nor egalitarian, yet embedded with some effective pro-environment conservation and enhancement ideas and practices, the fact remains that vestiges and modifications of these local institutional arrangements still pervade much of rural Ghana and as such should be constructively adapted in modernized management systems.

The current water concern in Ghana is often more a crisis of governance than a crisis of physical scarcity, as water resources are allocated inefficiently, unregulated pollution compromising water quality, weak water service providers failing to serve the public, and socio-environmental concerns left unaddressed. Without a significant shift in the way water resources are managed and water services are provided, the current water-related problems will only worsen. Explicitly, we advocate revisions of water laws, policies, and complementary changes to water resources' development and administration in Ghana. This will better accommodate customary water management arrangements alongside statutory initiatives. We, in the frame of paradigmatic complemantarity (Kuupole and Botchway 2010), propose the approach of blending the best of the two approaches (customary and statutory) in order to readdress their inherent inadequacies and ultimately yield sustainably hybrid institutions and methods that will facilitate the realisation of the long term goal of sustainability.

Unequivocally, We uphold the argument by Palmer (2011) that unless customary regimes are given a place in development and for that matter Water Resource Management, it will continue to be a dangerous and powerful undertow, sweeping out to sea the unsuspecting.

References

Achim, S. & Gonzalo, O. (2004). *Indigenous knowledge and natural resource management: Local pathways to global development*. A World Bank Report.

Amonor, K. S. (2002). Bush fire management, culture, and ecological modernization in Ghana. *IDS Bulletin, 33*(1), 65–74.

Andersen, M. S. (1993). *Ecological modernization: Between policy styles and policy instruments—The case of water pollution control*, Paper delivered at 1993 ECPR Conference, Leiden.

Appiah-Opoku, S. & Hyma, B. (1999). Indigenous institutions and resource management in Ghana. *Indigenous Knowledge and Development Monitor*, *7*(3), 15–17.

Awedora, A. K. (2002). *Culture and development in African with special reference to Ghana*. Accra: Institute of African Studies, University of Ghana press.

Bonye, S. & Millar, D. (2004). Traditional institutions: Entry points for endogenous development. *Compass Magazine for Endogenous Development*, (7), 13–16.

Botchway, D.-V. N. Y. M. & Agyemang, Y. S. (2012). Indigenous religious environmentalism in Africa. *Religions: A Scholarly Journal*, (6), 66–80.

Briggs, J. (2013). Indigenous knowledge: A false dawn for development and practice. *Progress in Development Studies, 13*(3), 231–243.

Buttel, F. H. (2000). Ecological modernization as social theory. *Geoforum, 31*(1), 57–65.

Christoff, P. (1996). Ecological modernization, ecological modernities. *Environmental Politics, 5*(3), 476–500.

Cohen, M. (1997). Sustainable development and ecological modernisation: National capacity for environmental reform. OCEES Research Paper No. 14. Oxford: Oxford Centre for the Environment, Ethics, and Society.

Cohen, M. J., & Murphy, J. (2001). *Exploring sustainable consumption*. Oxford: Permagon.

Community Water and Sanitation Agency (CWSA). (2001). *Community water and sanitation agency coverage data on potable water and sanitation facilities in rural communities and small towns in Ghana*. Accra: Ministry of Work and Housing.

Doyle, T., & McEachern, D. (2008). *Environment and politics* (3rd ed.). London: Routledge.

Dryzek, J. (2005). *The politics of the earth: Environmental discourses* (2nd ed.). Oxford: Oxford University Press.

Eckersley, R. (2004). *The Green State: Rethinking democracy and sovereignty*. Cambridge: MIT Press.

FAO. (1996). *Readings in African customary water law*. Rome: FAO Legislative Studies.

FAO-AQUASTAT (2005). *FAO's information system on water resources and use*. Rome. Availableonline:http://www.fao.org/nr/water/aquastat/countries_regions/ghana/print1.stm, [Accessed September 2, 2013].

Fisher, R. D. & Freudenburg, R. W. (2001). *Ecological modernisation and its critics: Assessing the past and looking towards the future.* Available online from: http://www.vedegylet.hu/okopolitika/Freud%20&%20Fisher%20%20Ecological%20Modernization.pdf [Accessed September 2, 2013].

Ghana Irrigation Development Authority (GIDA). (2001). *General information on public irrigation projects in Ghana,* Accra.

Global Water Partnership Technical Advisory Committee (TAC). (2000). Integrated water resources management. *TAC background paper*, No. 4. Stockholm: Global Water Partnership.

Goodin, R. E. (1996). *The theory of institutional design*. Cambridge: Cambridge University Press.

Gouldson, A., & Murphy, J. (1996). Ecological modernization and the European Union. *Geoforum, 27*(1), 11–21.

Hajer, M. A. (1995). *The politics of environmental discourse: Ecological modernization and the policy process*. Oxford: Claredon Press.

Haverkort, B. & Millar, D. (2004). *Alternative logic for development intervention*. Bolgatanga: CECK.

Hilden, M., & Rosentrom, U. (2008). The use of indicators for sustainable development. *Sustainable Development, 16*(4), 237–240.

Homann, S., Rischkowsky, B., & Steinbach, J. (2008). The effect of development interventions on the use of indigenous range management strategies in the Borana Lowlands of Ethiopia. *Land Degradation and Development, 19*(4), 368–387.

Huber, J. (2000). Towards industrial ecology: Sustainable development as a concept of ecological modernization. *Journal of Environmental Policy & Planning, 2*(4), 269–285.

Jackson, T., & Dixon, J. (2007). The New Zealand resource management act: An exercise in delivering sustainable development through an ecological modernisation agenda. *Environment and Planning B: Planning and Design, 34*(1), 107–120.

Kuupole, D. D. & Botchway, D.-V. N. Y. M. (eds.) (2010). *Polishing the pearls of ancient wisdom: Exploring the relevance of endogenous african knowledge systems for sustainable development in postcolonial Africa, Cape Coast, Ghana*. Cape Coast: Faculty of Arts, University of Cape Coast and Centre for Indigenous Knowledge and Organizational Development.

Langhelle, O. (2000). Why ecological modernization and sustainable development should not be conflated. *Journal of Environmental Policy & Planning, 2*(4), 303–322.

Lautze, J., Barry, B., & Youkhanac, E. (2008). Changing paradigms in Volta basin water management: Customary, national and transboundary. *Water Policy, 10*(6), 577–594.

Maganga, F. P. (2003). Incorporating customary laws in implementation of IWRM: Some insights from Rufiji River

Basin, Tanzania'. *Physics and Chemistry of the Earth, 28*(27), 995–996.
Meadowcroft, J. (2000). Sustainable development: A new(ish) idea for a new century? *Political Studies, 48*(2), 370–387.
Mensah, K. (1999). *Water law, water rights and water supply, Ghana*. Silsoe: Department for International Development.
Mensah, F. (2010). Integrated water resource management in Ghana: Past, present, and future. *Proceedings from the World Environmental and Water Resources Congress, 2010*, 2026–2037. doi:10.1061/14(371)211.
Milanez, B., & Bührs, T. (2007). Marrying strands of ecological modernisation: A proposed framework. *Environmental Politics, 16*(4), 565–583.
Millar, D. (2003). Blending systems of governance. *Compass Magazine for Endogenous Development*, (6), 30–33.
Ministry of Water Resources Works and Housing. (2005). *Access to water supply and sanitation: A country status overview*, Accra.
Ministry of Water Resources Works and Housing. (2007). *National water policy*, Accra.
Ministry of Works and Housing. (1998a). *Institutions and participation*. Accra: Water Resources Management (WARM) Study, Environmental Management Associates Ltd.
Ministry of Works and Housing. (1998b). *Information building block*. Vols. 1–3. Accra: Water Resources Management (WARM) Study, Nii Consult.
Mol, A. P. J. (1996). Ecological modernization and institutional reflexivity: Environmental reform in the late modern age. *Environmental Politics, 5*(2), 302–323.
Mol, A. P. J. (2002). Ecological modernization and the global economy. *Environmental Politics, 2*(2), 92–115.
Mol, A. P. J., & Sapaargaren, G. (2002). Ecological modernization and the environmental state. In A. P. J. Mol & F. H. Buttel (Eds.), *The environmental state under pressure* (Vol. 10, pp. 33–52). Research in Social Problems and Public Policy, Emerald Group Publishing Limited.
Murphy, J. (2000). Editorial—Ecological modernisation. *Geoforum, 31*(1), 1–8.
Nkonya, L. K. (2006). Customary Laws for Access to and Management of Drinking Water in Tanzania, *Law, Environment and Development Journal*, p. 50, available at http://www.lead-journal.org/content/06050.pdf
O'Connor, J. (1994). Is sustainable capitalism possible? In M. O'Connor (Ed.), *Is capitalism sustainable?* (pp. 152–175). New York: Guilford.
O'Riordan, T., Cameron, J., & Jordan, A. (2001). *Reinterpreting the precautionary principle*. London: Cameron May.
Odame-Ababio, K. (2002). *The changing focus in the development and management of Ghana's water resources*. Accra: Water Resources Commission.
Oelofse, C., Scott, D., Oelofse, G., & Houghton, J. (2006). Shifts within ecological modernization in South Africa: Deliberation, innovation and institutional opportunities. *Local Environment, 11*(1), 61–78.
Opoku-Agyemang, M. (2001a). *Shifting paradigms: Towards the integration of customary practices into the environmental law and policy in Ghana*. Proceedings from Securing the Future International Conference on Mining and the Environment, Skelleftea, Sweden.
Opoku-Agyemang, M. (2001b). Water Resources Commission Act and the nationalisation of water rights in Ghana. *Proceedings from Securing the Future International: Conference on Mining and the Environment*, Skelleftea, Sweden.
Orsato, R. J., & Clegg, S. R. (2005). Radical reformism: Towards critical ecological modernization. *Sustainable Development, 13*, 253–267.
Palmer, L. (2011). Water relations: Customary systems and the management of Baucau City's water. *Land and Life in Timor Leste: Ethnogaphic Essays.* Available online from:http://epress.anu.edu.au/wp-content/uploads/2011/12/ch073.pdf, [Accessed December 7, 2013].
Pejovich, S. (1999). The effects of the interaction of formal and informal institutions on social stability and economic development. *Journal of Market and Morality, 2*(2), 164–166.
Pena, H. (2011). Social equity and integrated water resources management. *TAC background paper,* No. 15, Stockholm: Global Water Partnership.
Redclift, M. (2005). Sustainable development (1987–2005): An oxymoron comes of age. *Sustainable Development, 13*, 212–227.
Sarpong, G. A. (2004*). Going down the drain? Customary water law and legislative onslaught in Ghana*, Paper commissioned by FAO as part of its studies on effect of legislation on Customary Water Rights in Rome. FAO Legal Papers on Line at http://www.fao.org/legal/pub-e.htm
Uphoff, N. (1990). *Local institutional development: An analytical sourcebook*. West Hartford, Connecticut: Kumarian Press.
Water Resources Commission. (2012). *National integrated water resources management (IWRM) plan,* Accra.
White, C. M. N. (1965). African customary law: The problem of concept and definition. *Journal of African Law, 9*(2), 86–87.
World Commission on Environment and Development (WCED). (1987). *Our common future.* Oxford: Oxford University Press.
Wright, J. & Kurian, P. (2009). Ecological modernization versus sustainable development: The case of genetic modification regulation in New Zealand. *Sustainable Development*, published online: 30 September 2009.
Xie, M. (2006). *Integrated water resources management (IWRM)—Introduction to principles and practices.* A paper prepared for the Africa Regional Workshop on IWRM, Nairobi, under GEF's International Waters Learn Program, World Bank Institute (WBI).