FIG COMMISSION 8
Working Group 8.5 African Water Governance

GOOD PRACTICE FOR RESILIENCE PLANNING TO ADDRESS WATER GOVERNANCE CHALLENGES IN AFRICA

Abstract

Resilience applies to both the industrialised and less-industrialised parts of the world and is associated with many aspects of human activity, often responding to the effects of climate change. It could be related to food, water, land, or energy scarcities. It could relate to living by the coast and the threat of sea-level rise and storm surges, or in mountainous areas threatened by glacial deluge, or in arid areas with erratic rainfall, or on small or low-lying islands facing increasingly violent storms. It could also relate to living in rural areas or in urban situations. Whenever and wherever there is a threat of a natural hazard (such as flooding, drought, heatwave), then there is an associated need to "come back" after the effects of that hazard have been endured.

Development gains can be quickly wiped out by a natural hazard directly, a surge in prices (as a consequence of a disaster), or a resource conflict. Gains could also be undermined over time by the cumulative effects of stressors such as climate change; environmental degradation; water, food, and energy scarcity; and economic uncertainty. While humanitarian responses to crises have saved lives and helped to restore livelihoods, such efforts have not always addressed underlying vulnerabilities. A resilience-building approach helps to address the damaging effects of shocks and stressors before, during, and after crises, thereby minimising human suffering and economic loss. The ability and capacity to "come back" is a measure of the individual or collective resilience. In this working group, the focus is on resilience in urbanised areas in Africa from a water governance perspective and the role of surveyors.

Some current thinking on the following policy issues are presented:

- Current and future challenges in terms of the resilience of water governance;
- Principles of conventional water governance and understand how those principles could be re-configured or aligned with climate change imperatives;
- Current practices around Africa for managing water resources and combine with climate change predictions and population growth scenarios;
- Critical success factors when managing water resources; and
- Possible future scenario strategies for managing water resources and provide guidance to governments, municipalities, communities, and professionals on reflecting these potential futures into current practice for sustainable, spatially-informed water governance.

This will be a precursor to the final deliverable to develop and describe a generic process for the building of resilience into urban water governance particularly from the perspective of the role of surveyors with the intention of producing a FIG Working Paper on good practice for resilience planning to address challenges of African water governance.

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Contents

NOTE FROM THE WORKING GROUP

An interim paper intending to promote discussion with a view to enriching the content, and identifying case studies from around Africa

ABBREVIATIONS AND ACRONYMS

CBO	Community-Based Organisation
CCMA	Cape Coast Municipal Assembly
DWA	Department of Water Affairs
EBM	Ecosystem-Based Management
EPA	Environmental Protection Agency
FON	Friends of the Nation
GWP	Global Water Partnership
GWS	Green Water Saving
ICZM	Integrated Coastal-Zone Management
IWRM	Integrated Water Resources Management
M&E	Monitoring and Evaluation
NBI	Nile Basin Initiative
NGO	Non-Governmental Organisation
NWRS2	Second National Water Strategy
OECD	Organisation for Economic Co-operation and Development
STMA	Sekondi-Takoradi Metropolitan Assembly
TWRM	Transboundary water resources management
UN	United Nations
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
WACDEP	Water, Climate and Development Programme
WPP	Water Partnership Programme

1.0 INTRODUCTION

Environmental change as a result of climate change, population growth and desertification are affecting water systems significantly in Africa. Lack of water is impacting the ecology, agriculture and the general economy of most Africa nations. In addition, poor water governance results in inequitable access to freshwater and the unsustainability of its use in many parts of Africa. Water governance refers to a range of political, social, economic and administrative systems that are in place to develop and manage water resources and the delivery of water services, at different levels of society (UNDP 2004). It has also been defined as a set of rules, practices, and processes (formal and informal) through which decisions for the management of water resources and services are taken and implemented, stakeholders articulate their interest and decision-makers are held accountable (OECD, 2015a). Water governance addresses issues on who gets what water at what quality and quantity, when and how, and who has the right to water and related services, and their benefits as well as dealing with the challenges in water delivery at all levels. Effective water management determines the equity and efficiency in water resource and services allocation and distribution, and balances water use between socio-economic activities and ecosystems (Milligan, 2018).

Ensuring the resilience of water governance in Africa is critical as there is a near consensus that the social and ecological impacts of water-related issues are disproportionately high (Schulze, 2011). The issues are also worsened by infrastructural deficits, weak institutional capacity and high political instability in the continent (Bonnassieux & Gangneron, 2011; Spoon, 2014). Sustainable assess to water is still a major challenge in Africa due to disjointed management arrangements, multiple and divergent actors' interests, discordancy between formal and informal water institutions, the inadequate political will to support water governance, and uncoordinated water management policies (Lalika *et al*., 2015; Msuya, 2010). The need to understand the social, environmental, political and economic context of water management in Africa requires analysis of current and future challenges in terms of the resilience of water governance (Olagunju et al., 2019).

Water used to be the main factor for the location for settlements. It uses to be the key source of transport, agriculture and trade. Therefore, controlling water resources was a source of power and wealth. Conventionally, there was no formal regulatory regime for water resources in most societies of the world. Water resources were governed by customary/traditional and informal arrangement/ institutional framework. In fact, water governance was in the hands of the users and this in most cases led to abuse of water resources and the struggle for control by the user groups, which often led to conflict (Meissner and Jacobs 2016). Over the years, it became clear that water is too valuable a commodity for its management to be handed over to its users and there remains a vital role for external monitoring and enforcement (DWAF, 1997). This insight brought governmental, non-governmental and other stakeholder institutions into water governance. This multi-stakeholder arrangement for water governance emerges from transboundary water government. These multiple institutions mostly act as monitors and enforcers of bilateral or multilateral water governance regulatory policies. The water resource community in these instances includes the governmental and private sectors, water managers, users and civil society implementing transboundary water management strategies (Meissner and Jacobs 2016). This 'community' also develops solutions to water management challenges.

According to Norman and Bakker (2009), the water governance literature describes governance-based not on political borders but on natural catchments and encourages multi-sectoral approaches like Integrated Water Resource Management (IWRM). International river basin organisations and commissions have become common institutional forms that manage water. These organisations are set up with the aim of fostering basin-wide cooperation (Mirumachi and Van-Wyk, 2010). Institutional mechanisms, such as co-management, public-private partnerships and social–private partnerships are among the conventional ways in which the state, users and communities interact to manage water resources (Lemos and Agrawal, 2006). In recent time water governance has become a global issue due to water scarcity, water resource crises in some part of the world, climate change, global rush for land and water and power shifts in the global political economy (Sojamo, and Larson, 2012). In addition, rapid economic development and societal change are putting increasing pressure on water ecosystems and other natural resources (Batchelor, undated; Baumgartner and Pahl-Wostl, 2013). In many countries or regions, demand is exceeding supply to the extent that water resources are fully allocated in all, but the highest rainfall years. Under such conditions, which are often referred to as river basin "closure", available water resources are fully allocated and the political importance of effective water governance increases (Batchelor, undated).

This working paper considers some of the social, environmental, political and economic context of water governance in Africa to identify the strategies necessary in terms of resilience, in the face of climate change, population growth and diminishing resources.

2.0 CURRENT AND FUTURE CHALLENGES IN RESILIENCE OF WATER GOVERNANCE

Major Water Basins in Africa

Africa has large rivers, big lakes, vast water lands and limited, but widespread, groundwater resources (UNECA et al., 2002). There are 63 river basins in Africa that are transboundary, covering more than 60% of the continent's land area (UNEP, 2010).

Although the water basins (Figure 1) pose significant governance challenges, there are 94 four international water agreements in Africa to cooperate and manage the shared water resources (UNECA, 2011).

Although the continent appears to have large untapped water potential, the spatial and temporal distribution of water resources is one of the main challenges and problems (UNECA, 2011). Good governance of water is critical to ensuring that development gains are retained, particularly as climate change, population pressure and economic imperatives continue to drive rural-to-urban migration.

Figure 1: Water Basins in Africa
Source: UNECA, 2011

The Challenges

Water governance challenges are invariably complex. The fundamental challenge is to establish systems of water governance that take account of and adapt to societal, economic, political and environmental conditions that are characterised by variability, change and uncertainty. The Water Partnership Programme (WPP) summarises the key issues and challenges affecting water governance in Africa. This includes the sector policy, legislation and regulation; decentralisation and devolution; sector-wide approaches; water sector financial management; monitoring and evaluation (M&E) integrated and transboundary water resources management (IWRM and TWRM); transparency, accountability and corruption; civil society participation; alternative service provision and public-private partnerships; gender; rights, voice and recourse; and, equitable service delivery (WPP, undated). Progress in building sustainable institutions for water governance is influenced by various systematic, socio-environmental and knowledge challenges (Olagunju et al., 2019).

These challenges have been summarised in Figure 2.

Within Africa, as elsewhere, a number of institutions are responsible for water governance. This has resulted in the overlapping of responsibilities and poor coordination (Gordon et al., 2013).

International agreements are often disconnected from national legislation and procedures. National water regulations and policies on paper may not reflect actual practices when it comes to evaluating, deciding and implementing new water resources development projects. Also, the lack of transparency and accountability has been widely mentioned in the literature as affecting water governance in Africa. They are closely related to one another within the context of governance systems and they are considered a prerequisite for good governance. For instance, transparency necessitates strong sector performance monitoring systems, which will enhance accountability for the use of resources by service providers. Decentralisation provides an opportunity for the introduction of transparency and accountability measures but also introduces threats if the community and civil society voices are not well articulated. Moreover, corruption in the water sector results from a lack of transparency and accountability. Corrupt practices are endemic in many institutions and transactions.

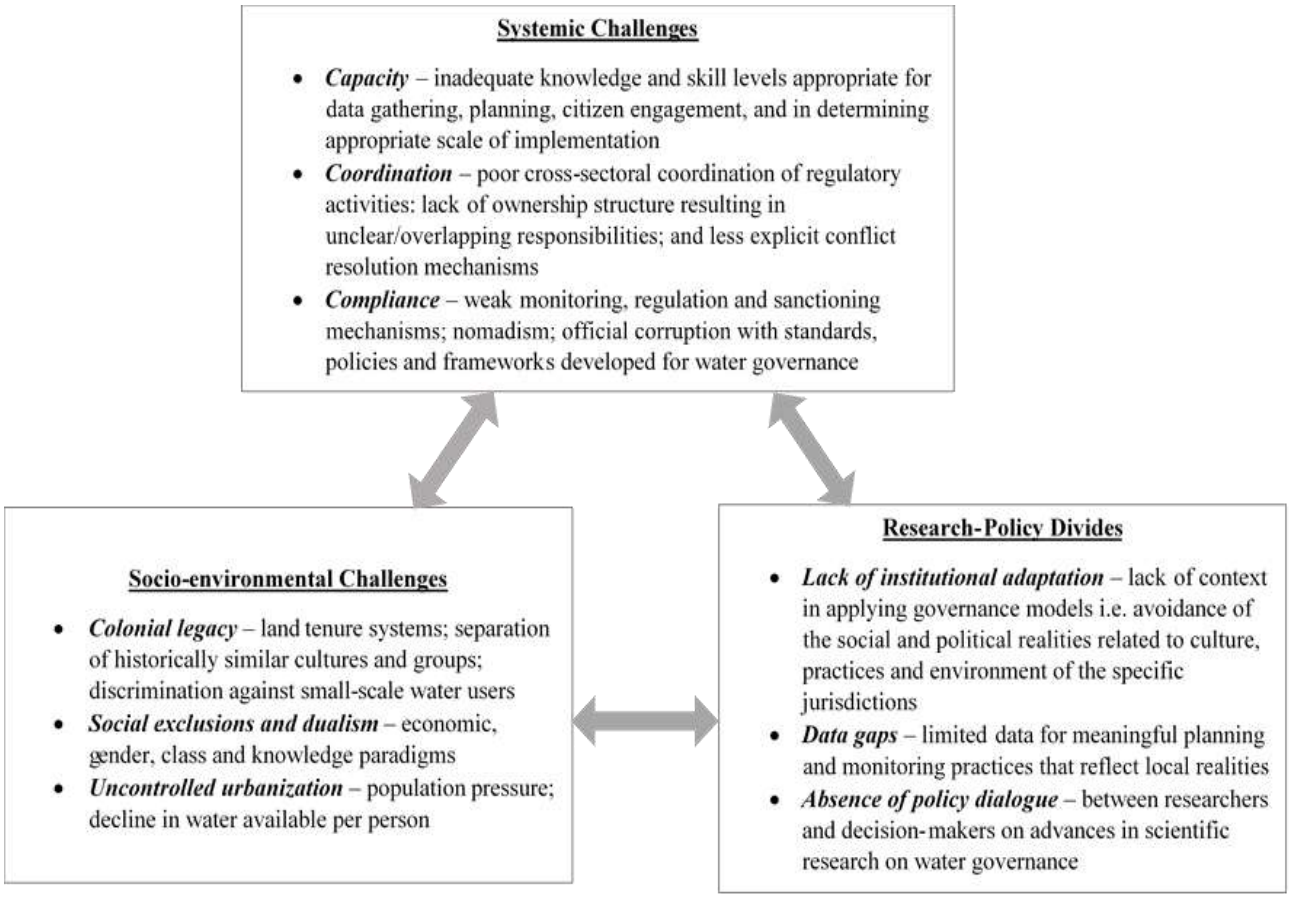

Figure 2: Cross-cutting challenges identified in water governance in Africa
Source: Olagunju et al., 2019

Transboundary Issues

Transboundary water resources management provides for governance of water resources shared between two or more riparian neighbouring countries. There are many shared water basins in Africa, the Nile Basin being geographically the largest with ten riparian countries and complex upstream/downstream issues to deal with. In the South African Development Community (SADC), there are thirteen transboundary rivers shared by two or more riparian states. The Volta River basin is a trans-national catchment shared by six riparian countries in West Africa and covers about 400,000 km² (Appeaning Addo *et al*., 2018). The watershed is 40% in Ghana, 42% in Burkina Faso, 6% in Togo, 5% in Mali, 4% in Benin and 3% in Côte d'Ivoire (Oguntunde et al., 2006). Transboundary Water Resource Management (TWRM) cannot be conducted purely on a state-by-state basis since many local, national and international stakeholders are involved. TWRM represents a situation in which water governance is complicated by issues of politics and competition for scarce resources between two or more countries. Furthermore, weak legal and regulatory frameworks, a lack of basin-wide institutional arrangements for joint development and management of transboundary water resources, poor water resources information systems, poor financing and a lack of stakeholder participation also affect the success of TWRM (Melesse *et al*., 2014). The management of these shared rivers, lakes or aquifers relies on multilateral coordination and institutional development (UN Environment, 2019). The need for cooperation and information sharing is an essential element of building resilience in future water governance.

Resilience of Water Governance

The interactions among society, its government agencies, and the ecosystems they manage, create significant challenges when dealing with cross-scale issues such as transboundary water governance (Benson and Garmestani 2011). The solution to the resilience problem includes the use of adaptive management, which attempts to reduce uncertainty and creates an avenue for continual learning (Green *et al*., 2013). The most critical steps in adaptive management are the design and implementation of monitoring and the iterative process of feeding that information back into management actions (Garmestani *et al*. 2009).

This facilitates management to evolve from a system of strict control to a cycle of experimenting, monitoring, learning, and adapting (Green *et al*., 2013).

Treaty design plays a significant role in reducing conflict among states over shared water resources. Institutional resilience is measured by levels of conflict and cooperation in the basin, which reflects the stability of water management regimes (Green and Perrings 2013). The unique socioeconomic and physical characteristics of each international basin preclude strict prototypes for building resilient water management institutions (Ostrom *et al*. 2007).

Building Future Resilience

A report by El Vilaly and El Vilaly (2013) estimated that by 2030-2050, changes in temperature and precipitation due to climate change will have variable impacts on surface water levels in the African region. The Sahel water resources will be the most vulnerable in the region because of higher temperatures and lower rainfall. With the inclusion of climate projections, the area river flows are expected to decline by 15-20 % (2020) and 20-40% (2050) (CIFOR, 2005). This will threaten socioeconomic water-dependent sectors especially in West Africa where there is significant reliance on agriculture, livestock production and fishing (El Vilaly & El Vilaly, 2013).

Achieving resilience in water governance in the future cannot be undertaken speedily using guides from outside any given country or region. Good governance needs to be developed to suit local conditions. According to Rogers and Hall (2003), there is no single model of effective water governance. For an effective governance system to be resilient, it must fit the social, economic, environmental, political and cultural particularities of each country. Effective policies may be sought through the active involvement of stakeholders. Capacity building and long-term hard work of awareness-raising and knowledge use among others are required to enable effective stakeholder involvement. In several case studies, public participation and stakeholder engagement have been implemented. However, the distribution of burdens and benefits of policies could be improved to address issues of equity and environmental justice (UN Environment, 2019).

Policy effectiveness draws attention to the role of citizens, the private sector and non-governmental bodies, in particular through participatory processes. Collaborative efforts are required to involve the private sector and non-governmental organisations, or local governments and citizens. Also, it is important to stress the role of state and citizens, and the development of a system of transparency and accountability, to bridge the social, economic and political dichotomies in existing practice. This will help address the issues of justice, equity, and power.

Progression in water governance in Africa will require a collaborative and inclusive water governance research approaches as well as dedicated investments in research to yield a long-term impact in Africa. Mainstream gender and development issues in all water sector activities are also critical. It is important to ensure that the needs of the vulnerable especially women and children are considered when strengthening water governance policies and laws.

Good water governance is key to the sustainable management and equitable access to the available freshwater resources of Africa. However, several challenges face the water management systems both at national and transboundary levels. The fundamental challenge is to establish systems of water governance that take account of, and adapt to, societal, economic, political and environmental conditions that are characterised by variability, change and uncertainty. Transboundary basin organisations set up throughout Africa as part of the water resources management structures of the riparian countries lack the necessary support from national governments due mainly to the individual countries' developmental ambitions. Generally, a number of institutions are responsible for water resources management often with poor coordination.

Good water governance in African will require the full commitment of nations to the principles of IWRM at both national and transboundary levels. This means developing and implementing all-inclusive stakeholder frameworks with adequate technical capacities and other resources for management at the national level and empowering the TBOs to carry out their mandates effectively.

3.0 PRINCIPLES OF CONVENTIONAL WATER GOVERNANCE AND CLIMATE CHANGE IMPERATIVES

According to the United Nations Development Programme (UNDP) (2000), Water governance refers to the political, social, economic and administrative systems that are in use to regulate the development and management of water resources and provisions of water services at different levels of society. It covers the manner in which allocative and regulatory politics are exercised in the management of water and other natural resources and broadly embraces the formal and informal institutions by which authority is exercised (Batchelor, undated).

Different principles and institutions have evolved over the years to govern water resources in various parts of the world. Boateng (2006), noted that human populations live in different societies and communities that have different environments, cultures, norms and values. These influence behaviour and perspective. Consequently, different criteria have evolved for decision-making, which implies different institutional frameworks for water management in different parts of the world. The Ostrom approach was to derive design principles from analysing the management of local, common-pool resources such as irrigation water and transnational rivers, where one or more groups use a common pool resource, though not available for others outside that group and it is possible for members of the group to stop others gaining access to it (Ostrom, 1990). This approach seems to be the kind of institutional arrangements that have governed water management historically.

This governance principle was outlined by Ostrom (1990) as:

(1) Clearly defined boundaries;
(2) Proportional equivalence between benefits and costs;
(3) Collective choice arrangements;
(4) Monitoring;
(5) Graduated sanctions;
(6) Conflict-resolution mechanisms;
(7) Minimal recognition of rights to organise; and
(8) Nested enterprises.

These common-pool resources management principles were key doctrines for the management of common-pool resources such as water resources during the 1990s, however, an answer is needed as to whether these principles will suffice today. The growing population and climate change-induced drought, and pollution of groundwater in recent times have put resources under pressure. New approaches for water planning and management are required if escalating conflicts are to be avoided and environmental degradation is to be reversed (Ragab and Prudhomme, 2002). In fact, adaptation to climate change represents specific challenges for institutional dynamics – uncertainties, conditions beyond the envelope of historical experience and heterogeneous local impacts and capacities to respond (Huntjens *et al*, 2012; Sivakumar, 2011). Besides, water management problems are not an exclusive matter of water quantity, but also of water quality. The environmental impacts that human activities affect water resources have gained increased interest in recent years and water pollution (including groundwater) has become a high priority issue for the protection of the quantity and the quality of the surface water and groundwater resources (Iglesias *et al*, 2007; Sivakumar, 2011).

In addition, the fact that more than 300 rivers around the world are being shared by two or more nation-states and that there are already numerous conflicts in the planning, development, and management of water resources in these basins further complicate matters for present and future water resources planning.

In view of these, any genuine effort towards proper management of future water resources and resolving potential future water-related conflicts will need to overcome many challenges (Sivakumar, 2011). The effects of increased population and its many associated effects (e.g. urbanisation, water pollution, and deforestation) is already causing enormous stress on the world's freshwater resources.

What strategic principles or institutions can we develop for sustainable management of water resources today and for tomorrow?

The ensuring global water challenge led to the establishment of UN-Water in 2003, which was conceived as an interagency mechanism to coordinate action for achieving water-related targets set by the UN Millennium Declaration; specifically, Target 7.C of the Millennium Development Goals, there has been increased activities in the development of more formal and global institutional framework for water governance (Baumgartner and Pahl-Wostl, 2013). The changing role of traditional leadership in the governance framework might be influenced by movements that are taking place in society due to globalisation processes, predicted possible effects of climate change and trends of modernity that contribute to the overall erosion or modification of traditional values (Malzbender, Goldin, Turton, and Earle, 2005).

Among the emerging global water governance institutions are the Global Water Governance (GWG) (Mukhtarov, 2007) and Global Water Partnership (GWP) (Rana and Kelly (2004). These organisations have increasingly intensified transnational communication of experts, diplomats, government officials, non-governmental organisations, and think-tanks involved in the field of water resources management has gradually brought Multiple stakeholders and internationalisation of water resources issues beyond those of traditional water governance (Malzbender, Goldin, Turton, and Earle, 2005; Mukhtarov, 2007).

The OECD multi-stakeholders' platform for Water Governance Initiative (WGI) which was initiated in March 2013, has developed 12 principles of water governance with active contribution and support from GWP. The overview of the 12 principles is presented in Figures 3 and 4.

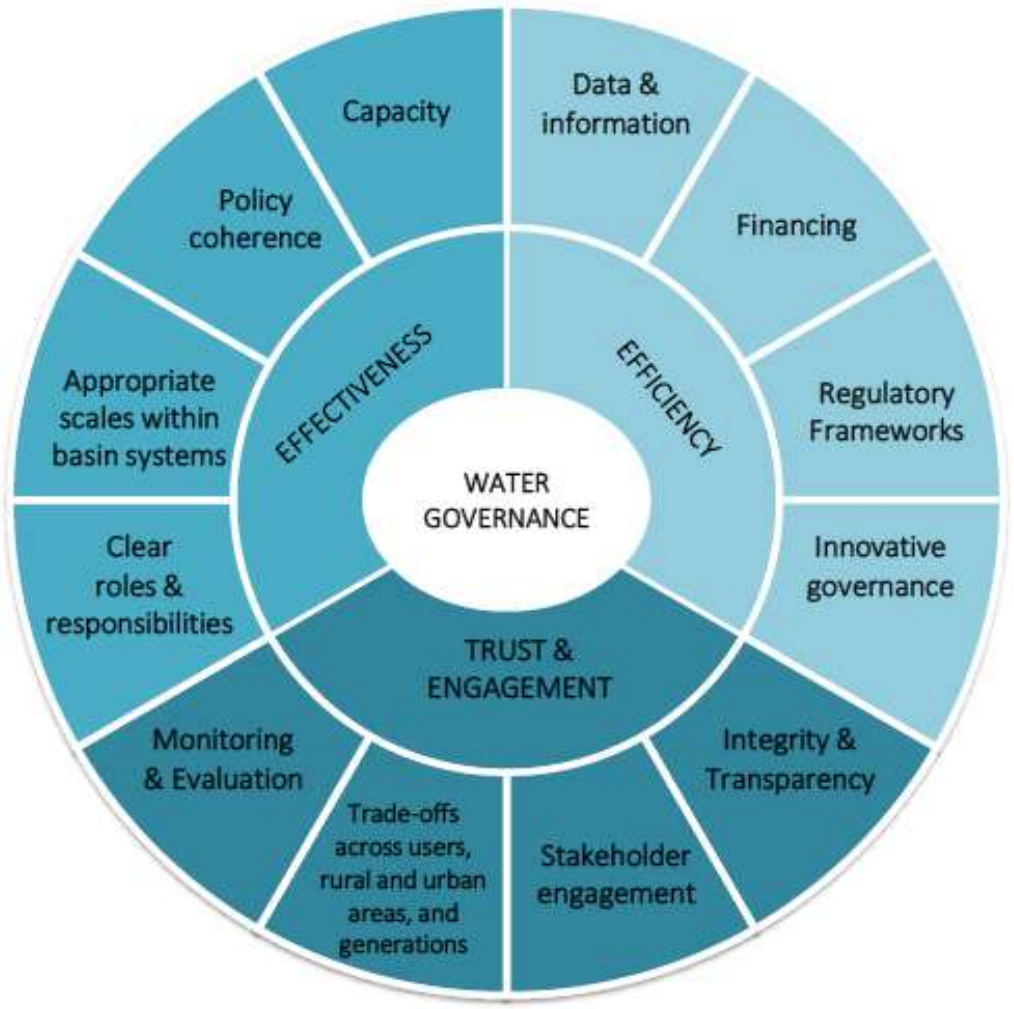

Figure 3: Overview of OECD Principles on Water Governance (GWP, 2019)

Principle 1. Clearly allocate and distinct roles and responsibilities for water policymaking, policy implementation, operational management and regulation, and foster coordination across these responsible authorities

Principle 2. Manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and foster coordination between the different scales

Principle 3. Encourage policy coherence through effective cross-sectoral coordination, especially between policies for water and the environment, health, energy, agriculture, industry, spatial planning and land use

Principle 4. Adapt the level of capacity of responsible authorities to the complexity of water challenges to be met, and to the set of competencies required to carry out their duties

Principle 5. Produce, update, and share timely, consistent, comparable and policy-relevant water and water-related data and information, and use it to guide, assess and improve water policy

Principle 6. Ensure that governance arrangements help mobilise water finance and allocate financial resources in an efficient, transparent and timely manner

Principle 7. Ensure that sound water management regulatory frameworks are effectively implemented and enforced in pursuit of the public interest

Principle 8. Promote the adoption and implementation of innovative water governance practices across responsible authorities, levels of government and relevant stakeholders

Principle 9. Mainstream integrity and transparency practices across water policies, water institutions and water governance frameworks for greater accountability and trust in decision-making

Principle 10. Promote stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation

Principle 11. Encourage water governance frameworks that help manage trade-offs across water users, rural and urban areas, and generations

Principle 12. Promote regular monitoring and evaluation of water policy and governance where appropriate, share the results with the public and make adjustments when needed

Figure 4: Details of OECD Principles on Water Governance (GWP, 2019)

These twelve principles underpin a modern water governance framework. Now the question for discussion is: how does the past water governance principles relate to the modern principles above? Given the present and anticipated impacts of climate change on water, is it possible to re-configured or aligned the historical water management principles for the governance or management of water today?

It is clear from Figure 5 that the eight common-pool resources governance principles outlined by Ostrom, (1990), matches well with the recent OECD twelve water governance principles presented in Figure 4.

The addition of four new principles by the OECD may be due to the complexities, uncertainties and pressure on water resources that emanate from the impacts of climate change and ever-increasing population. It is also clear that the old water governace principles focus more on “Trust and Engagement” (Figure 5).

Conversely, the recent water governace principles developed by the OECD place equal emphasis on” Effectiveness, Efficiency and Trust and Engagement”. This implies that modern water managers need to employ innovative approaches that ensure effectiveness and efficiency to meet the growing demand for water and the reduced availablity of water due to the efffects of climate change. Of course, trust and engagement of stakeholders or user groups are still required in order to avoid conflict.

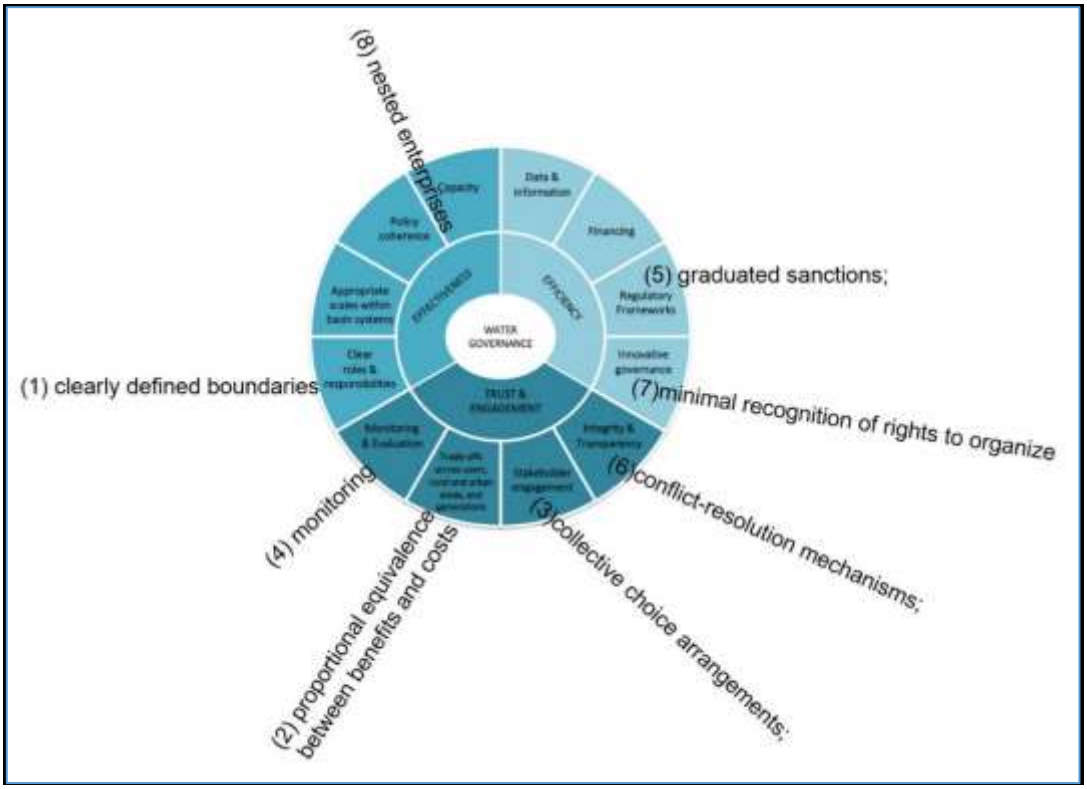

Figure 5: Super-imposed historical water management principles over modern principles

Climate change and associated impacts such as increased temperature, changing rainfall patterns and increase dry seasons coupled with increasing population and increasing demand for water are likely to cause water shortages, particularly in the urban environment. In fact, water resources are already threatened with projected water crises in many places in the world if effective and resilience management approaches are not put in place. For example from approximately 1 billion people in 2015, the population of sub-Saharan Africa is expected to grow to about 2.2 billion by 2050 (UN, 2017). Consequently, by 2025, water availability in nine countries, mainly in eastern and southern Africa, is projected to be less than 1,000 m^3 per person per year.

Twelve countries would be limited to 1000-1700 m^3 per person per year, and the population at risk of water stress could be up to 460 million people, mainly in western Africa (Bates *et al*., 2008, UNECA, 2011). This general threat is exacerbated by specific impacts of climate change, which include sea-level rise, erratic rainfall patterns, the drying-up of rivers, flooding, drought and poor water quality both for surface and groundwater among others.

In most African water sector policies, climate change impact on the water resources is not explicitly taken into account for sound integrated water management across the continent (UNECA, 2011). Some countries have taken up this challenge and are spearheading reforms in the water sector.

4.0 CURRENT PRACTICE FOR MANAGING WATER RESOURCES

Current Practices across Africa

The major sources water resources found in sub-Saharan Africa are international river basins with about 35 countries sharing 17 major river basins (Donkor and Wolde, 1998) which call for integration among member states and different management units. Since the 1990s, the Integrated Water Resources Management (IWRM) principles have become the basis of many water resources management across many nations in Africa. The IWRM is based on three main principles, which are social equity, economic efficiency and environmental sustainability. It is defined as a process that promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Global Water Partnership, 2000). Based on the nature of resources available and socio-economic development, various countries have adopted the IWRM at different levels for managing their resources.

In eastern Africa, the Nile Basin Initiative (NBI) is playing a key role in implementing IWRM in the region. The vision is to achieve sustainable socio-economic development through the equitable utilisation of, and benefit from, the shared Nile Basin water resources. The NBI is made of 10 countries with representatives from each member country serving on the management board. The core goals for the initiative are water security, energy security, food security, environmental sustainability, climate change adaptation and transboundary water governance. To enable successful implementation, all countries within the basin had to initiate water legislation revisions. The initiative has successfully established a number of data monitoring systems as well as a Nile Basin River Flow Forecasting system for the effective management of the basin resources. Donor agents, as well as contributions from Member States, are currently financing the projects.

In a bid to better the concepts of IWRM, the Department of Water Affairs (DWA), South Africa, in 2013 came up with its second National Water Strategy (NWRS2), which introduced development water management (DWM) which is embedded in the democratic state. Its builds upon the IWRM principles (considered as IWRM in practice). The NWRS2 brings on-board the role of government, which critics of IWRM see as a major problem with the IWRM. Emphasis is also laid on water infrastructure and service delivery. Developmental water management under this strategy is defined as 'water management which takes, as a central premise, the fact that water plays a critical role in equitable social and economic development, and that the developmental state has a critical role in ensuring this takes place (van Koppen & Schreiner, 2014).

The strategy sets out the following order in water allocations: (1) The ecological and basic human reserves; (2) International obligations; (3) Water for poverty eradication and redressing inequities from the past; (4) Water uses that are strategically important; and (5) Licenced water for general economic purposes. The DWA, for example, takes increasing powers to reallocate to water uses with the highest equity outcomes without compromising on environmental sustainability.

Green water saving (GWS) schemes have *de facto* become climate-resilient development programmes being used in water management. The GWS is based on local stakeholders paying for watershed services using fair payment methods for watershed services (Beyene & Luwesi, 2018) whether implemented as water and land conservation measures, cropping and tree planting techniques, or payments for watershed services. GWS schemes remain effective mechanisms for preparedness, adaption and mitigation of climate impacts using available resources. Kenya, for example, has initiated various reforms more especially from the 2010 constitution which provides for an 'equalisation fund' to enable increased *per capita* availability of and access to safe water and sanitation services, as well as irrigation water, even in marginal and dry-lands. Based on that, a number of amendments have been introduced to its Water Act 2016. Under the Act, six major institutions were given the mandate to manage the water resources of the country, with varying roles including regulating flooding, harvesting and storage, standards for water provision, provision of grants and arbitration of water-related cases (Beyene & Luwesi, 2018). Under the new water Act, all income from water permits, abstraction and water user fees were to be entirely used for the conservation and management of water resources. Since Kenya's reforms started there has been an increasing trend of financial flows to the water sector.

In central Africa, the Water, Climate and Development Programme (WACDEP) was operationalised in 2010. The focus was to integrate water security and climate resilience into development planning processes, build climate resilience, and help countries adapt to a new climate regime through increased investments in water security. The target was the Lake Chad and Congo-Oubangui river basin institutions and the Cameroon government.

5.0 CRITICAL SUCCESS FACTORS WHEN MANAGING WATER RESOURCES

Water resources are critical to life, for potable supplies and sanitation, for food production, for energy generation and for many other production requirements. Supplying the growing population, therefore, depends on the capacity (and the will) to manage the resource differently (i.e. ensuring its quality, quantity and access) so that it can reach more people. Population is not the only factor to consider. The brutal challenge of climate change resulting in changes in rainfall regimes, threatening surface water and the regularity of aquifer recharge, and the contamination of aquifers in expanding urban areas, are other factors that contribute to making water resources scarcity a reality.

Before the industrial revolution, it was possible to withdraw and consume water to everyone's satisfaction. This is no longer true; 1 billion in 1800, 2 billion in 1900 and about 7.7 at the end of 2019 no longer allows for the management of water without cooperation. Accessible water is unequally distributed and population growth varies throughout Africa. Sub-Saharan Africa where access to clean water is already a challenge for the current population, presents a high risk of increasing, and irreversible, water scarcity.

The way governments have mismanaged water for decades does not auger well for future management. Lake Chad which is shared by Cameroon, Chad, Niger and Nigeria and has been a source of freshwater for irrigation projects in each of these countries for years. Since 1963, the lake has shrunk to nearly a twentieth of its original size, due both to climatic changes and to high demands for agricultural water. The changes in the lake have contributed to a local lack of water, crop failures, livestock deaths, collapsed fisheries, soil salinity, and increasing poverty throughout the region. The main factors in the shrinking of the lake have been overgrazing (resulting in deforestation) and large and unsustainable irrigation projects.

Shared water and its availability are critical to Africa. The scarcity of water in Africa generally will become harder to manage as demand rises. The population of 1.3 billion is growing by 1.5-2% a year. The irony is that Africa has abundant freshwater: large lakes, big rivers, vast wetlands and limited though widespread groundwater. Yet only 4 % of the continent's available freshwater is currently being used. Governments need to improve the way they use water and by managing better cooperation with neighbouring countries.

There are some critical success factors to be considered:

Critical Success Factor 1 Taking responsibility

African governments should promote an enabling environment, including appropriate legislation, public-private partnerships, community involvement, and economic incentives that will foster water infrastructure development for sustainable economic growth. Governments should focus on the management of supply and demand by investing in water infrastructure operations and maintenance, and by promoting effective use of water. This should include enhancing water storage by water harvesting, adopting conjunctive water uses, promoting wastewater treatment and recycling, and reducing the currently substantial losses in the supply chain. As populations grow, industrial, agricultural and individual water demands will escalate. In rural Sub-Saharan Africa, millions of people share their domestic water sources with animals or rely on unprotected wells that are breeding grounds for pathogens.

The average distance that women in Africa walk to collect water is six kilometres. People lacking access to improved water in rural Africa consume far less water than needed, partly because they have to carry it over long distances and water is heavy. Average water use ranges from 150 - 200 litres a person a day in most countries in Europe yet is less than 10 litres in countries such as Mozambique. For every person who lives more than one kilometre from a water source, water use is often less than five litres each day of unsafe water.

There is a need for further development of the water resource to improve access to safe water and sanitation. However, where progress has been made serious efforts are necessary to maintain the infrastructure and services and to implement wastewater treatment and recycling. Governments and the private sector should develop nationally and locally appropriate and effective water quality treatment technologies and low-cost sanitation solutions.

Critical Success Factor 2 Human, Institutional and Financial Capacity

There is generally a shortage of human resources for water management in Africa. Education, knowledge and capacity development at all societal and institutional levels as well as good governance, are key for efficient and sustainable, integrated water resource management and development. African governments need to strengthen capacity enhancement programmes at community, academic and institutional levels; support knowledge-based strategies for water management amongst policy and decision makers.

Although African country leaders have committed themselves to ensure sustainable access to safe and adequate clean water supply and sanitation, especially for the poor and to plan and manage water resources to become a basis for national and regional cooperation and development, inadequate human, institutional and financial capacity constraints the sustainable management of water resources and seriously affects the proper planning and implementation of water and sanitation policies and programmes.

Critical Success Factor 3 Food Security

With a growing population, Africa will need more food and must secure the water and energy needed to ensure its production at the same time as good quality water resources are becoming scarcer. There is opportunity to grow food with the currently available resources. Water must not become the limiting factor for food and water security (Africa Water Vision 2025).

African governments should build efficiency into food production and delivery, as well as resource use, through investment in education and innovation, green technologies, multiple uses of recycled products, and in the abundant renewable energy resources. This includes biogas production from organic waste, reuse of nutrients in agricultural production, and recycling of process water.

Critical Success Factor 4 Energy Security

Much of the delivery of water to supply rural Africa is powered by electricity. Providing access to electricity in rural areas of Africa is a major challenge. The fuel is generally of poor quality, and energy is used inefficiently; the power supply is unreliable and access to it limited, with millions of people in rural areas still unable to benefit from modern energy services. This not only has an adverse effect on economic productivity; more importantly, it also affects people’s quality of life and is having a strong impact on the environment.

The unsustainable use of locally sourced biomass and increasing dependence on fossil fuels are causing environmental degradation at local (land degradation), regional (air, water and soil pollution) and global levels (greenhouse gas emissions contributing to climate change).

Locally based measures that use renewable energies to secure the rural power supply, and the water supply, could open up new opportunities for economic productivity while also reducing greenhouse gas emissions and local pollutants resulting from the extensive usage of fossil fuels.

Critical Success Factor 5 Water and Health

The basic requirement for lactating women engaged in even moderate physical activity is 7.5 l/day. At any one time, close to half of all people in developing countries are suffering from health problems caused by poor water and sanitation. Together, unclean water and poor sanitation are the world's second-largest killer of children. It has been calculated that 443 million school days are lost each year to water-related illnesses. Many take water from canals and irrigation ditches, with risks of exposure to polluted agricultural run-off. A survey of 5 000 schools in Senegal showed that over half had no water supply and almost half had no sanitation facilities.

Of those schools with sanitation, only half had separate facilities for boys and girls. The result was that girls chose not to use these facilities, either because they did not want to risk being seen to use the toilet, or because they were warned that these facilities were not private or clean enough. Girls also avoided drinking water at school to avoid urination, thereby becoming dehydrated and unable to concentrate. People living in the peri-urban areas of Nairobi pay five to ten times more for water than those living in high-income areas in that same city. The cost of connecting to the utility represents about three months' income for the poorest 20% of households, rising to six months' in urban Kenya.

Critical Success Factor 6 Transboundary Cooperation

Several countries share rivers, lakes and groundwater systems, as well as in-country basins that cut across different administrative jurisdictions. It cannot always be expected that water conflicts to always be amenably resolved.

Several nations receive most of their water from rivers that cross borders of neighbouring countries which are viewed as hostile. These include Namibia, Congo, and Sudan, all of whom receive 75 % or more of their freshwater from the river flow from often hostile upstream neighbours.

Lessons learned from successful transboundary cooperation efforts and agreements among some African states indicate that successful transboundary water distribution is inherently dependent on political cooperation between the involved riparian states.

In the absence of strong rules and laws, treaties are the best form of formal river/lake basin and aquifer management. To avoid any potential conflicting uses, it has been suggested that the African Union should strengthen cooperation among regional economic communities and stakeholders to assure just and equitable distribution of water resources at regional and national levels. In addition, the African Union could provide a platform for the collection of data and dissemination of information to guide planning, monitoring and assessment of the water resources for joint management.

Critical Success Factor 7 Governance and Management

African countries need to streamline their efforts to promote good water governance, secure the promised financing for development, and invest in water infrastructure, human resources, and institutions for proper management of the water resources. African governments, in collaboration with water managers and communities of users, should develop and implement transparent, evidence-based policy, legal and institutional frameworks that adequately address water issues including governance, shared responsibilities, and water security.

Critical Success Factor 8 Financing

There is a clear need in Africa to increase funding to build human and institutional capacities to effectively develop and utilise water resources. Investment in the water sector should come from both public and private sectors, and initiatives such as like the Comprehensive Africa Agriculture Development Programme should be encouraged and Public-Private-Partnerships strengthened. If water becomes a limiting factor in food production and energy supply, then the risk of a downturn in the economy and societal well-being becomes extremely high. It is necessary for governments to invest more in the water sector, and this should be done based on the real value of water. The real value analysis for water must include its environmental, social, operational and construction components.

It is essential for water policymakers to ensure proper allocation and achieve economic efficiency and environmental sustainability.

Critical Success Factor 9 Managing Risk

African governments should put in place new or review existing strategies and policies to counteract the impact of global and climate change on water resources, and incorporate climate change adaptation strategies in their development plans and programmes.

Policy for reducing disaster risk is complex and multidisciplinary by essence; thus, it requires careful development planning, scientific knowledge, early warning systems that are people-centred, and effective mechanisms for disaster responses including future risks related to climate variability and change.

6.0 PROPOSALS FOR FUTURE SCENARIO STRATEGIES FOR MANAGING WATER RESOURCES

Effective water governance helps to prevent the frequent mismatch between central government policies and priorities on one hand, and the people's concerns and aspirations on the other UNDP (2003). According to OECD Water Governance Programme (2019), water demand will increase by 55% by 2050 due to growing demand from manufacturing, thermal electricity generation and domestic use. Therefore managing and securing access to water for all is not only a question of money but equally a matter of good governance.

Several proposals are being worked on and one is provided below

The Fosu Lagoon
The Fosu Lagoon is an urban resource located in Cape Coast, the capital city of the Central Region of Ghana. The geographical coordinates of the lagoon are 5 º7'N and 1 º16'W. The lagoon is a shallow body of water which is separated from the sea by a sand bar (closed lagoon) which is sometimes broken by heavy rains or manually as part of the rituals during the Fetu Festival in Cape Coast. The Fosu Lagoon is an important resource to the people of Cape Coast because it provides both economic and cultural benefits. The amount of fish that live in the lagoon provides fishermen with some income and the people with protein. The mechanic shops along the lagoon are also used by the artisans as their livelihood. The lagoon also forms part of the Fetu festival celebrated by the people of Cape Coast.

The Essei Lagoon
The Essei Lagoon maintains a permanent opening into the sea as a result of human interference (a man-made open lagoon). The geographical coordinates of the lagoon are 4 º 54'N and 1 º 44'W. The lagoon is located in Sekondi-Takoradi, the capital town of the people in the Western Region of Ghana and is bordered to the north by the Secondi Takoradi Metropolitan Assembly (STMA) road, east by the Bakaakyir road and west by the Bakaano road. It is an urban lagoon with numerous human activities impinging on the ecological health of its resources.

A preliminary survey of some lagoons along the coast of Ghana has indicated that human activities have created ecological pressure on the natural habitats of fish and other marine organism living in and around them. The result of the factors is that some of the lagoons are disappearing and others shrinking. Some have been heavily polluted whilst others are expanding. As a result, the aesthetic values of some of the lagoons and their status as Ramsar sites are being lost (Aheto, Mensah, Okyere, Mensah, Kafui & Opoku-Agyarkwah, 2010). This observation has been noted by de Wit *et al.,* (2001), who said that the hydro-geomorphological conditions of coastal lagoons are dynamic.

Over the last two decades, coastal lagoons have come under increasing anthropogenic and natural pressures. For example, urbanisation and increasing population have contributed to further land reclamation and water demand that has resulted in the deterioration of water quality (Aheto, *et al*., 2010; Boateng, 2008).

Sustaining public interest and stakeholder participation in environmental issues will create opportunities for conserving and restoring areas that seek to provide the required ecological goods and services for the benefit of humanity. Alternative management strategies in the form of water governance scenarios using the Fosu (Central Region) and the Essei (Western Region) Lagoons in Ghana are presented as case studies.

Education and Sensitisation

To ensure the sustainable management of lagoons, there is a need for education or sensitisation and dialogue to encourage local people to feel a sense of belonging and value the lagoons as a basis of their livelihood and survival. In order for people to show ownership of the Fosu and the Essei Lagoons and manage them well, government, civil society based organisations, academics and other national and international level stakeholders should begin to think like the local people.

This could be an appropriate way to address the situation holistically with the intention that the people are likely to show ownership of the resource at their disposal. According to Steenson (2010), local residents have wealth of knowledge about their environment and they also depend on it for their livelihood, hence their values, interests, and concerns should be the basis of local management and should be an integral part of the decision making process.

Empowering the Traditional and the Local Authorities

Coastal lagoon management in the case of the Fosu and Essei Lagoons is based on the traditional management approach where there is a chief, usually hereditary in lineage, who functions as a custodian or caretaker and the lagoon is controlled, managed, regulated and monitored by taboos and outright bans and, in some cases, customary laws and practices.

The analogy above resonates with Atampugre and Adu-Boahen, (2016) in their work on transboundary river governance in West Africa using the case of the Volta River system that showed, among other matters, that traditional management strategies are used in managing rivers in Africa. Of course, education, religion and modernisation as well as economic conditions have now changed the paradigm on which this traditional management approach operated. The chiefs and the traditional leaders do not have power any longer as every individual considers the lagoons as common property. Hardin (1968) argued that natural resources held in common are subject to massive degradation because they are exploited as if there was no limit. This proposition by Hardin (1968) is evident in the lagoon areas, as every individual, in some way, claims possession or ownership of the lagoons and decides on its usage in his or her own will and interest. This unstructured usage has degraded and polluted the Fosu and the Essei Lagoons. The degradation of the Lagoons is due to a lack of regulation on access to resources held as open.

The tragedy in many cases occurred only after existing communal land or water resources had been transformed, weakened or destroyed as a result of processes following culture contact. Hardin (1968) argues that users of commons are caught in an inevitable process that leads to the destruction of the resources on which they depend.

According to Berkes (1989); Feeny, Berkes, McCay and Acheson, (1990) the common property (common pool) resources share two characteristics: (a) exclusion or the control of access of potential users was difficult and (b) each user was capable of subtracting from the welfare of all other users. These two universal characteristics of commons are referred to as the exclusion problem ~ the ability to exclude people other than the members of a defined group and the “subtractability” problem (refers to the ability of social groups to design a variety of mechanisms to regulate resource use among members). Ostrom *et al* (2002) define common-pool (or common-property) resources as those in which (i) exclusion of beneficiaries through physical and institutional means is especially costly, and (ii) exploitation by one user reduces resource availability for others.

Common property or common-pool resources may be held in one of the four basic property rights regimes:

- Open-access is the absence of well-defined property rights. Access is free and open to all;
- Private property refers to the situation in which an individual or corporation has the right to exclude others and to regulate the use of a resource;
- State property or state governance means that rights to the resource are vested exclusively in government to control access and regulate use; and
- In communal-property (or simply common-property) regimes, the resource is held by an identifiable community of users who can exclude others and regulate use.

In the Fosu and the Essei Lagoons, the open-access regime where access to both is free without any restrictions is evident. The residents and other users determine when and how to use the Lagoons for their own benefits.

It should be recognised that these four regimes are ideal, analytical types. In practice, resources are usually held in mixed combinations of property-rights regimes. The current research on the status of the Lagoons revealed a missing link in the sense that, the protection of the Lagoons is shrouded in the philosophy of the commons, thus the open regime and every individual claim ownership, making the management of the lagoons problematic. However, according to Feeny *et al* (1990), there is a general consensus that long-term sustainability is not possible under the open-access regime and hence resources are depleted under such regimes. The issue of the tragedy of the commons is relevant to the situation pertaining to the Fosu and the Essei Lagoons in Ghana.

The commons regime becomes highly visible in the sense that the ownership of the Fosu and the Essei Lagoons are always contested by various stakeholders. Studies revealed that management institutions such as Ministry of Works and Housing, Water Resources Commission, Environmental Protection Agency, Forestry Commission, Traditional Council, metropolitan bodies, as well as NGOs performed poorly due to several challenges relating to capacity for operation, financial and technical capacities, as well as logistical constraints.

National plans and conventions are ineffective to protect resources that are local in scale. The mangrove area and coastal resources are used as local commons by several groups. There were pervasive ignorance and mismatch on the management of the lagoons Cash *et al* (2006). The critical task, in this case, seems to be the inability of the community to impose its rules on the end-users of the lagoons.

There is inadequate enforcement of restrictive regulations; the lack of state recognition, commitment and mechanisms for cross-level coordination has limited the ability of the various stakeholders to contribute to management at the local level. There is also a lack of funding, commitment and logistics at the regional level management within the catchment area of the lagoons. It is vital to recognise that the community level is also important as the starting point for the solution of the tragedy of the commons (Ostrom *et al*, 2002). However, higher levels of organisation are also important in providing monitoring, assessment, enforcement, and fostering local management.

Environmental Management

The changing physical features and conditions along the lagoons need to be monitored, regulated, and prosecution introduced into the environmental management system because education requires such reinforcement.

Despite significant education/awareness-raising, people are reluctant to change their attitudes and behaviour towards the environment. In the case of the Essei Lagoon, there have been several restoration programmes such as erection of sign-boards and employment of coastal guards to alert, educate and arrest offenders. With regards to the Fosu Lagoon, there is a tripartite committee which seeks to monitor and manage the lagoon. Yet, this effort has not yielded the desired results and there is a call by residents for offenders to be prosecuted as part of the measures to restore the lagoon.

Legislation and Commitment of Stakeholders

Current research reveals that current management systems are inefficient to support the protection and management of coastal lagoons in Ghana as there is lack of funds, logistics and personnel to enforce the policies. There is a lack of interest and poor attitude on the part of the government and other stakeholders. Legislation and regulations are flouted by the local people since they are not punished by any organisation or institution. Some of this lack of enforcement can be put down to lack of financial support from Government (for example, for routine vehicle maintenance, and payment of casual workers). This lack of funding can extend for nearly two years. There is, therefore, the need to bring all stakeholders on board in a participatory manner, under the leadership of the local residents to facilitate restoration plan of the Fosu and the Essei Lagoons. Again, national, regional and international environmental pressure groups should join in the call for the restoration of all polluted lagoons in Ghana. Offenders who pollute the environment through indiscriminate defecation, dumping of refuse and other industrial waste should be arrested and prosecuted to serve as a deterrent to others.

There is also the need to empower the local residents to lead the crusade for the restoration of the lagoons, thereby making the residents serve with commitment and zeal as local champions. The legislation should be able to ensure the existing local rules and regulations are duly enforced. Government funding is critical.

Proposals for Future Scenario Strategies for Managing Water Resources: A Bottom-Up Approach

A sustainable management plan for the preservation and restoration of the Fosu and Essei Lagoons was proposed. This new proposed plan is based on a bottom-up approach which is integrated into nature and has the local residents at its core. The need for management solution to the factors causing the changing dynamics of the Fosu and the Essei Lagoons is essential (Figure 6). This solution is enshrined in the National Environmental Policy (2014) of Ghana. The intended outcome of the policy is to help the country adapt to changing trends and new development in the management of its environment. Its vision is '*to manage the environment and to sustain society at large*'. The policy takes into account the new paradigm of sustainable development based on integrated and coordinated environmental management and seeks to ensure citizens'

quality of life and their environments. It also aims at ensuring equal access to land and other natural resources, more efficient use of social, cultural, natural resources and public participation and environmental governance.

To ensure an integrated bottom-up approach to coastal lagoon management, decision-makers and experts on aquatic policy should employ approaches such as ecosystem-based management (EBM), integrated coastal zone management (ICZM), community-based management approach (etc) and blend them together.

The blending should take into account local knowledge around which policy formulation and decision-making revolve.

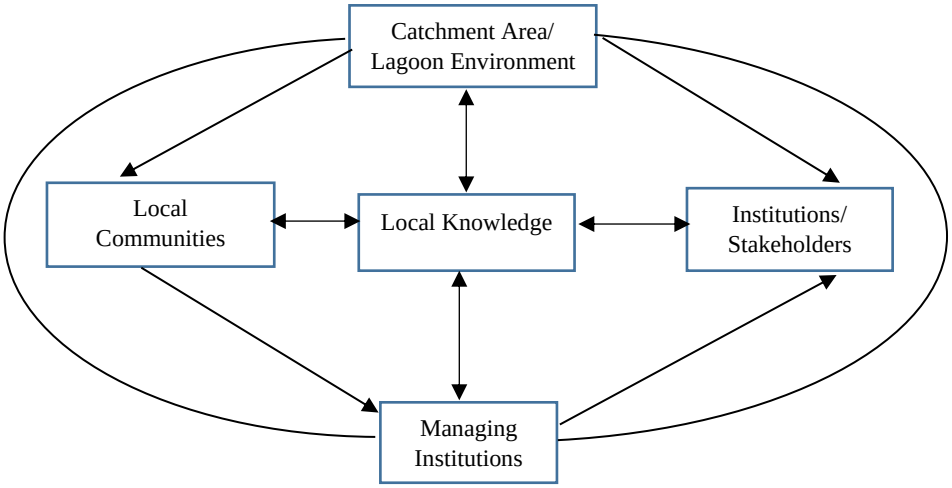

Figure 6: Proposed Bottom-Up Approach to Coastal Lagoon Management

The ownership and management of the Fosu and the Essei Lagoons are not clear and it is problematic in nature. Hence, the incorporation of the local content knowledge, (interests, skills, perceptions, and values of the local people) has been indicated to be low or non-existent in the current management strategies (top-down approach) of the lagoons. It was opined by residents that if they identify with the decisions, they will accept them and enforce its compliance by the various users of the lagoon. This, they reiterated, as building consensus among the various users and interest groups in lagoon management.

The Government of Ghana acknowledges that, in ensuring effective management of the environment and its resources, there is a need to integrate environmental considerations with social, political and economic justice, as reflected in the National Environmental Policy (2014) which states that these principles as the fundamental principles which will be employed by Government to direct actions including decision-making, legislation, regulation and enforcement. The new management approach will take into account the pivotal roles played by local knowledge which is represented by the traditional authorities in most jurisdictions. In this context, the values, interests, aspirations and decision making processes of the residents, who are the first to experience the effects of any environmental injustices, are taken into consideration.

The framework is expected to work taking cognisance of the institutions or stakeholders. By improving planning, implementation, monitoring and evaluations at all levels of the economy are among the processes through which the coastal zone could be managed effectively and sustainably. Due to the multifaceted nature of the coastal zone, there is a need for policies prepared by both local and central governments and other stakeholders taking the beliefs, skills and aspirations of the local people into account.

There is also a need to have a strategy that provides a balanced and long-term strategic management framework for the integrated and ecologically sustainable use of lagoons. There is a need to generate the latest scientific information, combined with community and stakeholder feedback, to develop coastal lagoon management plans that originate from the local people. The primary purpose is to describe what can be done by whom, how and where.

When this is done, it will help other public authorities and communities, in general, to address priority management issues over a defined implementation period. For the institution and stakeholders to effectively work, there is a need for a laid down strategy on how each of the managing institutions is expected to do and at what stage is their mandate supposed to be curtailed.

The following are the strategic arrangements for improving the quality of the lagoons.

- Resettlement of mechanic shops;
- Periodic water parameter analysis;
- Periodic stakeholder meetings;
- Monitoring pressures on coastal ecosystems;
- Evaluating community use of the coastal lagoons; and
- Managing risks to public safety and built assets.

All these activities should be undertaken in consultation with the local communities. This will ensure consensus building and creation of trust among the various stakeholders. The expectation is that stakeholders share ideas and discuss case studies on improving strategic directions. The interaction among these stakeholders should be all-encompassing and roles assigned to each of the stakeholders. By so doing, the diverse groups would understand their schedule and may be able to evaluate themselves appropriately. This will prevent conflict of interest and confrontation in the sense that each group of people knows what is expected of them at the period of evaluation. When this occurs, the local people will feel part of the process and be involved as they participate at each level of the process, thereby encourage ownership and the urge to safeguard the resource.

The local people should be given the opportunity to take an active part in all the deliberations at each level of planning (Figure 7). This is to prevent the perceived intricate conflict between the district assemblies, traditional authorities, NGOs and CBOs, researchers, academics, residents and other users.

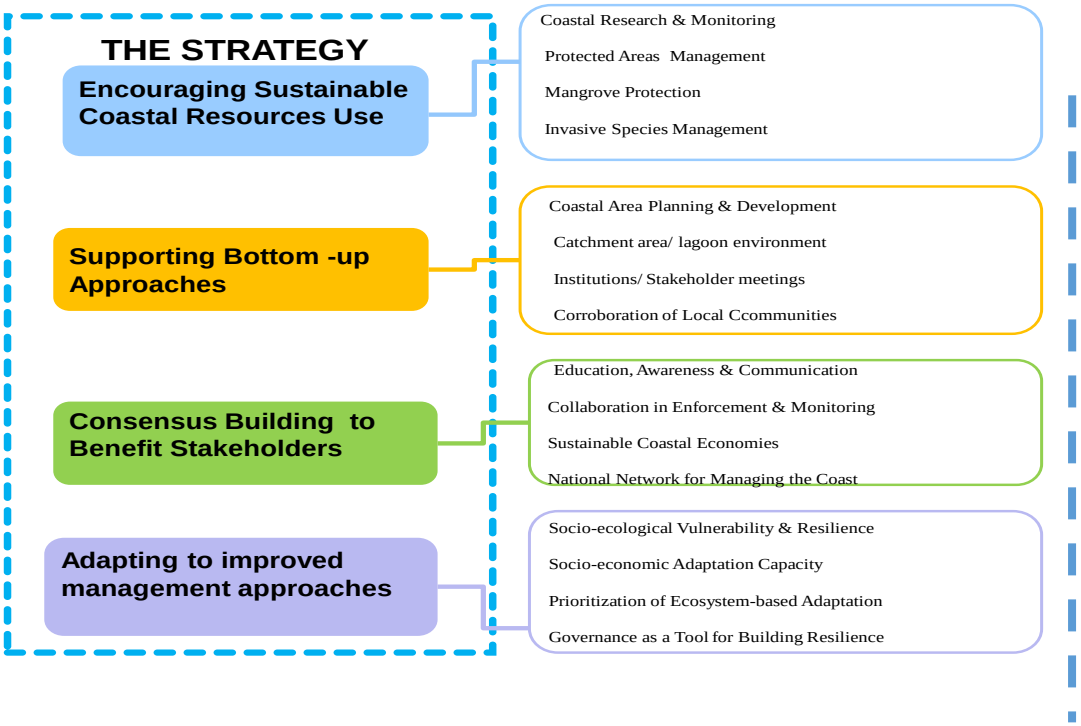

Figure 7: Strategic Plan for Institutions/Stakeholders
Source: Field Data (2019)

Local Communities

Due to the multifaceted nature of the coastal environment, integration among the local communities must be encouraged to stimulate the realisation that the lagoon and its resources are common property and hence should be managed in a coordinated manner. In this regard, the communities along the lagoons and its surrounding areas should have a common goal of sustainably utilising the resource to guarantee something for future generations. Therefore, local communities should play key roles in all aspects of the management process, from planning and identifying common goals to the implementation and monitoring stages. The inclusion of the local community at the various stages is an attempt to stress the value placed on local knowledge, memory and interests. This could be in the form of formation of vigilante/ volunteer groups, employment of locals as guards etc. This will place the local people at the centre of the management process and let them feel like part of the planning and implementation process.

Managing Institutions

At the core of the framework is managing institutions. Ellsworth, Hildebrand and Glover (1997) are of the view that the allocation of responsibilities across various levels of government and sectoral lines severely limit the ability to address coastal zone issues. This is because the approach fails to facilitate the collective management of the coasts. The approach normally focuses on the space with absolute disregard to the people and hence fail to address the cultural, social, economic as well as the environmental needs and aspirations of the people. The notion expressed above reflects the characteristics of most top-down approaches to coastal zone management.

Local people are not involved in the project initiation or planning, implementation, monitoring and evaluation. Top management members have the sole priority to formulate and implement the policies. The proposed framework is in direct contrast to the views expressed above as this framework is expected to give the opportunity to the local people whose livelihoods are dependent on the coastal environment and are made the integral or the centre of attraction in decision making. Ellsworth et al. (1997) are of the opinion that local communities rarely have the power to influence the decisions that affect them; their voices are seldom satisfying for decision-makers.

There is a five-level scale for evaluating public involvement in decision-making:

- *Public information or education effort*: This means the public should be informed of plans that have already been deliberated on. It is the least amount of public involvement with respect to decision making;
- *Requesting for comments from the public*: When the plans are generally already made, with the Government merely seeking affirmation from the public to gauge the possible success of the plans;
- *Public consultation*: It is the commonest practice amongst management approaches where changes or advice from the public is taken into consideration before implementing a preconceived plan;
- *Public advisory committee*: It is an organised group that delivers a more formal type of public consultative advice. They are meant to be representatives of the public; and
- *Multi-stakeholder process (joint planning):* It recognises the rights of all interested parties to be included in the decision-making process. It leads to greater ownership and responsibility for the public as the proposed initiatives involve the public.

The performance of the functions by the local people is the reflection of their role in the management of the coastal zone. When the community members are engaged this way, it leads to greater ownership and responsibility among the public as the proposed initiatives involved them from the beginning to the end. It is at this level that their interests, opinions, knowledge and values are brought on board. The local knowledge is also considered as an important link that can provide feedback between the local scale management and the local environment.

Gunderson and Hollings (2002) consider that local knowledge is the knowledge generated through observations of the local environment. In this context, the local knowledge is expected to rest on the traditional authorities and the stakeholders in the various communities and their roles and involvement should reflect the embodiment of the local people as a whole. Since local communities have the greatest interest in the conservation and sustainable use of coastal resources, they should have incentives, resources and capacity for marine and coastal ecosystem conservation.

There are two main groups of managing institutions, by direct managers or by indirect managers. The direct mangers are the local communities who live within the catchment areas of the lagoons, whilst the centralised managing institutions such as the Wildlife Commission, Water Resources Commission, and District Assemblies etc. form the indirect managers. The Fosu and the Essei Lagoons are not protected by law compared to the Muni lagoon, which is protected by the Ramsar convention. The Essei Lagoon, for instance, is public property and is expected to be managed, protected and held in trust for the people by the district assembly while the Fosu Lagoon is not well defined and may be regarded as mixed tenure between public ownership, customarily owned or stool lands for festive occasions like the annual Fetu Afahye.

The ownership and management of the lagoons are therefore not precisely categorised. With the choice for a bottom-up approach to lagoon management, it is expected that roles are assigned and management and tenure status as well as protection status established for the various lagoons.

The key finding regarding governance and management of the two lagoons was that the interface/relationship between the ownership and management of the Fosu and the Essei Lagoons were problematic; there is a 'missing link' or an over-lap. There were ineffective decision-making processes that seek to connect the interests, knowledge and experiences of all stakeholders (from civil society, the private and public sectors as well as local communities). The incorporation of the local content knowledge (views, ideas, local knowledge, customs, traditions, skills etc) was low or non-existent in the management strategies on the Fosu and Essei Lagoons.

When local people come out to formulate their decisions, they will accept them and enforce the compliance by various users of the lagoons. The existing management plans are not sustainable and effective due to lack of commitment by all parties: the Government and other users of the Fosu and Essei Lagoons.

7.0 GENERIC PROCESS FOR THE BUILDING OF RESILIENCE INTO URBAN WATER GOVERNANCE

This is the next stage for the Working Group

8.0 BIBLIOGRAPHY

Adger, W. N., Hughes, T. P., Folke, C., Carpenter, S., & Rockström, J., (2006). Social-ecological resilience to coastal disasters. *Science* 309 (5737): 1036-1039.

Aheto, D.W., Okyere, I., Mensah, E., Mensah, J., Aheto, S. P. K, & Agyarkwa, E.O. (2010). *Rapid biodiversity assessment on the Essei and Butuah lagoons and the Whin River estuary in the Sekondi-Takoradi Metropolis of the Western Region of Ghana*. Friends of the Nation in Partnership with the Integrated Coastal and Fisheries Governance (ICFG) Initiative in Ghana. Technical Report. Pp. 130.

Appeaning Addo K., Nicholls R. J., Codjoe S. N. A. and Mumuni A. (2018). A biophysical and socio-economic review of the Volta Delta, Ghana. *Journal of Coastal Research*. DOI 10.2112/JCOASTRES-D-17-00129.1. http://www.jcronline.org/doi/abs/10.2112/JCOASTRES-D-17-00129.1?code=cerf-site

Atampugre, G., & Adu-Boahen, K., Eshun,. J. (2016). Trans-boundary-boundary river governance in West Africa: A case of the Volta River. *African Journal of Interdisciplinary Studies*, (9), 25-40.

Batchelor, C. (undated). Water governance literature assessment. IIED

Bates, B. C., Kundzewicz, S. W., & Palutikof, J. P. 2008. Climate change and water. Technical paper of the Intergovernmental Panel on Climate Change. Geneva: IPCC Secretariat. http://library.arcticportal.org/1634/1/climate-change-water-en.pdf

Baumgartner, T., and C. Pahl-Wostl. (2013). UN-Water and its role in global water governance. Ecology and Society 18(3): 3. http://dx.doi.org/10.5751/ES-05564-180303

Benson, M. H., and A. S. Garmestani. 2011. Embracing panarchy, building resilience and integrating adaptive management through a rebirth of the National Environmental Policy Act. *Journal of Environmental Management* 92:1420–1427. http://dx.doi.org/10.1016/j.jenvman.2010.10.011

Berkes, (1989). Common property resources. Ecology and community-based sustainable development. Belhaven Press, London.

Beyene, A. & Luwesi, C.N. (2018). Innovative Water Finance in Africa: A Guide for Water Managers. The Nordic Africa Institute. ISBN 978-91-7106-816-3

Boateng, I. (2006). Institutional Frameworks in the Administration of Coastal and Marine Space in Africa; In, Administering Marine Spaces: International Issues. Frederiksberg: The International Federation of Surveyors (Publication No. 36).

Boateng, I. (2008). Integrating sea-level rise adaptation into planning policies in the coastal zone. Presented at the Federation of International Surveyor WorkingWeek2008:IntegratingGenerations. www.fig.net/pub/fig2008/papers/ts03f/ts03f_03_boateng_2722.pdf

Bonnassieux, A., & Gangneron, F. (2011). Mini-networks of potable water: Between political issues and local arrangements. The case of Djougou town in Benin. [Des mini-réseaux d'eau potable: Entre enjeux politiques et arrangements locaux. Le cas de la commune de Djougou au Bénin]. Mondes En Developpement, 39(3), 77–92.

CIFOR. (2005). Natural Resources, Communities and Climate Change in West Africa: Impacts, Vulnerabilities and Responses. Center for International Forestry Research, Ouagadougou.

de Wit R., Stal L. J., Lomstein, B. A., Herbert, R. A., Van Gemerden, H., Viaroli P., Ceccherelli, V. U., Rodriguez-Valera, F., Bartoli, M., Giordani, G., Azzoni, R., Schaub, B., Welsh, D. T., Donnelly, A., Cifuentes, A., Anton, J., Finster, K., Nielsen, L., B., Underlien Pedersen, A. E., Turi Neubauer, A., Colangelo, M., Heijs, S. K. (2001). Robust: The role of buffering capacities in stabilising coastal lagoon ecosystems. *Continental Shelf Research, 21*: 2021- 2041.

Department of Water Affairs and Forestry (1997). White Paper on a National Water Policy for South Africa [online] Available at www.gov.za (accessed 24.09.2004).

Donkor, S.M.K. & Wolde, Y.E. (1998). Integrated Water Resources Management in Africa: Issues and Options. In Bergkamp and Pirot [Eds.] *Proceedings of a Workshop held at the 2nd International Conference on Wetlands and Development,* (November 1998, Dakar, Senegal).

Ekow F. J. & Adu-Boahen, K., (2016). Coastal environmental injustice in Ghana:the activities of coastal sediment miners in the Elmina, Cape Coast and Moree area. *GeoJournal,* 79(6), Springer. DOI 10.1007/s10708-014-9612-4. ISSN 0343-2521

El Vilaly A. and El Vilaly M.A.S. (2013). Climate Change and Water Resources in West Africa: Transboundary River Basins. https://www.climatelinks.org/resources/climate-change-and-water-resources-west-africa-transboundary-river-basins

Ellsworth, J., Hildebrand, L., & Glover, A. (1997). *Canada's Atlantic coastal action programme*. A community based approach to collective governance. *Ocean and coastal management,* 36,121-142.

Evans, P. (2004). Development as institutional change: the pitfalls of mono-cropping and the potentials of deliberation. Stud. Comp. Int. Dev. 38 (4), 30–52.

Feeny, D., Berkes, F., McCay, B. J., & Acheson, J. M. (1990). The tragedy of the commons. Twenty two years later. *Hum.Ecol*.18, (1): 1-19.

Global Water Partnership (GWP). (2000). Integrated Water Resources Management, GWP Technical Committee Background Paper 4. Stockholm: GWP. https://www.gwp.org/globalassets/global/toolbox/publications/background-papers/04-integrated-water-resources-management-2000-english.pdf

Global Water Partnership (2019). OECD Principles on Water Governance. Retrieved from: https://www.gwp.org/en/GWP-Mediterranean/Knowledge-and-Resources/OECD-Principles-on-Water-Governance/

Gumasi, M. (2004).Rough road to sustainable development. *Africa Renewal*, Vol. 18,

Gunderson, L. & Hollings, C. (2002*). Panarchy: understanding transformation in human and natural systems,* Washington, Island press.

Garmestani, A. S., C. R. Allen, and H. Cabezas. 2009. Panarchy, adaptive management and governance: policy options for building resilience. *Nebraska Law Review* 87:1036–1054.

GARNET International Conference on ''Pathways to Legitimacy''. University of Warwick, 17–19 Sep
Rana, S., & Kelly, L. (2004). The Global Water Partnership. Addressing Challenges of Globalisation: An Independent Evaluation of the World Bank's Approach to Global Programs. Case Study. The World Bank, Operations Evaluation Department, Washington, DC.

Gordon, C., Nukpezah, D., Tweneboah-Lawson, E., Ofori, B. D., Yirenya-Tawiah, D., Pabi, O., Mensah, A. M. (2013). West Africa – Water Resources Vulnerability Using a Multidimensional Approach : Case Study of Volta Basin. In *Climate Vulnerability: Understanding and Addressing Threats to Essential Resources* (pp. 283–309). Elsevier Inc., Academic Press. https://doi.org/10.1016/B978-0-12-384703-4.00518-9

Green, O. O., and C. Perrings. 2013. Institutionalised cooperation and resilience in international water law. *In* C. Allen and A. Garmestani, editors. *Social-Ecological Resilience and Law.* Columbia University Press, New York, New York, USA.

Green, O. O., B. A. Cosens, and A. S. Garmestani. 2013. Resilience in Transboundary Water governance: the Okavango River Basin. *Ecology and Society* **18** (2): 23. http://dx.doi.org/10.5751/ES-05453-180223

Hardin, G. (1968). The tragedy of the commons. Science, Vol. 162 no. 3859 pp. 1243-1248 DOI: 10.1126/science.162.3859.1243.

Huntjens, P., Lebel, L., Pahl-Wostl, C., Camkin, J., Schulze, R., & Kranz, N. (2012). Institutional design propositions for the governance of adaptation to climate change in the water sector. *Global Environmental Change*, *22*(1), 67-81.

Iglesias, A., Garrote, L., Flores, F., & Moneo, M. (2007). Challenges to manage the risk of water scarcity and climate change in the Mediterranean. *Water Resources Management*, *21* (5) 775-788.

Milligan K. (2018). What is 'good' water governance? https://watercentre.org/blog/what-is-good-water-governance/

Lalika, M. C. S., Meire, P., & Ngaga, Y. M. (2015). Exploring watershed conservation and water governance along Pangani river basin, Tanzania. Land Use Policy, 48, 351–361.

Lemos, M. C. and Agrawal, A. (2006). Environmental governance *Annual Review of Environment and Resources* 31 297–325.

Malzbender, D., Goldin, J., Turton, A. and Earle, A. (2005). Traditional water governance and South Africa's "National Water Act" – Tension or cooperation? International Workshop on African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa, 26-28 January 2005, Johannesburg, South Africa. www.nri.org/projects/waterlaw/workshop.htm

Mbonile, M. J. (2005). Migration and intensification of water conflicts in the Pangani basin, Tanzania. Habitat International, 29(1), 41–67.

Melesse, A. M., Abtew, W., & Setegn, S. G. (Eds.). (2014). *Nile River basin: eco-hydrological challenges, climate change and hydro-politics*. Springer Science & Business Media.

Meissner, R., & Jacobs, I. (2016). Theorising complex water governance in Africa: the case of the proposed Epupa Dam on the Kunene River. *International Environmental Agreements: Politics, Law and Economics*, *16*(1), 21-48.

Mirumachi, N., & Van Wyk, E. (2010). Cooperation at different scales: challenges for local and international water resource governance in South Africa. *Geographical Journal*, *176*(1), 25-38.

Msuya, T. S., 2010. Developing integrated institutional framework for sustainable. Watershed management in Pangani River Basin, Tanzania (Thesis for Award of PhD Degree of Sokoine University of Agriculture). Morogoro, Tanzania.

Mukhtarov, F. (2007). Global water governance and the concept of legitimacy. Proceedings of the GRSC National Environmental Policy. (2014). *Ministry of Environment Science and Technology*, Accra, Ghana.

Network of African Science Academies (2014). Grand Challenge of Water Security in Africa

Norman, E. S. and Bakker, K. (2009). Transgressing scales: water governance across the Canada–U.S. borderland *Annals of the Association of American Geographers* 99 99–117.

OECD (2015a). "OECD Principles on Water Governance. http://www.oecd.org/cfe/regional-policy/OECD-Principles-on-Water-Governance.pdf

Oguntunde, P. Friesen, J. van de Giesen, N. and Savenije, H.H.G. (2006). Hydroclimatology of the Volta River Basin in West Africa: Trends and Variability from 1901 to 2002. Physics and Chemistry of the Earth, 31: 1180-1188.

Olagunju, A., Thondhlana, G., Chilima, J. S., Sène-Harper, A., Compaoré, W. R. N., & Ohiozebau, E. (2019). Water governance research in Africa: progress, challenges and an agenda for research and action. *Water International*, *44*(4), 382–407. https://doi.org/10.1080/02508060.2019.1594576

Organisation for Economic Co-operation and Development (2019). Water governance programme. https://www.oecd.org/env/watergovernanceprogramme.htm

Ostrom, E., Dietz, T., Dolsak, N., Stern, P. C., Stonich, S. &. Weber, E. U. (2002). *The drama of the commons*. National Academy Press, Washington, D.C., USA.

Ostrom, E., M. A. Janssen, and J. M. Anderies. 2007. Going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America* 104(39)15176–15178. [online] URL: http://www.pnas.org/content/104/39/15176.full

Özerol, G., Vinke-De Kruijf, J., Brisbois, M. C., Flores, C. C., Deekshit, P., Girard, C. & Schröter, B. (2018). Comparative studies of water governance: A systematic review. *Ecology and Society*, *23* (4). https://doi.org/10.5751/ES-10548-230443

Ragab, R., & Prudhomme, C. (2002). Sw—soil and Water: climate change and water resources management in arid and semi-arid regions: prospective and challenges for the 21st century. Biosystems Engineering 81(1), 3-34.

Rogers, P., & Hall, A. W. (2003). *Effective water governance* (Vol. 7). Stockholm: Global water partnership.

Schulze, R. E. (2011). Approaches towards practical adaptive management options for selected water-related sectors in South Africa in a context of climate change. Water SA, 37(5), 621–646.

Sivakumar, B. (2011). Global climate change and its impacts on water resources planning and management: assessment and challenges. *Stochastic Environmental Research and Risk Assessment*, *25*(4), 583-600.

Soeftestad, L.T. (1996). *Ghana sector work on integrated coastal zone management may 1996 stakeholder workshop process - process documentation.* World Bank, Washington DC.

Sojamo, S. and Larson, E.A. 2012. Investigating food and agribusiness corporations as global water security, management and governance agents: The case of Nestlé, Bunge and Cargill. Water Alternatives 5(3): 619-635.

Spoon, J. (2014). Quantitative, qualitative, and collaborative methods: Approaching indigenous ecological knowledge heterogeneity. Ecology and Society, 19(3), 33.

Steenson, M. (2010). *Integrated coastal zone management* [Online].Available http://en.wikipedia.org/integrated_coatsal_zone_management[Accesed] 05/4/2014

UN (2006). The water for life decade: 2005-2015 and beyond. https:// www.un.org/waterforlifedecade/pdf/WaterforLifeENG.pdf

UN, 2017. Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2017 Revision, Volume I: Comprehensive Tables (ST/ESA/ SER.A/399). United Nations.

UN Environment. (2019). *Global Environment Outlook -GEO-6: Healthy Planet, Healthy People*. (P. Ekins, J. Gupta, & P. Boileau, Eds.). United Kingdom and New York: Cambridge University Press. https://doi.org/10.1017/9781108627146

United Nation Development Programme (2003).*Clean water and sanitation for the poor*. Internet http://www,undp.org

UNDP, (2004), “Water Governance for Poverty Reduction,” UNDP, New York, p.17

UNECA, 2011. Climate change and water resources of Africa: challenges, opportunities and impacts. Working Paper 5. http://repository.uneca.org/bitstream/handle/10855/21058/Bib-20389.pdf?sequence=1

UNECA, AU and AfDB (2002). “The Africa Water Vision 2025”: Equitable and Sustainable Use of Water for Socioeconomic Development. Addis Ababa, Ethiopia. Also under http://www.uneca.org/awich/african%20water%20vision%202025.pdf

UNEP .2010. “Africa Water Atlas”. Division of Early Warnning and Assessment (DEWA). United Nations Environment Programmed (UNEP). Nariobi. Kenya

UN WATER/AFRICA (undated) Africa Water Vision 2025: Equitable and Sustainable Use of Water for Socioeconomic Development

WPP (undated). Water Sector Governance in Africa. https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Vol_1_WATER_SECTOR_GOVERNANCE.pdf

van Koppen, B. & Schreiner, B. (2014). Moving beyond integrated water resource management: developmental water management in South Africa, *International Journal of Water Resources Development*, 30:3, 543-558, DOI: 10.1080/07900627.2014.912111