

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

185,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Communities at the Centre of River Basin Management for Sustainable Development in Northwest Cameroon

Henry Bikwibili Tantoh, Danny Simatele,
Eromose Ebhuoma and Felix Kwabena Donkor

Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/intechopen.74119>

Abstract

Access to a reliable water resource can be a key driver for socio-economic development. Both physical and economic water scarcities are negatively affecting the economies of sub-Saharan African countries, particularly rural communities with the latter considered a crucial challenge. This paper examines the role of local resource users in river basin management for sustainable development in Northwest Cameroon. Using secondary data and empirical evidence collected from three rural districts (Mbengwi, Njinikom, and Ndu) in Northwest Cameroon, it is argued that the involvement and engagement of local resource users and community-based organisations in decision-making processes in river basin management can contribute to sustainable water supplies and enhance sustainable development. In the context of rural communities in the Northwestern part of Cameroon where water supply is mostly through gravity-led techniques, river basins are the main sources of community water supply. It is, therefore, argued in this paper that sustainable development will be possible through a polycentric water governance approach. Thus, clarifying issues of participation, integration, and jurisdiction between the stakeholders (central and local governments and community groups) is crucial for sustainable outcomes. Until the full participation and engagement of local groups and resource users in decision-making processes are achieved, uncertainty will dominate river basin management in Northwest Cameroon.

Keywords: integrated catchment management, community management, water, rural, Cameroon

1. Introduction

Access to reliable clean water is crucial for healthy human communities. The availability of freshwater is a decisive factor in efforts to ensure food production, energy security, and poverty alleviation [1]. However, Africa's environmental and natural resources (NRs) are experiencing increasing pressures from population growths, increasing demands for food, rising urbanisation, climatic variation, and change [2]. In a bid to effectively manage environmental resources, the responsibility for diverse aspects of NR development, utilisation, and management is shared among several government ministerial departments, private actors, and local governances with inadequate coordination structures [1]. This has resulted in serious degradation in part due to patchy sectoral approaches to their governance [3]. The outcome is often ineffective use and derisory protection of valued NRs.

The central question in this field is how to effectively and efficiently manage river basins¹ for sustainable development. The more specific question this paper asks is how to achieve this goal in a context where top-down and centralised approaches to management exclude rural communities who depend on the natural environment for their well-being. Although this pattern of factors may be unique to this case study, several of them are common around the world, and so the paper has broader significance. Resolving all these issues simultaneously may be unlikely, so the paper argues that priority should be given to finding better ways to involve and engage local communities in decision-making processes and that making the roles of national and local governments clear is crucial for effective management and sustainable development² (SD). In other words, the paper explores how different forms of governance might lead to easier water user involvement, resulting in more sustainable river basin management. Unfortunately, changes in human behaviour and the pressure put on the NRs have coincided with significant changes in climatic conditions, further compromising the ability of the natural environment to adequately supply the ecosystem services required for human socio-economic development.

Nyambod and Nazmul [3], writing on water management and poverty alleviation, argue that climate change is projected to worsen recent and impending pressures on water resources (WRs) from rising population and changing land use patterns and increase the incidence and severity of droughts and floods. It has been observed that many sub-Saharan African (SSA) countries are expected to experience the most devastating impacts of these changing climatic conditions due to their geographic location, low incomes, low levels of technological development, fragile institutional capability to adapt to rapid variations in the face of environmental alterations, as well as their greater dependence on climate-sensitive renewable NR sectors such as water, agriculture, and energy [4]. Anyadike [5] argues that SSA countries are predominantly prone to climate variability and change due to the fact that many of them are vulnerable to the increasing desertification of our continent, deteriorating run-off from river basins, impoverishment of soil fertility, reliance on subsistence agriculture and animal husbandry, the

¹This is the land area between the source and the mouth of a river, including all land that drains into the river and provide many functions and uses to humans, other species and the environment [7].

²Sustainable development in the context of this study is development that steadily meets the needs and wants of the populations (constant water supply, conservation the watershed, agricultural practices etc.,) without disregarding the capacity of future generations to meet their own needs.

high incidence of HIV/AIDS and vector-borne diseases, insufficient government mechanisms, and rapid population growth, factors that have the potential to compromise SD.

Existing research recognises the critical role played by water as the centre of socio-economic development [6]. The design and management in river basins are therefore essential aspects in a country's quest for poverty alleviation and SD [7]. River basins are essential for social, economic, and ecological opportunities. They absorb and channel the run-off from rainfall, which, when sensibly managed, can provide fresh drinking water as well as access to food, hydropower, building materials, medicines, and recreational opportunities. In a situation where a river basin crosses a number of countries and communities, the stability might be at stake especially when ineffectively managed [7]. In most countries and communities, the uncertainty of prevalent property rights for *common pool resources (CPRs)*, combined with market failures to secure the value of river basin services, threatens the sustainability of NRs. This has resulted in the complexity and uncertainty of river basin management (RBM) threatening the activities in the watershed and the river basin's health [8]. Given these complexities, governments, development experts, and non-governmental organisations (NGOs) have recognised the necessity to preserve and manage freshwater ecosystems at the basin level in a bid to address the socio-economic, ecological, and capacity challenges SSA countries face in managing their NRs [9]. These, it is felt, would strengthen environmental sustainability, growth, and equity and this will be possible in an integrated approach.

In the context of Cameroon, for example, NRs have been formally managed by highly centralised national institutions and this has resulted in the exclusion of rural communities from the role resource management [10]. They further question the effectiveness of top-down approaches in promoting equitable access to NRs as well as meeting the needs of the population especially those communities in close proximity to them. However, there is now a shift in policy rhetoric towards adopting community-based approaches, for example, in water resource and environmental management in Cameroon they argued. This initiative could practically learn from polycentric governance approaches³, which encourage multiple legitimate centres of decision-making that depend on each other. It is argued that polycentric resource governance seeks to enhance participation by promoting inclusive policymaking from different groups, between and among several centres of authority and scales of governance [11, 12]. This assertion, as observed by Tarko [13], is premised on the basis that the existence of multiple policymaking centres creates conditions for self-governance. However, the success of polycentric water governance will largely depend on the degree of collaboration of the different actors and the changes in the socio-ecological conditions of the community.

Given the difficulties of centralised management systems, in many SSA countries, there is now increased realisation of the importance of good governance as a benchmark for promoting effective and sustainable modes of natural resource management (NRM). A considerable amount of literature has been published on integrated river basin management⁴ (IRBM) as a

³This is a system of management with multiple policymaking centres with interconnecting prerogative, operating under an over-arching system of norms or rules.

⁴This is a management approach that promotes a less wasteful and more equitable and sustainable use of resources within a basin.

promising approach for managing river basins effectively [7, 14]. It is argued, for example, that IRBM will create an environment in which water users with different interests can unanimously arrive at a consensus on the management of their water resources [7, 6]. This approach to river management has been extensively encouraged as a favourable option for managing WRs, although the debate has been clouded due to the lack of serious alternative options for water resource management (WRM) beyond state control [9]. Moreover, the role of rural communities has been distorted because they are often disregarded from important decision-making processes in NRM. This is also the case when state capacity is weak or local groups linger on the margin of support from the government. It is argued that letting local resource users through community-based organisations (CBOs) conceive their own laws may regulate access to the resource, fostering the inclusion of participants who are reliable and excluding irresponsible individuals [9]. Such rules will, in turn, increase and instil confidence among resource users and the management institutions, which is essential for sustainable outcomes [15].

This paper, therefore, explores how local groups and CBOs can effectively contribute to the management of river basins for SD. This paper also argues that river basins will be efficiently managed if CBOs are involved and engaged in decision-making processes coupled with the support of state-level initiatives. This paper starts with an introduction that describes the scenario of environmental resource management, followed by the research approach that was used in the study. The remaining sections explore the concepts and theories of IRBM and CBOs. Finally, the paper examines the potentials of CBO in river basin management for SD in North-west Cameroon. The conclusion highlights the need to involve and engage community groups and CBOs in policymaking processes for sustainable outcomes.

2. Methodological approach

This study is based on empirical data that was collected between November 2015 and January 2016 in three rural districts (*Mbengwi, Njinikom, and Ndu*) in Northwest Cameroon (**Figure 1**). This was done through a *stratified sampling approach*⁵ to illuminate the question under study. From these 3 rural municipalities made up of at least 10 villages each, 2 rural communities were randomly selected using the technique of allocation concealment.⁶ This gave a total of six villages, *Tugi, Zang-Tabi, Baicham, Muloin, Njimkang, and Ngarum* (**Figure 1**), that were used for data collection. Data were collected from four groups within the communities: households, CBOs, NGOs, and government ministerial departments responsible for water and NRM. It was purposely decided to select 10 households from each of the 6 communities giving a total of 60 households using a systematic sampling interval of 5. The purpose was to evaluate their

⁵This is a sampling method that involves the division of population/communities into smaller groups known as strata. The main advantage is that it captures key population characteristics in the sample and produces characteristics in the sample that are proportional to the overall population.

⁶This is a randomised procedure of data collection that ensures that the different groups studied have similar attributes and prevents researchers and participants from guessing and thus influencing upcoming group tasks. The results give a fair representation as it is unbiased.

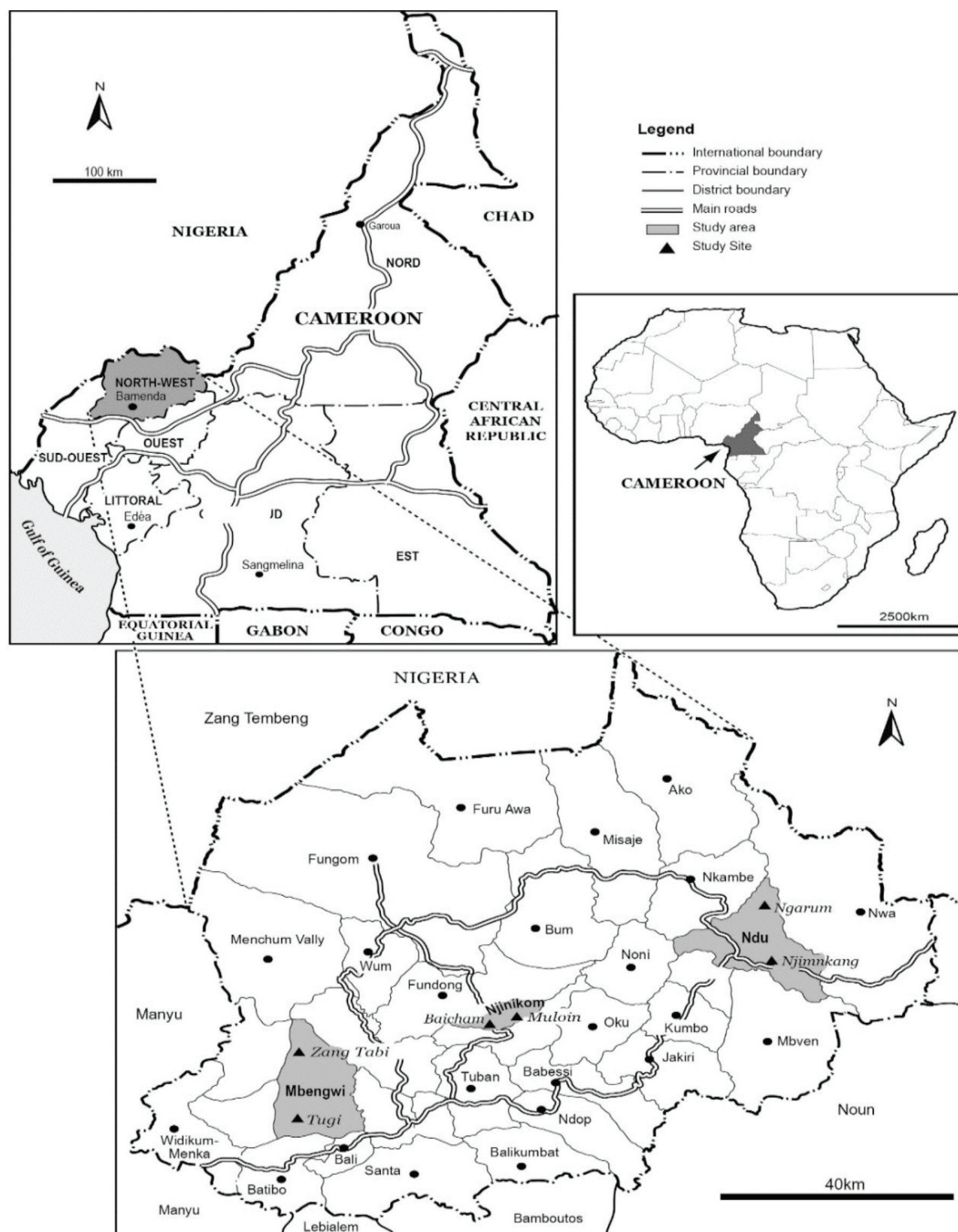


Figure 1. The map of Cameroon and the study sites in Northwest Cameroon. Source: Cartography Unit (2016), School of Geography and Environmental Studies, University of Witwatersrand, South Africa.

participation in community-based management (CBM) initiatives. The first participant in each of the communities was purposely chosen and then the interval of 5 was applied until the required number of 10 was researched.

In-depth interview discussions using semi-structured and open-ended questions were conducted with CBOs, such as informed water and environmental specialists and other stakeholders, from the six villages. Among these include the officials from the Ministry of Energy

and Water Resources (MINEE); the Ministry of Environment and Nature Protection (MINENP); the Ministry of Forestry and Wildlife (MINFOF); the Ministry of Agriculture and Rural Development (MINADER); as well as regional departments operating under these ministries in Northwest Cameroon.

Generally, eight officials from different government ministries and four regional officials were interviewed. Interview conversations with the six members of CBOs were also conducted. Discussions with five community leaders were also carried out to understand the role and extent to which community leaders and community members can participate in NRM concerns. This was possible through a snowball technique. This was followed by participants' observation to know the various activities taking place in and around the watershed. The aim of engaging with diverse actors was to assess the institutional, policy and management structures, as well as management practices that exist in the management of the river basins and other NRs in Northwest Cameroon. To complement the empirical data, a review of existing literature on the governance of NRs, polycentric water governance, and CBM using the rapid appraisal technique was conducted.

3. River basin management: a literature review

Water resources are increasingly under pressure from changes in land and water use patterns, combined with the impacts of climate variability and change [4]. This has been caused by rising population, increasing demands for food, and changes in consumption patterns joined with climate change to put enormous pressure on NRs [16]. Furthermore, these resources have been managed from centralised, top-down systems by state bureaucracies disenfranchising local communities from the management process [10]. As a result, international aid organisations, community development experts, NGOs, and local institutions are now looking for a way to effectively and efficiently manage NRs [14]. Development practitioners and social scientists such as economists, anthropologists, sociologists, and political scientists further offer different perspectives on NRM [17, 9, 10]. Pahl-Wostl et al. [18] argue that a universal approach will possibly lead to effective RBM. Regrettably, many current water governance structures in both developing and industrialised countries are unable to address these challenges, and it is often assumed that a "one size fits all" approach could possibly solve the different inclinations among different groups [9]. However, scientific analyses of RBM have shown that they are limited to individual case studies or comparisons between just a few water basins and cannot be generalised [19]. There is, therefore, a need to redefine the procedure for WRM giving more importance to the needs, priorities, and potentials of different stakeholders, communities, countries, and circumstances.

In the context of SSA, NRs were formally managed through indigenous management systems [20]. With the advent of colonisation by Western nations, the indigenous management systems were replaced with technocratic, centralised management models [21]. This system of management as argued by Ostrom [22] and supported by Amungwa [23] excluded rural communities in the management of NRs. It was thought that only a top-down system of management was capable of limiting locals' demand for NRs, which if unchecked through centralised systems

would ultimately lead to overexploitation and the damage of the resources [11]. After the independence of most African countries, though, rising number of scientific studies questioned the centralist view of NR governance, revealing that several local user groups have effectively self-governed their NRs [22, 24, 20]. There is now a paradigm shift in the way in which CPRs are governed. Community development experts and policy makers now encourage local users through CBOs and therefore advocate for extensive decentralisation of NRM from central to local institutions [25].

In a variety of NR sectors, developing countries have investigated with shifting NR governance responsibilities down from centralised governments to local institutions, thus stimulating the argument about the role of local participation in NRM. It has been argued that local groups of people have lived with and reaped from their resource systems for ages and have fashioned fairly correct rational patterns of how their biophysical system operates [20]. Tantoh and Simatele [10] are of the view that local groups, through CBOs, are more likely to design adaptable rules for local CPR governance than management approaches developed from the North (see also [20]). Governments are increasingly decentralising the management of NRs from central administrations to regional and to local levels [25]. International aid agencies have frequently advocated decentralisation⁷ on the notion that it would bring governance closer to the people and create a range of positive results, including poverty alleviation, ecological sustainability, and SD [17]. Recently, researchers have shown an increased interest in complexity and contradictions of this process, but policy prescriptions and their underlying theoretical models remain overly simplified [26]. Though decentralisation is sometimes represented as a solution for problems of poor NRM, development, and poverty alleviation, the reality is more complex [25]. A number of reforms are being considered as decentralisation, but the results of these reforms are context specific and cannot be universally advocated in every situation [27]. In the forestry sector, for example, decentralisation has been related to better performance but also to ecological degradation, and even when progress in the efficiency of forest management have occurred, matters about fairness persist [28].

Recently, researchers have shown an increased interest in the planning and management of river basins for sustainable outcomes [7]. This is because effective RBM is critical for poverty alleviation and SD, particularly in rural communities in developing countries. It has been argued that the interrelation of diverse water and land uses within a river basin, and their effects on one another calls for integrated management approaches [9]. Faysee [29] is of the opinion that managing a river basin effectively requires the creation of a river basin forum to provide spaces that allow water users and other stakeholders to engage in meaningful dialogue and participate in decision-making processes. This is because different stakeholders have different motivations, needs, and interests and thus a platform that involves representatives of different use sectors (agriculture, domestic use, etc.), as well as upstream and downstream user groups will improve the management of river basins (*coordinated management, conflict resolution, regulation and allocation of water to the different users and uses, etc.*) [30]. This assertion, as argued by [31], is premised on the basis that water platforms provide an

⁷Decentralisation denotes to the delegation of authority from higher to lower level organisations in the administrative ladder, usually from a central government to provincial, regional, district, and sub-district levels.

opportunity for actors with competing interests to meet and seek consensus on issues such as water allocation, negotiation of new rules, and resolution of conflicts. Polycentric forms of governance are clearly set out to consider such a context by establishing a system of rational water distribution and coordination between multiple users and decision makers [19, 12]. Borrini-Feyerabend et al. [20] observe that when NRs are managed at a local scale, for example, rules are needed to resolve disputes between different resource users and communities faster than were previously resolved at higher spatial levels, specifically as ecological conditions change.

In the past two decades, a number of researchers have advanced the concept of polycentric governance, both theoretically and empirically as an effective way to manage river basins [13, 12]. This is evident in the case of Kenya where the drive to polycentric water governance enabled the socio-ecological and institutional interactions through which responsibilities are distributed at the local, regional, and national level and across multiple levels for positive outcomes (*such as regulating water usage and ensuring water availability for downstream users, encouraging local decision-making, and increasing the level of coordination among water users*) [19]. Polycentric water governance as argued by Tarko [13] generates conditions for institutional competition, experimentation, and learning by doing couple with the overlapping of prerogatives that creates the ability to better spread knowledge, provide mutual assistance in cases of emergency, and enhance institutional competition and provide multiple choices to water users without displacing them (see also [17]). In the same vein, Andersson and Ostrom [11] argue that polycentric governance prevents difficulties linked with local tyrannies and inappropriate bias.

Despite the importance and potential of polycentric governance of NRs, many polycentricity scholars argue that results have not always been effective. Orchard and Stringer [12] note that participation is challenging in situations with traditionally top-down and highly ranked institutions, such as Swaziland, where communities and other groups have not traditionally had a substantial input in policymaking. This is indicative of patriarchy. It has also been argued that overlapping jurisdictions in polycentric systems of governance create somewhat redundant institutions [19]. The inability to formulate satisfactory plans to enable and encourage participation of diverse groups within the community from the beginning has restricted the capability of all groups to contribute and share their knowledge during its development [11]. They further argued that procedures for coordination and collaboration between decision centres are crucial features of polycentric regimes.

A stream of recent research has suggested that many policy reforms attempt to restructure contemporary top-down management strategy that often makes the resulting governance structure able to deal with the complexity of resource problems. The principle of IRBM has, therefore, developed to corroborate a framework for coordination, whereby all stakeholders involved in RBM can together develop sensible and satisfactory policies and approaches to watershed management. IRBM, as noted by McNally and Tognett [7], has good intentions, aimed at improving monitoring, allocation, and management of WRs. Even though very little has been done to transform theories into practical, components of integrated approaches are evolving in Uganda, for example, where the government has recognised water as a development

priority and introduced decentralised catchment management plans whilst integrating climate change concerns [32]. An efficient IRBM system will, therefore, require a series of important conditions to be in place such as considerable political will and commitment, meaningful collaboration by several organisations, as well as the existence of national integrated water resource management⁸ (IWRM) strategies, water laws and regulation, adequate budget lines, and sufficient technical and human capacity at national and local levels [9].

McNally and Tognett [7] are of the opinion that IWRM can be effective in some situations, but this requires substantial cooperation and communication among all interest-driven actors, a dynamic participation of CBOs (farmers, pastoralists, etc.). Faysee [29], for example, argues that transboundary basins cover 71% of the total surface area of West Africa; therefore, many countries have very high dependency ratios. Thus, cooperation among the member state through the Senegal River Basin Development Organization (OMVS) comprising Guinea, Mali, Mauritania, and Senegal will stimulate cooperation between member states and coordinate technical studies and activities to develop and regulate the flow of the river to meet the needs (irrigation, navigation, etc.) of the riparian communities in particular. Also, the Lake Chad Basin Commission (Cameroon, Central African Republic, Chad, Libya, Niger, and Nigeria) has an obligation to effectively and equitably manage the Lake Chad conventional basin and promote the integration and preservation of transboundary peace and security in the basin [33]. However, it is difficult to ensure joint management of a river that spans thousands of kilometres, which is shared among many states. This is because the transboundary nature of the rivers does not easily offer itself to joint management arrangements in which each member state can clearly identify significant benefits than those it can obtain by formulating collaboration arrangements at a smaller scale [33]. For an IRBM to be effective, an enabling environment must be realised. However, the responsibility of the central and local government to the IRBM process is lacking [31]. This is because IRBM processes are protracted and time-consuming that often mean IRBM principles are not applied locally [9]. As a result, the extent of IRBM may present substantial technological and institutional difficulties that appear overwhelming for governments and state utilities with limited capacity. Moreover, IRBM processes do not suggest an alternate approach, fit for a more local scale, if these various enabling factors are not present [9]. It can, therefore, be argued that without direct engagement with local groups and CBOs in river basin governance, there is a risk that NRM policies become hypothetical.

In circumstances where the states are considered as unstable and unsupportive, CBM initiatives may be a more realistic and suitable option for engaging local resource users in the management of CPRs [9, 34]. CBM seeks to engage directly with CBOs and the resource user so that they may play an active role in the lifecycle of the project (initiation, realisation, and execution) [15]. The role of CBOs in NRM is a subject that has risen in importance in recent years and it echoes strongly in developing countries where conventional, top-down and prescriptive roles from state bureaucracies for WRM may be unsuitable and many governments are now looking for ways through which they can develop on current management strategies [10]. For many people, CBOs can achieve a vital role in the management of CPRs,

⁸A process that promotes the coordinated management of water, land, and resources connected in order to maximise the socio-economic well-being without jeopardising the sustainability of vital ecosystems

such as water resources and range land. The idea of CBM in RBM is that it offers an opportunity for rural communities to engage in resource management with roles and responsibilities clearly defined alongside those of regulating water authorities. It should, however, be noted that CBM does not attempt to be a direct replacement for national IRBM plans. On the contrary, it provides tangible benefits for CD because it encourages effective use of local resources through monitoring each other's use and in doing so regulating and avoiding misuse [10]. Furthermore, it promotes agencies to engage in hydrological monitoring and to undertake innovative NRM initiatives for sustainable CD [9]. Given the fact that ecosystems are diverse, complex, and uncertain, effective and efficient management of NRs will require considerable capital in obtaining correct data to learn more about patterns of interaction, collaboration, and adapt policies over time that are better fitted to particular systems [20, 35].

4. Water and river basin management in a Cameroonian context

Water is a public good in Cameroon and MINEE is responsible for defining and coordinating the water policies in Cameroon with conventional sectoral approaches in the hands of many ministries and specialised agencies (**Table 1**).

The national policy framework for water in Cameroon follows the 1996 law on the environment⁹ (Law No. 96/12) and the 1998 law on water (No 98/005) [2]. These laws are extensions of colonial legislation through which the current management of NRs follows Western models with top-down management approaches. The basis of the 1998 water law in Cameroon pertains to water regimes that are articulated in five headings: (i) the general disposition and the field of application of the code of water, (ii) protection of water resources, (iii) exploitation of water, (iv) conflicts and sanctions, (v) diverse dispositions, and (vi) conclusion. It must be noted that the laws on the environment and water are the cornerstones of the current legislation on water and the water law is intended to complement the law on the environment and thus the principles contained in the law on the environment also apply to water. The water laws in Cameroon, for example, are aligned to some of the prescriptions of the Dublin Principles; fresh water is a finite and vulnerable resource essential to sustain life, development, and the environment, and water development and management should be based on a participatory approach involving users, planners, and policy makers at all levels and water has an economic value in all its competing uses and should be recognised as an economic good. However, the third Dublin Principle (Women play a central role in the provision, management, and safeguarding of water) has not been spelt out in the 1998 water law [36]. Also, the participation of resource users and CBOs appears to be inadequate in accessing data and providing views in public debates. The role of the CBOs is therefore consultative and appears they cannot unilaterally take decisions without consulting local government authorities.

⁹This is a framework law relative to environmental management, juridical framework, elaboration, coordination and financing environmental policies, national environmental plan, environmental impact studies, and protection of respective milieus.

Organisation	Ministries and Structure	Activities
Executing agencies	Ministry of Environment and Nature Protection (MINEP)	Responsible for the development, planning the management of the environment, and combating pollution and proposes measures for the sustainable management of natural resources.
	Ministry of Water and Energy (MINEE)	Central role in the management and protection of water resources at the institutional level.
	Ministry of Territorial Administration and Decentralisation (MINATD)	Intervenes in the field of water and sanitation through decentralised communities and develops disaster response strategies through the direction of civil protection.
	Ministry of Urban Development and Housing (MINDUH)	Intervenes in sanitation as part of the implementation of the national policy on urban development and housing.
	Ministry of Economy, Planning and Regional Development (MINEPAT)	Responsible for the preparation of general guidelines and development strategies and coordinates the implementation of spatial planning studies.
	Ministry of Domains and Land Affairs	Manages the public and private domains of the state; prepares, implements, and evaluates the land and cadastral policy of the country.
	Ministry of Transport (MINTRANS)	Responsible for the politics of sea transport.
	Ministry of Industry, Mines and Technological Development	Intervenes in environmental problems related to pollution and sanitation inherent in industries.
	Ministry of Finance (MINFI)	Through the direction of the treasury, it intervenes as the Banker of the State for the financing of projects in the Public Investment Budget (BIP).
	Ministry of Agriculture and Rural Development (MINADER)	Responsible for agricultural hydraulics policy in relation to other organisations concerned.
	Ministry of Livestock, Fisheries and Animal Industries (MINEPIA)	Intervenes in the management of water resources through its pastoral hydraulic service.
	Ministry of Economy, Planning and Regional Development (MINEPAT)	Responsible for the preparation of general guidelines and development strategies and coordinates the implementation of spatial planning studies.
	Ministry of Public Health (MINSANTE)	Health surveillance of communities, promotion of environmental health and hygiene, standardisation and regulation of spills in relation to the organisations concerned.
Technical and advisory bodies	Ministry of Commerce (MINCOMMERCE)	Responsible for the politics of commercialisation of water resources.
	National Water Commission (CNE)	It is the steering committee of the project management team for the elaboration of the IWRM plan. It is a consultative body of the government to define and put in place water policy in Cameroon.
	National Environment Committee	Responsible for the impact assessment of development actions on natural resources and to

Organisation	Ministries and Structure	Activities
		raise public awareness for sound environmental management.
Water management & operations organisations	Cameroon Water Utilities Corporation (CAMWATER) & Camerounaise des Eaux (CDE), Energy of Cameroon (ENEO)	CAMWATER/CDE is responsible for the production and commercialisation of the water resource. ENEO supplies hydroelectricity within the country.
Water management & operations organisations	The Urban and Rural Land Development Mission (MAETUR)	Responsible for putting in place water supply and sanitation systems in low-cost housing estates.
	Industrial Zones Development and Management Authority (MAGZI)	Responsible for the creation of industrial zones; these tasks and water and sanitation are limited to the design, construction, and management of secondary structures in industrial areas.
	Cameroon Real Estate Corporation (SIC)	Management of housing areas.
Funding organisations	Ministry of Finance, International aid Organisations, Non-Governmental Organisations	Finance development projects in the domain of water resources.
Research organisations	State universities, higher education institutions with their specialised laboratories, scientific research institutions	These organisations are generally under the supervision of the Ministry of Scientific Research and Innovation and carry out research in the water and sanitation sector.
Non-institutional actors	Non-Governmental Organisations (NGOs) Civil Society Organisations (CSOs), Community Organisations, traditional authorities	They work in the field of water and sanitation. They equally finance projects and provide technical assistance.

Source: [2, 36, 10].

Table 1. National actors involved in water and environmental management in Cameroon.

Cameroon like other developing countries in SSA has as preoccupation to satisfy the population with potable water and sustainably manage the environment with support from the international community. The Cameroon Water Utility Corporation (CAMWATER) and Camerounaise des Eaux (CDE), which took over from the state-owned National Water Company of Cameroon (SNEC) after privatisation, for example, are responsible for providing water supply to urban areas in Cameroon. Given the fact that the current laws have the likelihood of devolving part of the management role of the state to local entities and calls for the participatory approach in management, the supply of potable water to rural communities have been executed by Community-Based Water Management Organisation (CBWMO) with limited financial and technical know-how. This has, however, been enhanced by the Directorate of Water Supply and Hydrology (DWSH) under MINEE that assists rural communities in the realisation of community-based water supply ventures. This is because access to reliable water supply is a major indicator for socio-economic development in Cameroon. This observation, as argued by Fonteh [37] is premised on the basis that the availability of water in sufficient quantity and quality for the protection and promotion of human health; for food, agriculture, and rural livelihoods and well-being; for industrial development; for energy production; and for managing water-related risks is essential for the development and growth of nations. This

drive has been supported by the laws on the environment and water, which make provisions on sustainable management even though they are poorly implemented.

Regarding RBM, Cameroon has two major and two minor catchment areas. The two major catchments are the Adamawa High Plateau and the Western Highlands, which are collectively referred to as the Cameroon Volcanic Line [38]. The country equally has four drainage basins (*Atlantic, Congo, Benue, and Chad*), all fed by rivers from at least two catchment areas. The major catchment areas from which most rural water supply systems in the North western part of Cameroon are sourced as well as the river courses have been considerably modified from several arrays of land use intensification in the river basins and along river courses. Such alterations have upset the steady pattern of flow of most rivers and this has affected socio-economic activities coupled with the effects of draught and climate change in this part of the country. These changing land use patterns (*deforestation, overgrazing, reforestation, urbanisation, etc.*) have greatly modified the drainage basins over time [38]. In the Western Highlands¹⁰ of Cameroon, for example, massive deforestation for agricultural purposes has contributed to increasing seasonality of streams. However, reforestation using mostly eucalyptus, which is a profitable economic activity in the North western part of Cameroon, is an important factor affecting the flow of the headwaters of major rivers [39]. This is because eucalyptus has a deep rooting system, which can penetrate right to the water table and cause evapotranspiration. This has been described as an environmental terrorism [38]. However, the cutting down of eucalyptus along water courses in many parts of the Western Highlands has resulted in the revival of the regular flow of streams.

It has been argued that climatic change is expected to further increase the stress on WRs in many regions [4]. However, efforts to quantify the economic impact of climate-related changes in WRs are hampered by lack of data [5]. Cameroon through her water laws and texts conceived approaches to halt and reverse the effects of environmental degradation in the context of increased national and international efforts to encourage sustainable and environmental development. In contrast, Fonteh [37] argues that the mastery of the water resource has never been taken as major axes of developmental policy, and despite the existence of different strategic documents of the subsectors of water, a proper National Water Policy (NWP) with objectives and well-defined strategic orientations that clearly outlined management principles do not exist. Critical management problems include insufficient legal and institutional frameworks for the protection and regulation of WRs, inadequate information for informed policymaking, (such as the declining flow of rivers and shrinking water bodies-Lake Chad), and insufficient political will [36]. This affects basic needs, food security, ecosystem degradation, energy production, and water for industries and navigation. There is, therefore, the need to increase the speed for realising an IWRM in Cameroon through the prescriptions from international conventions and international NGOs (*World Summit on Sustainable Development, Global Water Partnership, etc.*). This would assist in the management of river basins (Lake Chad) and reduce environmental degradation. A combination of the different stakeholders is seen as

¹⁰ Comprise the Northwest and Western regions of Cameroon of with much of the higher altitude parts of the region are savannah grasslands used by pastoralists, whilst the valleys at lower altitude are densely farmed or forested.

a potential catalyst for tackling water issues and a way of ensuring that various groups including those traditionally excluded from water development, particularly the youths [40].

5. CBOs and river basin management in Northwest Cameroon

Water management for diverse uses (agriculture, hydro energy production, etc.) at the river basin level has been on the national agenda for decades with the objective to promote water-based socio-economic and environmental management and poverty alleviation in specific river basins of the country. It should be noted that some form of RBM has been in practice in the country and in rural communities where they are the main source of water supply. This is because river basins are the main sources of water supply for domestic consumption and agriculture in Cameroon. Among the four river basins (Atlantic, Congo, Benue, and Chad), two are shared with neighbouring countries (Lake Chad and Congo Basins) [38]. In the past, for example, single-purpose water resource planning was the norm, and surface water quantity was the major concern and rural communities used traditional approaches to regulate the management of their NRs. This system of resource governance was, however, replaced by centralised management techniques that placed resource management in the hands of central bureaucracies, excluding rural communities from accessing these resources for their sustenance. Progressively, contemporary development processes and rising human needs have exerted enormous pressure on the natural environment, resulting in unprecedented levels of environmental degradation. However, CD experts are of the view that the involvement of local groups through CBOs in the management of their NRs could lead to sustainable outcomes [20]. Interview conversations with CD experts in MINADER, for example, show that:

“Rural communities have always managed their natural resources for community development. This has been strengthened by technical and managerial support from government departments to ensure sustainable management” (pers. comm, January 2016).

The above discussion emphasizes the importance of development experts and the role of local institutions in the management of their resources. This is because rural communities have better knowledge of local necessities, have access to information about their environment, are more likely to respond to local needs and wants, and are easily held answerable by local populations [20, 34].

Several studies have documented the effects of the economic crisis that Cameroon experienced in the late 1980s and the Structural Adjustments Programme (SAP) in the early 1990s that reduced government expenditure on some of its traditional responsibilities such as the provision of potable water to rural communities and some other basic amenities [41, 42]. Carmody [43] argues that SAPs did not facilitate recovery, but rather accentuated economic decay because of theoretical flaws in the underlying neo-classical economic model, which misinterpreted Africa’s geographic and politico-economic context. This economic downturn was followed by the devaluation of the Franc CFA and the retrenchment of many civil servants leading to hardship and the prevalence of poverty [42]. This increased the exploitation of the

natural environment. Supporting this assertion, Seghezzo [44] emphasized that people cannot be poor and protect the environment for which they can exploit to improve their living conditions. Given the inability of governments to provide basic amenities to the population, the prevalence of poverty and the increasing pressure exerted by the ever-increasing human needs and wants facilitated the rebirth of self-help and CD initiatives, which were practiced before colonialism. It is within this framework that CBM initiatives through Village Development Associations (VDAs) have been encouraged by national governments, CD experts, and NGOs as one of the ways through which rural communities could take control and manage their resources. Interview discussions with the chairs of the Zang-Tabi Water Management Committees (WMCs) revealed that:

“The village development association determine projects that are mostly needed by the community and potable water supply happens to be one of such projects. Residents are thus obliged to contribute both in cash and in-kind in the realisation of community water supply systems and manage the water catchments which are the main source of the water systems” (pers. comm, December 2015).

In the domain of potable water supply, WMCs have been formed to organise, manage, and protect river basins that furnish the water systems (**Figure 2**).

It should be noted that water is supplied to the communities through the gravity-led technique. This has been facilitated by the hilly landscape of Northwest Cameroon. This method of water supply is sustainable, adaptable, and cost-effective. **Figure 2** shows the structure and relations between the stakeholders engaged in WMCs at the local and national level. The initiation of community water projects is done by VDAs. Since water is life for the people and the environment, rural groups are usually very enthusiastic in the CBM initiatives. Before the execution of the project, the municipal council, CD experts, and NGOs assist the community to design a system based on the local environment. They provide technical, institutional, and financial assistance in the realisation of such community water initiatives. For example, rural Northwest Cameroon is mountainous and the gravity-led water supply technique has been greatly encouraged by CD technicians. After the identification of the technique of water supply, a local Board of Water Management is set up to oversee the construction of the water projects. This is followed by the setting up of the WMCs comprising project committee, catchment protection committee, and stand tap/sanitation committee to facilitate the operation of the system. Those elected into these committees are usually nominated by the quarter heads and must be of high moral standings and must have shown interest in CD projects and are subsequently voted by the entire village during annual village development meetings. The WMCs are responsible for collecting water operation and maintenance fees, organising communal labour, and the protecting the water catchments. CBWMOs, therefore, offer a single approach that involves local men and women in designated communities in a joint action to identify, develop, and test new strategies and tools for improving water systems.

Given the fact that water catchments are the sources of community-based water supply systems, the nature of the catchments will determine the sustainability of the water systems. **Table 2** shows the various forms and activities taking place in and around the water catchments, which have an impact on WRs.

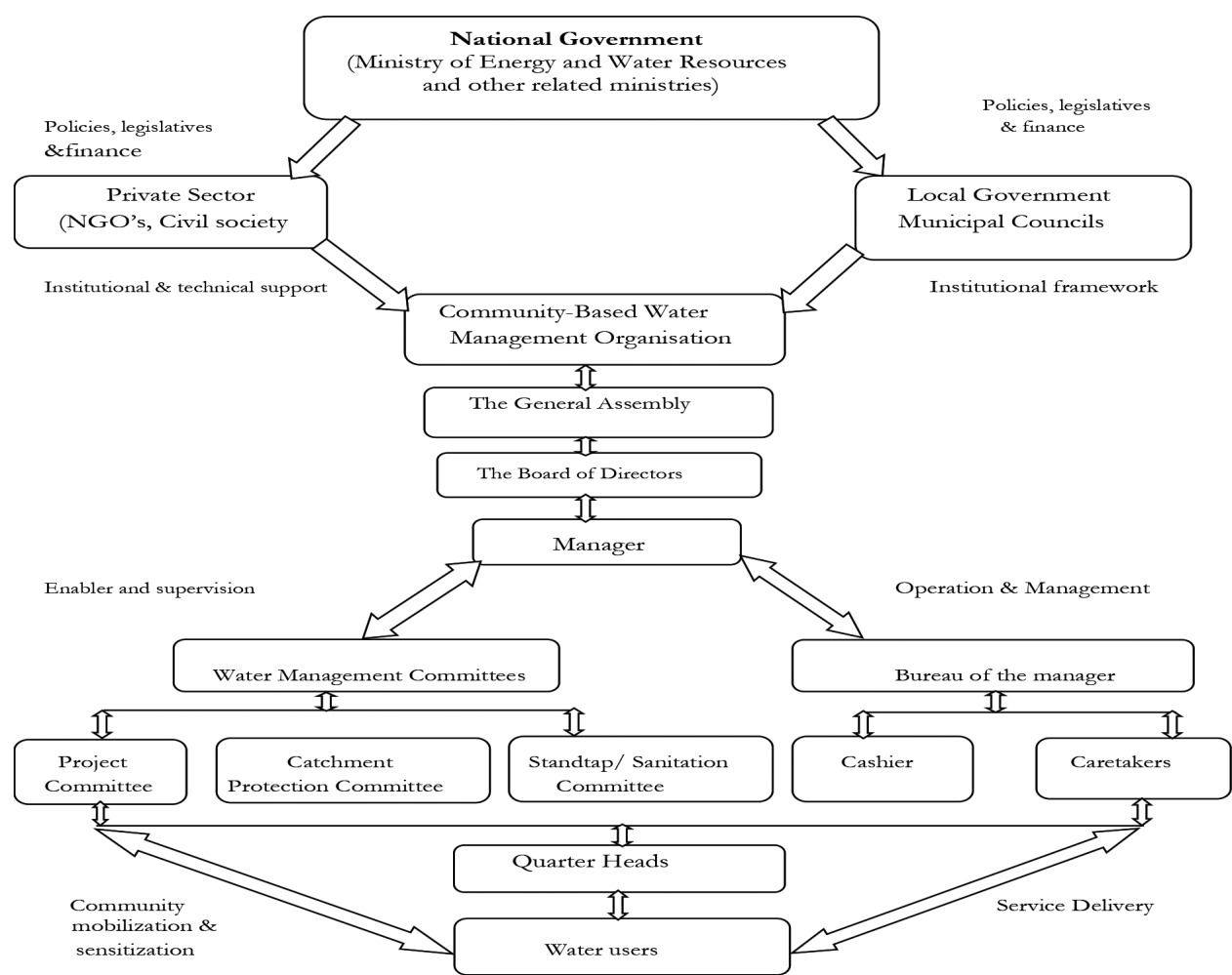


Figure 2. The structure and relationships between local and public actors in water management in rural Northwest Cameroon.

A range of activities take place in and around the catchment. For example, agriculture that is the mainstay of the population occupies 34.4% in Ndu, 34.7% in Njinikom, and 31.8% in Mbengwi. Animal husbandry occupies 45.8% in Ndu, 29.2% in Njinikom, and 25% in Mbengwi, and afforestation with mostly eucalyptus trees make up 39.4% in Ndu, 27.2% in Njinikom, and 33.4% in Mbangwi. The last but not the least is conservatory activities, essential for environmental sustainability, and this makes up 33.3% in Ndu, 33.3% in Njinikom, and 33.3% in Mbengwi (Table 2). Building from the activities taking place in and around the water catchments, it can be argued that all the catchments are poorly managed coupled with the effects of climate change with adverse effects on WRs. If an effective water supply is to be assured, the activities in and around the perimeters of the river basins have to be aptly monitored and managed.

Over time, it became clear that concerns relating to both water quality and quantity, and to groundwater and surface water, should be treated together. A more comprehensive approach to planning and management became known as IWRM. Given the fact that the river basins are the sources of water supply within the communities, the water catchment committees make sure these sources are protected against bushfires and animal encroachment. Furthermore, the growth of eucalyptus trees, which is an economic activity within the communities and thrives

Rural districts	Village	No of watersheds	Nature of the catchments							
			Agriculture		Grazing		Afforestation (<i>eucalyptus trees</i>)		Conservation (<i>bush fires, encroachment</i>)	
			Frequency N = 38	%	Frequency N = 24	%	Frequency N = 33	%	Frequency N = 15	%
Ndu	Ngarum	2	6	15.9	6	25	7	21.2	3	20
	Njimkang	2	7	18.4	5	20.8	6	18.2	2	13.33
Njinikom	Baicham	2	6	15.9	4	16.7	5	15.2	2	13.33
	Muloin	3	7	18.4	3	12.5	4	12	3	20
Mbengwi	Tugi	2	6	15.9	3	12.5	5	15.2	2	13.33
	Zang-Tabi	2	6	15.9	3	12.5	6	18.2	3	20
Total				100		100		100		100

Source: Field work 2016.

Table 2. Household perception regarding the nature of water catchments in Northwest Cameroon.

well around water catchments, has been a major problem [39]. The effects of climatic change have equally been serious especially on river catchments where agriculture and animal husbandry thrive best. This has been exacerbated by rising population, increasing demands for food, and changes in consumption patterns leading to the encroachment of sensitive regions such as water catchments. In view of these challenges, an IRBM approach through a polycentric system of governance whereby all the stakeholders set up different centres of decision-making bodies and the different levels and scales of management is crucial: for example, bringing upstream and downstream users together, farmers, animal grazers, and other interest-driven actors to a platform to discuss and look for sustainable solutions for sustainable socio-economic development. The aim of IRBM is to ensure multifunctional use of a river and its basin for SD.

6. Conclusions

Governance organisations are imperfect responses to the challenge of collective-action problems. Since these imperfections may exist at any level of governance, this paper argues that the involvement and engagement of local groups and resource users in river basin engagement will instil a sense of belonging and proprietorship. The role of local institutions in NRM is a subject that has risen in eminence lately and it echoes powerfully in developing countries in general and SSA countries in particular where conventional approaches for NRM may be inappropriate and many governments are seeking ways in which to improve on current management and governance strategies. The ecosystem approach promotes the integrated management of land and water and connecting resources in a way that achieves mutually compatible conservation and sustainable use and delivers equitable benefits for people and the

environment. This approach strengthens the links between physical, ecological, social, and economic systems to ensure that environmental and economic needs are met and enhanced for long-term purposes [45]. For this to be effective, sustained, water resource policies must mesh with overall national economic policy and related national sectoral policies. Thus, a well-tailored water legislation will create a framework for such integrated management that determines the manner that socio-economic dynamics relate to WRs, providing the context for private, public, community, and individual water activities [46]. An inclusive water legislation (*involving and engaging local groups in decision-making processes*) especially provides a structure for both conservation and SD targets and can spur efficient options in water protection. It should be noted that policies, legislation, the establishment of governing bodies at various levels, and knowledge management are all part of ensuring that the objectives of IRBM are met. Addressing the growing challenges associated with WRM will require bold and difficult changes to existing institutions and policies governing water resources. The establishment of a proper enabling environment that ensures the rights of users and provides the appropriate level of protection of river basins will go a long way to improve and ensure effective IRBM and SD.

Acknowledgements

The financial assistance of the National Institute for the Humanities and Social Sciences-Council for the Development of Social Science research in Africa (NIHSS-CODESRIA) towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at are those of the authors' and are not necessarily to be attributed to the NIHSS-CODESRIA.

We also acknowledge the Short Term Doctoral Student Internship Grant (FRC-2017) from the Faculty of Science, University of the Witwatersrand.

Author details

Henry Bikwibili Tantoh^{1*}, Danny Simatele¹, Eromose Ebhuoma² and Felix Kwabena Donkor³

*Address all correspondence to: bikwibilith@gmail.com

1 Department of Geography and Environmental Studies, School of Geography, Archaeology and Environmental Studies, Center in Water Research and Development (CiWaRD), University of the Witwatersrand, Johannesburg, South Africa

2 Department of Geography and Environmental Studies, School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, Johannesburg, South Africa

3 School of Animal, Plant and Environmental Sciences, University of the Witwatersrand, WITS, South Africa

References

- [1] Mapedza E, Tafesse T. Opportunities for expanding the benefits from cooperative transboundary water governance in the Nile Basin: Benefits beyond physical water quantities. In: *Nature & Faune – Managing Africa’s Water Resources: Integrating Sustainable Use of Land, Forests and Fisheries*. Vol. 27. Issue. 1. Accra: FAO Regional Office for Africa; 2012. pp. 14-18
- [2] Guy-Romain et al. Objectifs du Millenaire pour Le Developpement en Afrique: Cas du Cameroun. 2006;7:1-9
- [3] Nyambod EM, Nazmul H. Integrated water resources management and poverty eradication-policy analysis of Bangladesh and Cameroon. *Journal of Water Resource and Protection*. 2010;2(3):191
- [4] Eboh E. Introduction. Debating Policy Options for National Development. Implications of Climate Change for Economic Growth and Sustainable Development In Nigeria. 2009
- [5] Anyadike RNC. Climate change and sustainable development in Nigeria: Conceptual and empirical issues. Debating Policy Options for National Development; Enugu Forum Policy Paper 10. Enugu, Nigeria: African Institute for Applied Economics (AIAE); Enugu, Nigeria. 2009
- [6] United Nations Development Programme. Water Governance for Poverty Reduction. New York: Water Governance Programme Bureau for Development Policy UNDP; 2004. p. 93
- [7] McNally R, Tognett S. Tackling poverty and promoting sustainable development: Key lessons for integrated river basin management. A WWF Discussion Paper. United Kingdom-Surrey: WWF; 2002
- [8] Dell’Angelo J, Mccord PF, Gower D, Carpenter S, Caylor KK, Evans TP. Community water governance on Mount Kenya: An assessment based on ostrom’s design principles of natural resource management. *Mountain Research and Development*. 2016;36(1):102-115
- [9] Bunclark D, Carter L, Casey R, St John Day V, Guthrie. Managing Water Locally: An Essential Dimension of Community Water Development, A Joint pu. Westminster London: SW1P 2BP: The Institution of Civil Engineers, Oxfam GB and WaterAid; 2011
- [10] Tantoh HB, Simatele D. Community-based water resource management in North-west Cameroon: The role of potable water supply in community development. *South African Geographical Journal*. 2017 May;99(2):166-183
- [11] Andersson KP, Ostrom ÆE. Analyzing decentralized resource regimes from a polycentric perspective. *Policy Sciences*. 2008;41:71-93
- [12] Orchard SE, Stringer LC. Challenges to polycentric governance of an international development project tackling land degradation in Swaziland. *Ambio*. 2016;45(7):796-807

- [13] Tarko V. Polycentricity and the meaning of self-governance: The role of the calculus of consent in Elinor Ostrom's 'Design Principles. *Work*. Ostrom Work. 2014;**5**(c):36
- [14] Swatuk LA, Motsholapheko MR, Mazvimavi D. A political ecology of development in the Boteti River region of Botswana: Locating a place for sport. *Third World Quarterly*. 2011; **32**(3):453-475
- [15] Musavengane R, Simatele D. Significance of social capital in collaborative management of natural resources in Sub-Saharan African rural communities: A qualitative meta-analysis. *South African Geographical Journal*. 2016;**62****45**(October):1-16
- [16] Khanal PR, Santini G, Merrey D. *FAO: Water and the Rural Poor*. Bangkok: Food and Agriculture Organization of The United Nations Regional Office for Asia and The Pacific; 2014
- [17] Rihoy E, Maguranyanga B. Devolution and democratisation of natural resource management in southern Africa: A comparative analysis of CBNRM policy processes in Botswana and Zimbabwe. *CASS-PLAAS CBNRM Occasional Paper*. 2007;**18**:1-62
- [18] Pahl-Wostl C, Lebel L, Knieper C, Nikitina E. From applying panaceas to mastering complexity: Toward adaptive water governance in river basins. *Environmental Science & Policy*. 2012;**23**:24-34
- [19] McCord P, Dell'Angelo J, Baldwin E, Evans T. Polycentric transformation in Kenyan water governance: A dynamic analysis of institutional and social-ecological change. *Policy Studies Journal*. June 2016;**36**(1):102-115
- [20] Borrini-Feyerabend G, Kothari A, Oviedo G. *Indigenous and Local Communities and Protected Areas*, Number 11. 2004
- [21] Roe D, Nelson F, Sandbrook C, editors. *Community Management of Natural Resources in Africa: Impacts, Experiences and Future Directions*. London: International Institute for Environment and Development; 2009
- [22] Ostrom E. *Governing the Commons*. Cambridge University Press; 1990
- [23] Amungwa FA. The evolution of conflicts related to natural resource management in Cameroon. *Journal of Human Ecology*. 2011;**35**(1):53-60
- [24] Njoh AJ. The role of community participation in public works projects in LDCs: The case of the Bonadikombo, Limbe (Cameroon) self-help water supply project. *International Development. Review*. 2003;**25**:85-103
- [25] Ribot JC, Agrawal A, Larson AM. Recentralizing while decentralizing: How national governments reappropriate forest resources. *World Development*. 2006;**34**(11):1864-1886
- [26] Bartley T, Andersson K, Jagger P, Van Laerhoven F. The contribution of institutional theories to explaining decentralization of natural resource governance. *Society and Natural Resources*. 2008;**21**:160-174

- [27] Nuesiri EO. Monetary and non-monetary benefits from the Bimbia-Bonadikombo community forest, Cameroon: Policy implications relevant for carbon emissions reduction programmes. *Community Development Journal*. 2015;50(4):661-676
- [28] Andersson KP, Gibson CC. Decentralization reforms: Help or hindrance to forest conservation? Report Presented at the Conference of the International Association for the Study of Common Property (IASCP) in Oaxaca, Mexico; August 9-13, 2004. 24 pp
- [29] Fayse N. Troubles on the way: An analysis of the challenges faced by multi-stakeholder platforms. *Natural Resources Forum*. 2006;30(3):219-229
- [30] OECD, OECD Studies on Water Stakeholder Engagement for Inclusive Water Governance. 2015
- [31] Swatuk LA. A political economy of water in southern Africa. *Water Alternatives Journal*. 2008;1(1):24-47
- [32] Ministry of Environment and Water. Water and Environment Sector Performance Report. Minist. Water Environ. 2016 October. 290 pp
- [33] World Bank/French Development Agency (AFD). Lake Chad Development and Climate Resilience Action Plan. 2015
- [34] Njoh A. Citizen-controlled water supply systems: Lessons from Bonadikombo, Limbe, Cameroon. In: Balanyá B, Brennan B, Hoedeman O, Kishimoto S, Terhorst P, editors. *Reclaiming Public Water: Achievements, Struggles and Visions from around the World*. Transnational Institute (TNI) & Corporate Europe Observatory (CEO); 2012. 281 p
- [35] Ostrom E. A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America*. 2007;104(39):15181-15187
- [36] Ako AA, Eyong GET, Nkeng GE. Water resources management and integrated water resources management (IWRM) in Cameroon. *Water Resources Management*. 2010;24(5):871-888
- [37] Fonteh M. Water for people and the environment: Cameroon water development report. Background Report. Addis Ababa: Economic Commission for Africa; 2003
- [38] Molua EL, Lambi CM. Climate, hydrology and water resources in Cameroon. *Cent. Environ. Econ. Policy Africa (CEEPA)*. South Africa: Univ. Pretoria; 2006
- [39] Tantoh HB. Problematic of governance in the sustainable management of community projects: The case of potable water supply in Bambili [Masters thesis]. University of Dschang-Cameroon; 2011. p. 171
- [40] Donkor FK, Tantoh HB, Ebhuoma E. "Social learning as vehicles for catalysing youths." *CODESRIA Bulletin*, No. 3, 2017 Page 18
- [41] Fonchingong CC, Fonjong LN. The concept of self-reliance in community development initiatives in the Cameroon grassfields. *GeoJournal*. 2003;57(1):3-13

- [42] Baye MF. Non-parametric estimates of poverty lines: Measuring rural-urban contributions to poverty changes in Cameroon, paper presented in the CSAE Conference on Growth, Poverty Reduction and Human Development in Africa, Oxford 21-22 March 2004
- [43] Carmody P. Globalization in Africa: Recolonization or Renaissance? 2010. p. 196
- [44] Seghezze L. The five dimensions of sustainability. *Environmental Politics*. 2009;**18**(4):539-556
- [45] Mooney HA, Cropper A, Reid W. The UN millennium ecosystem assessment. *Trends in Ecology & Evolution*. 2004;**19**(5):221-224
- [46] UNW-DPAC. Integrated Water Resources Management Reader: UN-Water Decade Programme on Advocacy and Communication (UNW-DPAC). United Nations Off. to Support Int. Decad. Action "Water Life" 2005-2015. 2015. p. 8