The Evolution of Access to Drinking Water and Sanitation Coverage in Urban Centers of Selected African Countries

Saidou Baba Oumar

Devi Datt Tewari

School of Accounting, Economics and Finance
University of KwaZulu-Natal, Durban, South Africa
E-mail: saidoubo@gmail.com or devitewari@yahoo.com

Doi:10.5901/mjss.2013.v4n6p747

Abstract

The lack of adequate provision of drinking water and sanitation coverage is one of the major challenges facing humanity in the 21st century. Natural constraints, demographic pressures and managerial deficiencies such as sporadic precipitations, population explosion, rapid urbanization, and poor management of available resources were respectively main contributing factors to this undesirable situation across the globe. Taking these factors into consideration, this study found that urban centers of countries with abundant physical water supplies but poor water policy like Cameroon and Nigeria achieved low levels of access to drinking water and improved sanitation coverage compared to urban areas of countries endowed with limited water resources but sound water policy like Egypt and South Africa. Hence, it recommends the development of good water policy in countries that are fortunate to have copious amount of water resources.

Key words: *Water management, water vulnerability, drinking water, sanitation, urban center, Africa*
JEL Codes: O55, Q25

1. Introduction

The migration of people from rural to urban areas in the search of "greener pasture" and "cleaner jobs" has become a double edge sword to developing economies. The rural-urban migration inflicts serious demographic, social and economic consequences to both the exit and destination points of migrants. On the exit point of migrants, the phenomenon depopulates rural areas, deprives the agricultural sector of its productive labour force and lowers the family subsistence level of output. On their destination spot, it creates congestion, increases the rate of urban unemployment, amplifies crime rate and increases the need for extension and creation of more drinking water supply points, sewage facilities as well as improved sanitation coverage. The emergence of additional demands for public utilities in the urban centers confronts municipalities to severe managerial crisis as the access of residents to drinking water and sanitation coverage becomes limited across time.

Three techniques of managing the problems of drinking water shortages and limited sanitation coverage can be identified across time. Until 1980s the supply side technique was in vogue and offered solutions by putting in place more water supply infrastructures to satisfy the demand for drinking water of people. The increase in population over time limited the ability of the supply technique in addressing the problems of water and sanitation management, hence the shift to the demand side technique between 1980 and 2006. The demand side technique applied pricing system and moral suasion to regulate the water consumption behavior of users. Unfortunately, the demand side technique also failed the test of time and in 2007 the search for a better option to managing the problems of inadequate drinking water and sanitation coverage provisioning ushered the soft path technique. Table 1 gives a recapitulation of these techniques.

Table 1: Water management techniques

Technique	Working tool	Target
Supply	Dams, taps, boreholes, wells	Meet growing population demand
Demand	Pricing, persuasion	Preserve resource and save money
Soft path	Alternatives for execution of tasks done by water	Hit socio-politico-economic, ecological needs

Source: Compiled from Brandes and Brooks (2007)

A scrutiny of the three approaches reveals salient features. The supply management technique focuses on how to meet estimated water demands from current trends of water use and population growth; while the demand management approach seeks to condense needs for water use to preserve the resource and save money. However with the soft path approach, emphasis is put on the creation of alternatives for executing coverage that are currently provided by water without undermining the need for economic, social, political and ecological sustainability rather than the construction and maintenance of water supply infrastructures or the persuasion of users to moderate their water consumption levels (Brandes and Brooks, 2007). For example in Canada, an investigation of the future urban water consumption planning to make the district of British Columbia (BC) shun from looking for new water supplies until 2050 used the water soft path technique and suggested that its implementation in the community could reduce the pressure on available water resources and procure a global water savings of 30 million m^3 per year or 44 percent savings compared to 2005 use levels. With this approach, the BC urban community could achieve roughly 7 million m^3 level of water savings by 2050 compared to 2005 (Brandes and Maas, 2007).

Water management experiences in cities in selected countries of the American continent are very different. A brief discussion of a few is presented in Table 2. Although addressing the problems of drinking water and sanitation coverage of cities separately was in fashion across the world, the strategy proved to be fruitless in the city of Saõ Paulo in Brazil where the conditions of living for people continued to deteriorate on daily basis. To remedy the situation, therefore, there was the need for a partnership between the various sectors operating in the city for the realization of the common objective of fashioning a decent urban ecosystem through sacrifices either in kind or in cash (Braga et al., 2006). Conversely in the city of Mexico; only 10 percent of waste water was taken care of. The remaining 90 percent was untreated and diverted out of the basin of Mexico through a wide drainage network (Mays, 2007), whilst in the case of Albuquerque city in the state of New Mexico, United States (US), peak summer residential demands for water were nearly three times higher than winter minimum demand between 1980 and 2001 due to outdoor water use for landscaping and cooling systems. Besides, 49 percent of annual total residential demand occurred during the four summer months of June to September and prior to the implementation of a water conservation scheme in early 1990s, the per capita residential demand for water averaged 705 liters per day in the city. Luckily, with the enforcement of water conservation scheme, the per capita residential demand for water declined to 549 liters per day in late 1990s or 28 percent of the reduction in the summer residential water consumption (Gutzler and Nims, 2005).

Also in the city of Cochabamba in Bolivia, the government failed to regulate the private sector's participation in urban water supply due financial strains. Since 1967, *Société d'Economie Mixte et d'Aménagement de Paris* (SEMAPA) – the public water company responsible for the provision of water and sanitation coverage to the city, distributed water to only 57 percent of the population after 30 years of operation. The remaining 43 percent of the population counted on wells or private vendors for their supplies. Furthermore, about 50 percent losses in water were unaccounted because of leakages. The failures registered by SEMAPA informed the award of a 40-year contract in September 1999 to Aguas del Tunari (AdT) to supply water and sanitation coverage to the city. Unfortunately after the award of the contract, water tariffs in Cochabamba averagely increased by 35 percent in January 2000. Consequently, small and lower-income consumer paid less than 10 percent increase in their water tariffs but higher-income consumers experienced more than 106 percent water rate increase per cubic meter under the increasing block tariff (IBT) structure. The construction of a 120 meter (m) dam worth US$214 million to normalise the 6.6 m^3 per second flow of raw water was the long-term solution to the problem of provisioning drinking water to five municipalities in the Cochabamba valley. However, no positive development could be recorded as the crux of the matter pertained to the ability of putting a successful

regulation of public utilities to avail information about tariff increases to the general public subject to achievement of tangible results in service delivery (Nickson and Vargas, 2002).

Table 2: Water management experiences in cities in selected countries of the American continent

City	Country	Situation on ground	Outcome	Sources
Saõ Paulo	Brazil	Partnership between sectors	Fashioning a decent urban ecosystem	Braga et al., 2006
Mexico	Mexico	90 percent waste water untreated	Diversion of water to the basin of Mexico	Mays, 2007
Albuquerque	New Mexico, US	Implementation of water conservation scheme in early 1990s	Reduction of per capita water consumption per day from 705 liters to 549 liters in late 1990s	Gutzler and Nims, 2005
Cochabamba	Bolivia	50 percent losses of water unaccounted for due to leakages, award of a 40-year contract to Aguas del Tunari in September 1999 for supply of water and sanitation coverage	Average increase of 35 percent in water tariffs in January 2000	Nickson and Vargas, 2002

Finally, in the city of Dar es Salaam in Tanzania or Ouagadougou in Burkina-Faso, below 30 percent of households had pipe-borne water connection in their compounds (United Nations Development Program [UNDP], 2006). Moreover, residents of Dar es Salaam city confronted gross water supply deficits where 30 to 40 percent of water was daily lost to nature due to defective taps, broken pipes or lack of metering devices. And to enhance current water problems in the city, colossal amounts of money were needed to increase water delivery of the Mwanza municipal water project from 800 thousands liters to 2 million liters per hour and rehabilitate the sewage system of the city (Gondwe, 1990).
A global assessment of the state of improved access to drinking water and sanitation coverage indicated that with 62 percent and 60 percent to early 1990s, respectively, Africa lagged behind the rest of the world. As regards private connections for water; only 2 to7 out of 100 people had private pipe-borne water connections in urban centers on the continent, owing to the predominance of the state-owned utilities in the supply of public goods (World Health Organization/United Nations International Children's Emergency Fund [UNICEF/WHO]; UNDP and Water Utility Partnership as cited in United Nations Economic and Cultural Agency [UNECA], 2005:14). In this regard, the urban centers from Africa needed about 6000 to 8000 new connections every day to raise the number of people having pipe-borne water by 80 percent to meet the development goal of halving the needy people by the year 2015 (WHO as cited in Jerome, 2004:14). Table 3 summarises the discussion on the share of private water connections in selected African urban centers.

Table 3: Share of private water connections in selected urban centers of Africa

Urban center	Percentage of private connection	Sources
Dar es Salaam, Tanzania	Below 30	UNDP, 2006
Ouagadougou, Burkina-Faso	Between 30 and 40	Gondwe, 1990
African continent	Between 2 and 7 out of 100 people	UNDP and Water Utility Partnership as cited in UNECA, 2005

Literature on enhanced access to drinking water and proper sanitation coverage indicates that most studies provided ample facts on the situation at global, continental and isolated country levels but only a few among them focused

attention on the state of affairs in urban centers of several countries at once. This study, therefore, seeks to enlarge the literature on urban supply of water and sanitation coverage. Thus, the primary objective of this study is to examine the evolution for better access to drinking water and sanitation coverage in urban centers of four selected African countries.

Specifically, the study aims at:

- documenting information on selected socio-economic indicators of the concerned countries;
- examining water resources endowment and vulnerability status of the concerned countries and cities;
- analysing the access to drinking water and sanitation coverage in urban centers of the selected countries;
- discussing the achievements and obstacles of the millennium development goals in the selected countries;
- drawing policy lessons beyond the scope of the millennium development goal.

The remaining of the study is organised as follows. Section 2 examines the materials and methods of analysis. Section 3 discusses the socio-economic indicators of the concerned countries and cities. The analysis of water resources endowment and vulnerability status of countries is covered in section 4. Section 5 discusses the pattern of access to better water and sanitation coverage of the urban centers. Section 6 appraises achievements and obstacles of the millennium development goals, while section 7 concludes the study and draws policy lessons beyond the targets of the millennium development goals.

2. Materials and methods

Africa is endowed with both human and natural resources but these are harnessed differently to meet the basic requirements of human existence. In some African countries, the minimum survival requirements are met in spite of the relative scarcity of natural resources, especially water; whilst in others despite the relative abundance of water people are thirsty and live in poor sanitary conditions. To better understand the prevailing situation across the continent, four countries with dissimilar characteristics were chosen to chart the accessibility of people to drinking water and improved sanitation coverage in urban centers spanning 1990 to 2020 using a-five year interval between the years.

The choice of urban centers and countries as well as the time frame for the study was informed by specific parameters. The urban centers were selected because they are fast growing attraction pools of mankind across the African continent compared to rural areas. The annual rate of urbanization of 4.02 percent on the continent was almost two times greater than the 2.10 percent for Latin America and the Caribbean and 2.05 percent for Asia (WHO/UNICEF, 2000). Thus, in central Africa Cameroon was chosen, in northern Africa Egypt was picked, in western Africa Nigeria was considered and in southern Africa South Africa was considered. The selection of the countries was influenced by their status of economic leaders in their respective regional economic unions of Central African Monetary and Economic Community (CEMAC) for Cameroon, Maghreb Union (MU) for Egypt, Economic Organisation of West African States (ECOWAS) for Nigeria and Southern African Development Community (SADC) for South Africa (SA). A summary of the selected countries, cities and economic regions is given in Table 4.

Table 4: Summary of selected countries, cities and economic region

Country	City	Economic region
Cameroon	Douala	CEMAC
Egypt	Cairo	MU
Nigeria	Lagos	ECOWAS
South Africa	Johannesburg	SADC

Source: Authors' compilation

Other parameters that guided the selection of countries include their possession of contrasting water resource endowments, water vulnerability status as well as water availability scenarios. However, the study mainly placed emphasis on the years 1990, 2000, 2015 and 2020 for the following reasons. The year 1990 was the base year of the agenda for the millennium development goals (MDGs), 2000 marked the beginning of the 21st century which might have instilled change in attitude and moods of people around the globe, 2015 was the target date for the achievement of

MDGs, while 2020 is a prospective year chosen for assessing the outcome achieved after the target year of the programme. Consequently, a comparison of socio-economic indicators, water resource endowments and vulnerability status, accessibility to drinking water and improved sanitation coverage of selected countries as well as their level of achievement vis à vis the MDGs stands to offer a classification of the countries and lessons to learn for improvement in the provisioning and delivery of drinking water and enhanced sanitation coverage. Yet, the study depended solely on secondary data drawn from international organizations such as United Nations (UN), Food and Agriculture Organisation (FAO), UNICEF and World Bank.

3. Socio-Economic Indicators of Selected Countries and Cities in Africa

Table 5 presents the population estimates of the selected countries for the period 1990-2020. In 1990 and 2000 Cameroon had respective population estimate of 12 and 16 million inhabitants, projected to be 22.50 million in 2015 and 25.50 million to the horizon 2020. Egypt counted 58 million inhabitants in 1990 and 70 million people in 2000. Based on a high rate of births the population of the country is expected to reach 92 million people in 2015 and 99 million residents in 2020. Nigeria counted 97 million people in 1990 and 125 million inhabitants ten years later. Given the high rate of immigration into the country, the population estimate of the country is anticipated to attain 179 million residents in 2015 and 203 million people in 2020. Last but not least, the population of SA stood at 37 million inhabitants in 1990 and 45 million people at the eve of the 21st century and is likely to reach 52 million people in 2015 and 53 million inhabitants in 2020. Thus, it can be observed that over the period of 30 years; the size of the population increases by at least 100 percent in Cameroon and Nigeria, while in Egypt and SA it increases by 67 percent and 43 percent, respectively. SA registers the lowest rate of population increase over the period of review owing to the practice of family planning by at least 90 percent of urban families on one hand and the widespread of deaths from assaults and HIV/AIDS in the country on the other hand.

Table 5: Population estimates (million people) of selected countries, 1990-2020

Country	Period						
	1990	1995	2000	2005	2010	2015	2020
Cameroon	12.233	14.540	15.865	17.823	19.958	22.169	24.349
Egypt	57.785	63.858	70.174	77.154	84.474	91.778	98.638
Nigeria	97.338	110.449	124.842	140.879	158.259	178.787	202.911
South Africa	36.745	41.375	44.872	48.073	50.492	51.684	52.671

Sources: United Nations [UN] (2010a, 2010b)

Table 6 shows the population estimates of major cities of the selected countries between 1990 and 2020. The number of people in the four major cities of the concerned countries portrays an increasing pattern for the period under review. The population of Douala in Cameroon grew from 0.931 million people in 1990 to 1.432 million inhabitants in 2000 and is expected to reach 2.478 million and 2.815 million dwellers in 2015 and 2020, respectively. In the same manner, the population of Cairo in Egypt moved from 9.061 million inhabitants in 1990 to 10.170 million people in 2000 and based on this growth pattern, it is assumed to count 11.663 million residents in 2015 and 12.540 million inhabitants in 2020. Besides, the population of Lagos in Nigeria augmented from 4.764 million people in 1990 to 7.223 million people in 2000 and the city is on track to hit 12.427 million inhabitants in 2015 and 14.162 million residents in 2020. Finally, the population of Johannesburg in SA rose from 1.898 million people in 1990 to 2.732 million residents in 2000 and the city is expected to count 3.867 million individuals in 2015 and 3.996 million dwellers in 2020. Further, it is observed that over the 30 years of analysis, the population of Douala and Johannesburg is anticipated to increase by 100 percent each, while that of Cairo and Lagos is to augment by 39 percent and 180 percent, correspondingly. Although Cairo scores the least rate of population growth over the period of review, altogether these growth rates suggest increase in the demand for drinking water, additional requests for better sanitation coverage and more withdrawals of water resources from the environment.

Table 6: Population estimates (million people) of major cities of selected countries, 1990-2020

City	Period						
	1990	1995	2000	2005	2010	2015	2020
Douala	0.931	1.155	1.432	1.767	2.125	2.478	2.815
Cairo	9.061	9.707	10.170	10.565	11.001	11.663	12.540
Lagos	4.764	5.966	7.233	8.767	10.578	12.427	14.162
Johannesburg	1.898	2.265	2.732	3.263	3.670	3.867	3.996

Sources: UN (2010a, 2010b)

Table 7 displays the average life span of people at birth in the selected countries over the period 1990-2020. Between 1990 and 1995, the average life expectancy in Cameroon was 54.50 years. However, it fell to 52.70 years between 2000 and 2005 and is anticipated to remain at that level over 2010-2015 but it is expected to rise to 54.60 years for the period 2015-2020. In Egypt, an average life expectancy of 64.20 years was recorded for 1990-1995 which improved to 71.10 years between 2000 and 2005. The mean life span of people was predicted to remain at 71.10 years through 2010 to 2015. Yet, between 2015 and 2020, it is assumed to reach 72.20 years. In the case of Nigeria, the mean life span was 47.5 years between 1990 and 1995. It was predicted to decline to 46.6 years over the period 2000-2005 but for the period 2010-2015 and 2015-2020, it is assumed to hang on 48.4 years and 50.4 years, correspondingly. Likewise, SA had an average life expectancy of 58.5 years between 1990 and 1995. The average life span in the country dropped to 53.4 years between 2000 and 2005 and is envisaged to drop further to 50 years over the period 2010-2015 before rising again to 52.20 years for the years 2015 to 2020. A careful observation of the estimates over the 30 years of analysis reveals that the life expectancy increases by 1 percent or 6 months in Cameroon, 12.50 percent or 8 years in Egypt, 6 percent or 3 years in Nigeria, but decreases by 11 percent or 6 years in SA. These estimates explain that the longer the people live in the country, the more amount of water is to be required to satisfy their survival and sanitation needs, thereby resulting in high withdrawal of water resources from the environment and vice versa.

Table 7: Average life expectancy of people at birth (age) in the selected countries, 1990–2020

Country	Period					
	1990-1995	1995-2000	2000-2005	2005-2010	2010- 2015	2015- 2020
Cameroon***	54.5	52.5	52.7	54.6	52.7	54.6
Egypt***	64.2	67.2	71.1	72.2	71.1	72.2
Nigeria	47.5*	47.5*	46.6**	46.9**	48.4**	50.4**
South Africa	58.5*	60.5*	53.4**	49.3**	50**	52.2**

Sources: ***United Nations [UN] (2009a)
**UN (2007)
*Authors' calculations based on mean value of gender estimates from UN (2010f)

Table 8 shows the gross domestic product of the selected countries for 1990-2020. The economic performance of an economy bears considerable impacts on her ability to deliver the macroeconomic policy thrusts of the country, especially in the provisioning of social facilities (hospitals, roads, schools, security and utilities). In view of this, a healthy economy is susceptible to offer adequate social infrastructures to enhance the standard of living of people. Following this logic, it is observed that in 1990, Cameroon had a gross domestic product (GDP) of $ 12 billion and ten years later it was $ 14 billion. Yet, it is guessed to achieve a GDP of $ 18 billion in 2015 and $ 18.3 billion in 2020. For Egypt, the 1990 and 2000 GDP estimates were $ 39 billion and $ 63 billion, correspondingly and the forecasts for 2015 and 2020 tally with $ 88 billion and $ 94 billion, respectively. Conversely, the GDP for Nigeria stood at $ 43 billion in 1990, while in 2000 it was

$ 51 billion. Nevertheless, the GDP of the country is estimated to culminate to $ 94 billion in 2015 and $ 99 billion in 2020. Besides, SA achieved GDP levels of $ 112 billion and $ 134 billion in 1990 and 2000, respectively. And she is on track to hit $ 174 billion in 2015 and $181 billion in 2020. Based on the economic performance criterion, SA and Nigeria are expected to provide adequate water and sanitation coverage to their populations compared to Egypt and Cameroon.
A closer scrutiny of the socio-economic variables over the 30 years review period reveals an average population increase of roughly 80 percent and 105 percent for the selected countries and cities, correspondingly despite the family planning practice and the menace of HIV/AIDS. However, the arithmetic between increases and decreases in the life expectancy of people over the period of analysis suggests an average increase of only 2 percent or 1 year 5 months in the selected countries. Furthermore, the aggregate economic performance of the selected countries over the 30 years of review translates to an increase of roughly 111 percent for an average increase of only 28 percent per country or 0.93 percent per year for each country. Given the aggregate high rate of population growth and the low level of life expectancy in the selected countries, this performance is greatly insignificant to improve the living conditions of the populations.

Table 8: Gross domestic product of selected countries ($ 1990 prices), 1990-2020

Country	Period						
	1990	**1995**	**2000**	**2005**	**2010***	**2015***	**2020***
Cameroon	118456 90295	111234 22613	139917 27287	167853 18020	172821 63433	177937 15471	183204 09449
Egypt	394120 75194	494356 61877	628006 77636	784620 18333	832168 16644	882597 55733	936082 96930
Nigeria	426080 06465	436777 04790	512412 84064	847703 86084	893310 32855	941370 42423	992016 15305
South Africa	112013 939774	116927 826013	134158 288970	162180 359565	168116 160725	174269 212208	180647 465375

Source: UN (2010c)
*Authors' estimates based on computed average annual growth rate of 2.96 percent for Cameroon, 6.06 percent for Egypt, 5.38 percent for Nigeria and 3.66 percent for South Africa over the period 2005-2009 from World Bank (2010) estimates spanning 2005-2009

4. Water resources endowment and vulnerability status

Table 9 shows the water resources endowment of the selected countries for 1990-2020. With an average annual in depth precipitations of 1604 millimeters (mm) over the period under review as a result of constant supply of rainfall, the total actual renewable water resources endowment of Cameroon aggregated to 285.50 kilometers (Km^3) per year with varying per capita water levels. Conversely, Egypt boasted of 51 mm of rainfall in 1990 for total actual renewable water resources of 57.30 Km^3. Equally, Nigeria had 1150 mm of average annual in-depth rainfall and total actual renewable water resources of 280 Km^3. SA is no exception to the current situation of water resources depletion owing to human and environmental factors. Accordingly, she receives an average annual in-depth rainfall of 495 mm and total renewable water resources of 50 Km^3. A closer look at the statistics reveals that Cameroon is the most endowed in water resources; surpassing Nigeria by roughly 2 percent, Egypt by 398 percent and SA by 471 percent for it possesses many rivers and lakes.

Table 9: Water resources endowment of selected countries 1990-2020

Variable	Country			
	Cameroon	**Egypt**	**Nigeria**	**South Africa**
Rainfall (mm/year)	1604	51	1150	495
Total actual renewable water resources (Km^3/year)	285.50	57.30	280*	50

Sources: Food and Agriculture Organization [FAO] (2010a, 2010b)
*Seckler et al. (1998)

Table 10 presents the percentage withdrawal of water resources from the environment of the concerned countries for the period 1990 to 2020. Cameroon extracted 0.14 percent of its total actual renewable water resources in 1990 and exploited 0.35 percent of it in 2000. The country is expected to withdraw 0.66 percent and 0.79 percent of her total actual renewable water resources in 2015 and 2020, respectively. In the case of Egypt, 98.5 percent of the total actual renewable water resources was removed in 1990 and 94.69 percent of it in 2000. By 2015 and 2020, the rate of withdrawal of water resources in Egypt is anticipated to reduce to 71.86 percent and 64.25 percent, correspondingly.
For Nigeria, the proportions of extraction of water resources from the environment were 1.43 percent in 1990 and 1.67 percent in 2000. Yet, the current trend of water use in the country anticipates withdrawal rates of 8.16 percent for 2015 and 11.63 percent for 2020. Lastly, SA pulled out 26.58 percent and 24.96 percent of water resources from her total actual renewable water resources in 1990 and 2000, respectively. However, the concern recently expressed about the fast depletion of water resources and the efforts made to improve the situation announces a contraction to 22.53 percent and 21.72 percent in the rate of extraction of water resources from the environment by 2015 and 2020, respectively.
A careful examination of the exploitation rate of freshwater over the 30 years of analysis indicates an increase of roughly 1 percentage point for Cameroon and 10 percentage points for Nigeria but a decrease of roughly 34 percentage points for Egypt and 5 percentage points for SA. The variation in the rates of water resources extraction from the environment in the countries is generally attributed to the size of the population, availability of physical supplies, technology used for water withdrawal, and the effectiveness and efficiency of water management institutions.

Table 10: Percentage withdrawal of total actual renewable water resources (Km^3/year) of selected countries, 1990-2020

Country	Period						
	1990	1995	2000	2005	2010	2015	2020
Cameroon	0.140	0.243 (g)	0.346	0.450*	0.553*	0.656*	0.790*
Egypt	98.495*	102.300	94.690	87.080*	79.470*	71.860*	64.25*
Nigeria	1.43**	1.67**	2.798	3.86***	5.622***	8.156***	11.627***
South Africa	26.58	25.77 (g)	24.96	24.15*	23.34*	22.53*	21.72*

Sources: FAO (2010b)
(g) – Authors' estimates as average of 1990 and 1995 values
*Authors' calculations based on percentage increase or decrease observed between 1990 and 2000
** Authors' calculation as a ratio of water withdrawal estimates of 4.02 km^3 for 1990 and 4.70 km^3 for 1995 from State Hydrological Institute [SHI] (1998) for the country to total actual renewable water resources of the country for the specific years
*** Authors' calculation based on moving average increment on the previous year's estimate owing to population explosion

Table 11 shows the per capita water of the selected countries for the period 1990 to 2020. Cameroon was on 22031 m^3 per person per year (pppy) in 1990 but due to population explosion the per capita water dropped to 17172 m^3 pppy in 2000 and continuation of this pattern is anticipated to shrink the per capita water level to 13013.66 m^3 per inhabitant per year by 2015 and 11848.53 m^3 per inhabitant per year by 2020, respectively. Conversely, Egypt boosted of a per capita water of 950.20 m^3 per inhabitant per year in 1990, but given the demographic weight that exerts much pressure on actual endowments the per capita water contracted to 786.10 m^3 pppy in 2000 and is likely to drop to 624.33 m^3 per person per year by 2015 and 580.91 m^3 per inhabitant per year by 2020, correspondingly.

Equally, Nigeria had a per capita water of 2876.57 m^3 pppy in 1990. Yet, the expansion rate of her population commanded a lower level of per capita water of 2242.83 m^3 pppy at the start of the 21st century, which is probably to persist to respective levels of 1566.10 m^3 pppy in 2015 and 1379.91 m^3 pppy and 2020. Owing to human and environmental factors, the per capita water for SA reduced from 1296 m^3 pppy in 1990 to 1082 m^3 pppy in 2000 and is assumed to diminish further to 967.41 m^3 and 949.28 m^3 pppy in 2015 and 2020, accordingly.

Table 11: The per capita water (m^3 per person per year) of selected countries, 1990-2020

Country	Period						
	1990	1995	2000	2005	2010*	2015*	2020*
Cameroon	22031	19324	17172	15300	14455.35	13013.66	11848.53
Egypt	950.20	864.10	786.10	715.70	678.31	624.33	580.91
Nigeria	2876.57	2535.10	2242.83	1987.52	1769.25	1566.10	1379.91
South Africa	1296	1166	1082	1017	990.25	967.41	949.28

Source: FAO (2010b)
*Authors' calculations as a ratio of total actual renewable water resources to total population estimate of respective years

Experts in the management of water resources set the threshold of 1700 cubic meters (m^3) per person per year as the international minimum amount of water resources required for the successful running of all economic activities in an economy (World Bank, 2007; Roudi-Fahimi et al., 2002; Falkenmark et al., 1989). In view of this, the annual per capita water resource received out of the total actual water resources of an area qualifies the region as water scare, water stressed, water struggling or water surplus. As a result, any region whose annual water resource per person per year falls below 1000 m^3 is considered as a water scare area. Another area with an annual per capita water resource that oscillates between 1000 and 1700 m^3 is regarded as a water stressed place. Further, a place with a per capita water resource per year coinciding with 1700 m^3 is referred to as a water struggling or sufficient area, while a region where the annual per capita water resource exceeds 1700 m^3 is viewed as a water surplus area (World Bank, 2007; Abrams 2000-2001; Roudi-Fahimi et al., 2002; Falkenmark et al., 1989). A synopsis of the international standards of water status assessment is presented in Table 12.

Table 12: Annual per capita water resources assessment thresholds

Cubic meters (m^3) per person per year	Assessment status	Sources
1700 m^3	Minimum water resources for successful running of activities	Bank, 2007; Roudi-Fahimi et al., 2002; Falkenmark et al., 1989
Below 1000 m^3	Water scarce	World Bank, 2007; Abrams 2000-2001; Roudi-Fahimi et al., 2002; Falkenmark et al., 1989
Between 1000 and 1700 m^3	Water stressed	
Equal to 1700 m^3	Water struggling	
Above 1700 m^3	Water surplus	

There are several approaches to measuring the vulnerability status to water resources of an area. However, this study reviewed only a few among them. The water deficit criterion confronts the annual water supply with water use of economic activities over time. It argues that with increased water use across time and no change in the amount of water available to an area, water resources are expected to deplete thereby shifting the water status of the area from non-vulnerability to severe vulnerability. Consequently, it underlines that if the water use level is far beneath the constant level of water supply in the region, then the area is grouped as non-vulnerable or water surplus. Similarly, if the level of water use is close the invariable level of water supply of the area, then it is marginally vulnerable or water struggling but if the water use level is equal or not too far from the stable level of water availability of the region, in that case the area is set as vulnerable or water stressed. Lastly, it holds that if the level of water use is at a point too distant from the steady level of water supply, the region is regarded as highly vulnerable or water scarce (Shuval, 1987). Though time factor is accounted for in the analysis, the approach is too subjective, void of thresholds and may require time series data that are not easy to obtain all the time.

The water dependency criterion considers the size of the population that depends on every million cubic meter (m^3) of water resources in a given area. It states that the larger the population that depends on a million m^3 of water per

year is, the more vulnerable an area is. As a result, if less than 100 people depend on a million m^3 of water per year in a region, the area qualifies as non-vulnerable or water surplus. If the population depending on a million m^3 of water spans 101 to 500 people, the area is marginally vulnerable or water struggling. On the other hand, if the population that relies on a million m^3 of water during the year in the area lies between 501 and 1000 people, the area is water vulnerable or stressed. Finally, if the population of the area soliciting a million m^3 of water in the year surpasses 1000 people, the area is extremely vulnerable or water scarce (Brouwer and Falkenmark, 1989). Despite the provision of some thresholds to enable the measurement of the vulnerability status of a region, this criterion overlooked the extent of water use by the different population sizes.

The per capita water availability criterion compares water supply to water demand or use on a per capita basis. It states that the degree of vulnerability of a region depends on the magnitude of its per capita water supply and per capita water demand. Using a three by three template of water availability and water demand with three variants of low, medium and high levels of supply and demand; it generates nine different combinations that assist in deciding the water vulnerability status of a region. Consequently, if the per capita water supply of a region is low and its per capita water use is low, medium or high; then the area qualifies as most vulnerable or water scarce. Secondly, if the per capita water availability of the area is medium and its per capita water demand is low; then the area is marginally vulnerable or water struggling. Further, if both the per capita water availability and per capita water use are medium; then it is water vulnerable or stressed. However, if its per capita water supply remains medium but its per capita water use is high, therefore the area is extremely vulnerable or water scarce. The last array of the matrix indicates that if the per capita water supply of a region is high and its per capita water use is either low or medium, the region is considered as non-vulnerable or water surplus but if both the per capita water availability and per capita water use are high, it stands as marginally vulnerable or water struggling area (Brouwer and Falkenmark, 1989). Despite the introduction of different levels of water supply and demand in the analysis, the method remains biased as no quantitative thresholds were provided.

The water constraints criterion uses the logarithmic linear functional form to relate the size of the population with the per capita use of water in a region to describe its water vulnerability situation based on a predetermined level of water availability at a given time. The method suggests that if the water use level for the concerned period is located far away beneath the water constraint line, the region is regarded as non-vulnerable or water surplus but if the water use level is not situated far below the water availability line, it is held as managing vulnerability or water struggling. In addition, if the water use level for the concerned period falls on the water constraint line, the region is classified as more vulnerable or water stressed but if the water use level lies far beyond the water availability line, it is categorised as most vulnerable or water scarce (Shaw et al., 1991). In spite of the graphical presentation of the different scenarios, this approach was too qualitative in nature and lacked thresholds to depend on as objective values.

The combined water availability and use level ratio criterion was designed to account for the limitations of the methods discussed earlier. It uses a four by four model that incorporates per capita water supply and use ratio of available water supply to determine the extent of vulnerability of an area. Four thresholds of per capita water supply and four use ratios of available of water supply were defined. Accordingly, if the annual per capita water supply is below 1000 cubic meters (m^3) and the use ratio of available water supply is below 40 percent, the area is regarded as marginally vulnerable or water struggling but if with the same level of per capita water supply the use ratio falls between 40 and 60 percent, then the area becomes more vulnerable or water stressed. Further, if the per capita water supply per year is less than 1000 m^3 but the use ratio is between 60 and 80 percent or above 80 percent, then the area is considered as most vulnerable or water scarce. The second scenario considers an annual per capita water supply of 1001 to 2000 m^3 and draws conclusions that are similar to the first scenario in which the annual per capita water supply is less than 1000 m^3. In the third scenario where the per capita water supply per year lies between 2001 and 10000 m^3, a non-vulnerable or water surplus region susceptibly makes use of less than 40 percent of the available water resources and a marginally vulnerable or water struggling area uses between 40 and 60 percent of the available water resources. In addition, a more vulnerable or water stressed area exploits between 60 and 80 percent of the available water resources, whilst a most vulnerable or water scarce area extracts beyond 80 percent of the available water resources. In the last scenario, the annual per capita water supply is above 10000 m^3 and any area using below 40 percent or between 40 and 60 percent of the available water resources is categorised as non-vulnerable or water surplus area. However, if with that amount of annual per capita water the area uses between 60 and 80 percent of the available water resources, it is marginally vulnerable or water struggling but if its rate of exploitation of water resources exceeds 80 percent, it becomes most vulnerable or water scarce (Kulshrestha, 1993). Despite the combination of two factors influencing the phenomenon of

water scarcity and shortage in the model, the climate change variable was ignored in the model. Table 13 summarises the approaches to water resources vulnerability assessment.

Table 13: Water vulnerability assessment criteria

Criterion	Aim	Sources
Water deficit	To compare supply with water use over time	Shuval, 1987
Water dependency	To confront size of population of an area with every million of cubic meter of water resources	Brouwer and Falkenmark, 1989
Per capita water availability	To contrast water supply with per capita water demand	Brouwer and Falkenmark, 1989
Water constraints	To weigh log of size of population against log of per capita water use	Shaw et al., 1991
Water availability and use level ratio	To combine per capita water supply and use ratio of available water supply	Kulshrestha, 1993

For all the assessment criteria revealed some limitations, this study settles with the joint water availability and use level ratio approach to appraise the vulnerability status of the selected countries. Consequently, it uses four levels of vulnerability coded as 4WSLV to describe water surplus-least vulnerable rated with four dots (●●●●), 3WSLV to stand for water struggling-less vulnerable rated with three dots (●●●), 2WSLV to configure water stressed-more vulnerable associated with two dots (●●) and 1WSLV to represent water scarce-most vulnerable linked to one dot (●).

Table 14 shows the vulnerability status of the selected countries between 1990 and 2020. With an annual per capita water supply above 10000 m^3 and an average use rate of 0.5 percent (< 40 percent) of available water resources in the years of concern, Cameroon maintains a status of a water surplus-least vulnerable country. Egypt qualifies as a water scarce-most vulnerable country because her annual per capita water supply falls below 1000 m^3 and average use rate of available water resources is 82 percent (> 60 percent) for the years of interest.

The Nigerian scenario illustrates that the country was water surplus-least vulnerable in 1990 and 2000 with a per capita water supply between 2001 m^3 and 10000 m^3 per year and an average use rate of 1.96 percent (< 40 percent) of available water resources. Yet, forecasts to 2015 and 2020 reclassify the annual per capita water supply of the country to lie between 1001 m^3 and 2000 m^3 although the average use rate of 10 percent of available water resources remains below 40 percent. SA is expected to maintain the status of a water struggling -less vulnerable country even though her annual per capita water supply that lied between 1001 m^3 and 2000 m^3 from 1990 to 2000 promises a decline to less than 1000 m^3 in 2015 and 2020 in the face of little but less than 40 percent variation in the average use rate of 24 percent of available water resources over the years of concern. The information presented in Table 8 indicates that the lower than 40 percent the use of available water resources and the higher than 1000 m^3 the annual per capita water supply of a country are, the lesser the severity of its vulnerability to water resources is and vice versa.

Table 14: Water vulnerability status of the selected countries, 1990-2020

Year	Per capita water supply (m^3/year) (1)	Use rate (percentage) (2)	Decision rule*	Status	Country	Conclusion
1990	22031	0.140	(1) > 10000 m^3, (2) < 40%	●●●●	Cameroon	Surplus
2000	17172	0.346				
2015	13013.66	0.656				
2020	11848.53	0.790				
1990	950.20	98.495	(1) < 1000 m^3, (2) > 80%	●	Egypt	Scarce
2000	786.10	94.690				
2015	624.33	71.860	(1) < 1000 m^3, 60% ≤ (2) ≤ 80%	●		
2020	580.91	64.250				

1990	2793	0.180	2001 $m^3 \leq (1) \leq 10000\ m^3$,			
2000	2184	2.798	(2) < 40%	●●●●	Nigeria	Surplus
2015	1241.70	8.156	1001 $m^3 \leq (1) \leq 2000\ m^3$,			
2020	1094.07	11.627	(2) < 40%	●●●		Struggling
1990	1296	26.580	1001 $m^3 \leq (1) \leq 2000\ m^3$,			
2000	1082	24.960	(2) < 40%		South	
2015	967.41	22.530	(1) < 1000 m^3,	●●●	Africa	Struggling
2020	949.28	21.720	(2) < 40%			

NB: ●●●●: Water surplus-least vulnerable ●●: Water stressed-more vulnerable
●●●: Water struggling-less vulnerable ●: Water scarce-most vulnerable

Sources: Constructed from Table 10 and Table 11
*Kulshrestha (1993)

5. Access to drinking water and improved sanitation coverage

Table 15 presents the rate of access to drinking water in urban centers of the selected countries for the period 1990-2020. The evolution of access to improved water coverage in African urban centers was quite encouraging since the declaration of the millennium development goals. The urban areas in Cameroon recorded 76 percent rate of access in 1990, registered 84 percent in 2000. At this pace, the rate of access to drinking water is projected to attain 92 percent by 2015 and 96 percent five years later. Interestingly, Egypt urban areas registered 96 percent access to drinking water in 1990 against 99 percent in 2000. Following this performance, the rate of access to clean water in her cities is estimated to reach 100 percent in 2015 and 2020. Yet, acquiring drinking water in urban centers in Nigeria gave much to be desired as the rate of access to drinking water fell from 80 percent in 1990 to 71 percent in 2000 and is anticipated to undergo severe water crisis in future which may push its availability down to 57.50 percent in 2015 and further to 53 percent in 2020 owing to rapid population growth and wide spread of urban poverty in the areas. Finally, in SA the rate of access to drinking water rose from 98 percent in 1990 to 99 percent in 2000. With this pattern, it is assumed that by 2015 the struggle for the acquisition of drinking water may receive little attention from stakeholders since drinking water is going to be delivered to all irrespective of social or economic criteria in urban centers across the country.

Table 15: Rate of access to drinking water in urban centers of selected countries, 1990-2020

Urban centers in	Period						
	1990	1995	2000	2005*	2010*	2015*	2020*
Cameroon	76	80	84	88	92	96	100
Egypt	97	98	99	100	100	100	100
Nigeria	80	76	71	66.50	62	57.50	53
South Africa	98	98	99	100	100	100	100

Source: UN (2010d)
* Authors' calculations based on average percentage point increment of 4 for Cameroon, 1 each for Egypt and South Africa and an average percentage unit decline of 4.50 for Nigeria observed between 1990 and 2000

Table 16 displays the rate of access to improved sanitation coverage in urban centers of the selected countries for 1990-2020. While there was improvement in the degree of access to drinking water since the launching of the MDGs agenda in 1990, the rate of access to better sanitation coverage lagged behind the performances of drinking water provisioning in urban centers of the continent. Yet in 1990, only 47 percent of the urban population in Cameroon had improved sanitation coverage. This rate amplified to 50 percent at the dawn of the 21st century and kept on rising from time to time such that the portion of people to gain access to enhanced sanitation coverage in the city may reach 64.50 percent by 2015 and 68 percent by 2020. The scenario for Egypt was fascinating in that the proportion of people with access to better sanitation coverage in cites moved from 68 percent in 1990 to 79 percent in 2000 and continued to improve further. This positive development raised expectations that by 2015 the fraction of people to enjoy better sanitation

coverage may hit 95.50 percent and by 2020 all urban dwellers can afford proper sanitation coverage. Furthermore, the fraction of urban population which gained access to better sanitation coverage in SA rose from 64 percent in 1990 to 65 percent in 2000 and it is estimated to reach 68 percent by 2015 and 69 percent by 2020. Although good track records of improved sanitation coverage were registered in urban centers of Cameroon, Egypt and SA over the period under review, the highest performance of urban centers in Nigeria could achieve over the period under consideration was 38 percent only. Therefore, the rate of access to enhanced sanitation coverage of population ascended from 33 percent in 1990 to 34 percent in 2000 with the hope to rise to 37 percent and 38 percent by 2015 and 2020, correspondingly.

Table 16: Rate of access to sanitation coverage in selected cities, 1990-2020

	Period						
Urban centers in	**1990**	**1995**	**2000**	**2005***	**2010***	**2015***	**2020***
Cameroon	47	50	54	57.50	61	64.50	68
Egypt	68	73	79	84.50	90	95.50	100
Nigeria	33	34	34	35	36	37	38
South Africa	64	64	65	66	67	68	69

Source: UN (2010e).

*Authors' calculations based on an average percentage unit increment of 3.50 for Cameroon, 5.50 for Egypt and one each for Nigeria and South Africa observed between 1990 and 2000

6. Towards the mileeennium develoment goal and beyond

The study found that the population of the selected countries keeps rising over the period of review and Nigeria topped the list, followed by Egypt, then SA and last Cameroon. The pattern of population growth in major urban centers showed that Cairo (Egypt) maintained the lead to 2010 after which Lagos (Nigeria) assumes the leadership ahead of Cairo, Johannesburg (SA) and Douala (Cameroon), respectively. As regards life expectancy, Egypt recorded the highest level of life span averaging 70 years old at birth. From 1990 to 2000, SA trailed Egypt with an average life span of 59.50 years old at birth which is predicted to drop to an average of 51.10 years old over the period 2015- 2020 owing to the high rate of murder in the order of 46 deaths (16834 deaths ÷ 365 days) per day in 2009/2010 as reported by the South African Police Service (South African Police Service [SAPS], 2009-2010) and the high rate of 43 percent AIDS deaths out of a population of 5.21 million HIV/AIDS infected people or 10.56 percent (49320500 ÷21500000) of total population of the country as reported in 2009 by Statistics South Africa (Statistics South Africa [STATSSA], 2009). Besides, Cameroon and Nigeria almost maintained an average life span clustering around 54.60 and 48.40 years old at birth over the period of interest, correspondingly.

With reference to economic performance, SA leads throughout the period of investigation. Till the year 2000, Egypt was second to SA but afterwards Nigeria succeeded in the second position pulling behind Egypt as third and Cameroon last. About physical availability of water supplies, Cameroon is the most endowed with 285.50 cubic kilometers (Km^3) of total actual renewable water resources per year. Nigeria is second with 280 Km^3 of water supplies per year. Egypt is third with 57.30 Km^3 of total freshwater resources per year and SA last with only 50 Km^3 of annual total renewable water resources. Yet, Egypt is the greatest withdrawer of water resources from the environment with an average rate of 82 percent over the period of review, followed by SA with an average exploitation rate of 24 percent, then come Nigeria and Cameroon with average rates of extraction of six percent and 0.50 percent, respectively.

Salient features of the removal of water resources from nature in the selected countries revealed that the withdrawal rate keeps increasing in Cameroon but lies below 1 percent, while in Nigeria the extraction rate is projected to triple and quadruple the 2.798 percent tempo of the year 2000 in 2015 and 2020, accordingly as a result of population and industrial pressures on environmental resources. Conversely, in Egypt and SA, the 1990 rate of freshwater withdrawal dropped by roughly 4 percentage units and 2 percentage points in the year 2000, respectively. The extraction rate of freshwater is predicted to decrease further from what it was in the year 2000 by 27 percentage points and 4 percentage units in 2015, and 35 percentage units and 5 percentage units in 2020 for Egypt and SA, correspondingly. These developments are found to be associated with the concern and worries expressed by respective governments over the global looming water crisis phenomenon, mobilization of resources towards education of the population and formulation of water policies that promote conservation of environmental resources and regulation of water resource use between sectors of economic activities. Consequently, as total water supplies remained unchanged in the face of rising

demand for freshwater, the per capita water availability in the selected countries declines over the period of analysis. In spite of this, the annual per capita water supply of Cameroon stands above 10000 cubic meters (m^3) and that of Egypt lies below 1000 m^3. With regard to Nigeria, the per capita water supply per year stood beyond 2000 m^3 from 1990 to 2000 but afterwards it is projected to fall below 2000 m^3 over the period 2015 to 2020. Similarly, the annual per capita water availability for SA exceeded 1000 m^3 during 1990-2000 but is assumed in 2015 and 2020 to contract below 1000 m^3. Applying the principles of the joint availability and use level ratio of water vulnerability assessment, the study established that from 1990 to 2020, Cameroon remains a water surplus-least vulnerable country; Egypt continues to be a water scarce-most vulnerable country and SA maintains the status of a water struggling-less vulnerable country. Nevertheless, it found that Nigeria is foreseen to move from her 1990 to 2000 status of a water surplus-least vulnerable country to that of a water struggling-less vulnerable one between 2015 and 2020. In line with the MDGs and beyond, the study found that 96 percent of the urban population is likely to gain access to drinking water by 2015 and 100 percent of the population by 2020 in Cameroon. Besides, it argued that all urban centers in Egypt and SA must have gained access to drinking water since 2005; thereby allowing the opportunity to shift resources towards satisfying the water needs for rural areas in the countries. Finally, it anticipates a decline to 57.50 percent by 2015 and 53 percent in 2020 in the rate of access to drinking water from year 2000 rate of 71 percent in Nigerian urban centers owing to over-population, decrease in per capita availability of water resources and poor management.

Although the access to improved sanitation coverage was generally poor compared to access to drinking water in urban centers of the selected countries, it assumed an increasing pattern throughout the period of review. Therefore, the study posits that by 2015 and 2020 about 65 percent and 68 percent of the urban population is presumed to acquire access to improved sanitation coverage in Cameroon, respectively. Further, it projects access to improved sanitation coverage of 96 percent in 2015 and 100 percent in 2020 for the Egyptian urban population. Besides, it discloses that only 37 percent and 38 percent of the urban population in Nigeria is likely to gain access to improved sanitation coverage in 2015 and 2020, respectively as a result of congestion. Finally, it maintains that the proportions of urban population to attain better sanitation coverage in SA by 2015 and 2020 are likely to reach 68 percent and 69 percent, correspondingly.

To sum up, a scaling from one to four with one being the highest and four the lowest of the selected countries based on the performance of socio-economic and environmental variables is designed and presented in Table 17. Reading from it, one notices that Nigeria and Lagos are first, Egypt and Cairo are second, SA and Johannesburg are third and Cameroon and Douala are fourth on the population list. With reference to life expectancy, Egypt is first, Cameroon is second, SA is third and Nigeria is fourth. As regards economic performance, SA assumes the first position, followed by Nigeria, Egypt and then Cameroon. However, in the area of availability of water supplies, Cameroon and Nigeria are first and second; while Egypt and SA are third and fourth, respectively. In terms of water resources removal from the environment, Egypt tops the list; whilst SA, Nigeria and Cameroon trail one after the other. Furthermore, the scaling arrangement puts Cameroon in the first position, Nigeria in the second place, SA in the third spot and Egypt in the fourth location regarding the annual per capita water supply but considers Egypt to be the most vulnerable to scarcity of water resources; followed by SA, Nigeria and Cameroon, respectively. Finally, in respect of access to both drinking water and improved sanitation coverage; it gives priority to Egypt, then SA, next Cameroon and Nigeria in the end.

Table 17: Ranking of countries by performance of socio-economic and environmental variables

Variable	Ranking			
	No1	No2	No3	No4
Country population	Nigeria	Egypt	South Africa	Cameroon
City population	Lagos	Cairo	Johannesburg	Douala
Life expectancy	Egypt	Cameroon	South Africa	Nigeria
Economic performance (GDP)	South Africa	Nigeria	Egypt	Cameroon
Water supplies per year	Cameroon	Nigeria	Egypt	South Africa
Water withdrawal percentage	Egypt	South Africa	Nigeria	Cameroon
Per capita water supply per year	Cameroon	Nigeria	South Africa	Egypt
Rate of vulnerability to water resources	Egypt	South Africa	Nigeria	Cameroon
Access to drinking water	Egypt	South Africa	Cameroon	Nigeria
Access to improved sanitation coverage	Egypt	South Africa	Cameroon	Nigeria

Source: Authors' compilation

7. Conclusions and policy lessons

Although abundance of physical water supplies is an asset to support the provisioning and delivery objective of drinking water and enhanced sanitary conditions, it is not a s*ine qua non* condition towards its attainment. The case of countries like Cameroon and Nigeria with copious amount of freshwater resources but ill thought water management policy and poor governance on one hand and the state of countries like Egypt and SA with very little amount of water resources but well conceived water policy testifies to that claim on the other hand. Despite the location of Egypt and SA in arid and semi-arid regions, where water scarcity and shortages are acute, these two countries are far ahead of Cameroon and Nigeria on the path of MDGs achievement in urban centers and have ample time to devote towards the attainment of the overall MDGs including rural areas. Owing to environmental constraints, Egypt and SA took the initiative to put in place institutions for the effective and efficient management of water resources supported with sound water legislations. Cameroon and Nigeria are still lagging behind in spite of being located in a water abundant region – a status that is not guaranteed for ever given the uncertainty about nature and the fast growing rate of economic activities and population that necessitate exploitation of more volumes of water from the environment. As a result, Cameroon and Nigeria need to wake up from sleep as the phenomenon of aridity progresses gradually from their northern regions towards the southern areas. Thus, concrete actions in the formulation of good water policy frameworks are required in Cameroon and Nigeria to harness available resources to approach the MDG targets.

Acknowledgements

An earlier version of the paper was submitted to the discussion paper series of the School of Economics and Finance, University of KwaZulu-Natal, Durban, South Africa, Discussion Paper No 109, 2011.

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