

Original Paper

A Model for Sustainable Water Supply in Rural Communities: The Case of Ekondo-Titi, Cameroon

Jude Ndzifon Kimengsi^{1*}, Amawa Sani Gur² & Akhere Solange Gwan³

¹ Faculty of Environmental Sciences, Institute of International Forestry and Forest Products, Technical University of Dresden, Dresden, Germany

² Department of Geography, University of Buea, Buea, Cameroon

³ Department of Sociology & Human Geography, University of Oslo, Norway

* Jude Ndzifon Kimengsi, Faculty of Environmental Sciences, Institute of International Forestry and Forest Products, Technical University of Dresden, Dresden, Germany

Received: December 28, 2017 Accepted: January 16, 2018 Online Published: January 22, 2018

doi:10.22158/se.v3n1p46

URL: <http://dx.doi.org/10.22158/se.v3n1p46>

Abstract

One would have expected that Ekondo-Titi which has the rare luxury of benefiting from the radial drainage pattern of the Rumpi Hills (which serves as the main catchment in Ndian Division) would be self-sufficient in terms of water quality and quantity. This community is rather greeted with water scarcity which is partly blamed on the failure to initiate and sustain water supply schemes. Forest destruction in favor of oil palm plantations by Pamol and small holder schemes have contributed to degrade the major water catchments thereby increasing stream erosion and siltation. This has altered the flow characteristics of streams. This paper proposes a model for sustainable water supply by indicating the opportunities that exist for internal and external actors to galvanise their resources to ensure adequate water supply in this fast developing rural community. It was observed that a major setback in the attainment of this goal remains the insufficient resources (material and financial) and the absence of a synergy among the key actors of Ekondo-Titi. The model recommends the strengthening of stakeholder synergy and where necessary, further support from external actors in the process of initiating and sustaining water development projects.

Keywords

sustainable water supply, community development, deforestation, catchment degradation

1. Introduction

Water is an important factor of progress and development and represents the basis for the development of authentic civilization through the ages (Biswas, 1993). It remains a very essential ingredient for the survival of human species and the entire systems (Krenkel & Neventy, 1980). The World Bank (1997) observed that in the past few years, water crisis has emerged in many countries around the world. Water, which was once abundant, is now scarce. More than 1 billion people lack access to adequate water and 1.7 billion people have inadequate sanitation (UNICEF, 2010). The drivers of such decline in water quality and quantity vary and the resultant impacts are particular to each locality and region of the world; although the case of Africa calls for special concern. The need for sustainable management of water supply is becoming more crucial because new sources of water are becoming scarcer, more expensive to develop, requires more expertise and technological knowledge for planning, design, implementation and operation and are contributing to more social and environmental disruption (Biswas et al., 1993). As such, water no longer represents a cheap resource, which can be profligately used, abused or squandered without noticeable consequences on humanity.

The global concern today is to improve on the livelihoods of humanity as prescribed by the Sustainable Development Goals. Providing safe and secured water to communities is largely considered as a positive step towards achieving this noble objective. The human needs approach to development consider water, food and shelter as some of its basic elements. Potable water is one of the world's scarcest natural resources. The magnitude and universality of the problem of water shortage obviously requires corrective action at all levels of potential intervention. It calls for innovative and goal oriented approaches. Safe, secured and sufficient source of water is a fundamental requirement for the survival, well-being and socio-economic development of mankind. Many developing countries have problems of water scarcity resulting from catchment degradation. Thus, their attention has been turned towards this universal need. The active involvement of catchment users, residents and water supply users is critical for sustainable development and management of water catchments. Clean water supply is a major problem in Cameroon especially in areas where catchments are either degraded or not harnessed for water supply. This calls for preventive and corrective measures to curb the rate of catchment degradation and most importantly seek a way forward for the development of options for sustainable water supply in this emerging town. Summarily, the absence of a sustainable water supply framework is due, principally, to the absence of a community development scheme, catchment degradation in favor of oil palm plantations and the pollution and sedimentation of streams.

At the dawn of the Third Millennium, it is sad indeed to contemplate that humanity is at risk because approximately about 5million people approximately die from inadequate water supplies and sanitation every year (WHO, 1996, cited in Gleick, 2002). These revelations, in line with the Millennium Development Goals, call for combined efforts at the global, national and community levels so as to free mankind from the scourge of water scarcity and water related diseases. Hence, it is high time the population of this area looks at the ways and means of harnessing and protecting their catchments so as

to ensure adequate and safe water supply to this emerging urban centre. This can be done through the initiation of a community development scheme, reversing the trend of deforestation and reducing water pollution and stream sedimentation.

A healthy and academically sound population is very necessary for human resource development and consequent socio-economic progress. The WHO and UNICEF (2005) shows the link between water, sanitation and the cycle of poverty. This relationship explains the fact that communities that are affected by water problems generally develop a poor health situation which affects child development. The consumption of contaminated water by a majority of the population who are generally poor translates into the upsurge of water-related illnesses. The consequence is that a substantial amount of their little incomes are spent on medication; this reduces their abilities to obtain other life sustaining goods and services. Besides the intrinsic importance of health as a welfare determinant, poor health can directly influence an individual's opportunities—his or her earnings capacity, performance at school, ability to care for children and participation in community activities, among others. This important instrumental function of health implies that inequalities in health often translate into inequalities in other dimensions of welfare (WDR, 2006). The long term effect is that it hinders human resource development of the community.

Ekondo Titi can be said to be richly blessed with a natural catchment area which serves as a store for water. The forests found within this area contributes in giving it a sound catchments which can provide opportunities for water to be harnessed by stakeholders for the well-being of this Sub-Division which is pregnant with development potentials. The major catchment area here is the Rumpi Hills where most streams in Ekondo Titi as well as Ndian Division as a whole, take their rise giving it a radial drainage pattern.

Generally, government policy in Cameroon concerning the provision of potable water to its citizens has been largely geared towards urban centres with the virtual neglect of the rural areas. This has generated the problem of water scarcity in these areas especially as financial inadequacy stands as an impediment to the initiation and sustenance of community water supply schemes. There is a progressive depletion of the catchment areas through deforestation in favor of oil palm plantations.

Faced with the “un grasped opportunities” of developing a sustainable water supply scheme, this study examines the reasons behind the persistence of potable water scarcity in Ekondo Titi and also develops a framework for sustainable water supply in the Sub-division. This framework presents a possibility for synergy among the key stakeholders and the need to source for external assistance to attain this goal.

2. Method

2.1 Study Area

Ekondo-Titi Sub-Division is found within Ndian Division of the South West Region of Cameroon (Figure 1). The Sub-Division has an estimated population of 60000 inhabitants (Ekondo Titi Rural Council, 2010). Climatically, Ekondo-Titi is situated within the equatorial forest belt of Cameroon

(Ngwa, 1978). This area is marked by two distinct seasons—the wet and the dry season. Temperatures here are usually high and hardly go below 27°C. Also, there is high amount of rainfall and sunshine. The study area which partly falls in the Mount Cameroon area generally has a tropical seasonal climate, with one wet and one dry season. The equatorial location of Ekondo Titi suggests that there is a substantial amount of rainfall which guarantees catchment recharge. However, the fact that there is the absence of the basic infrastructures necessary for the harnessing of these water supply possibilities remains a problem.

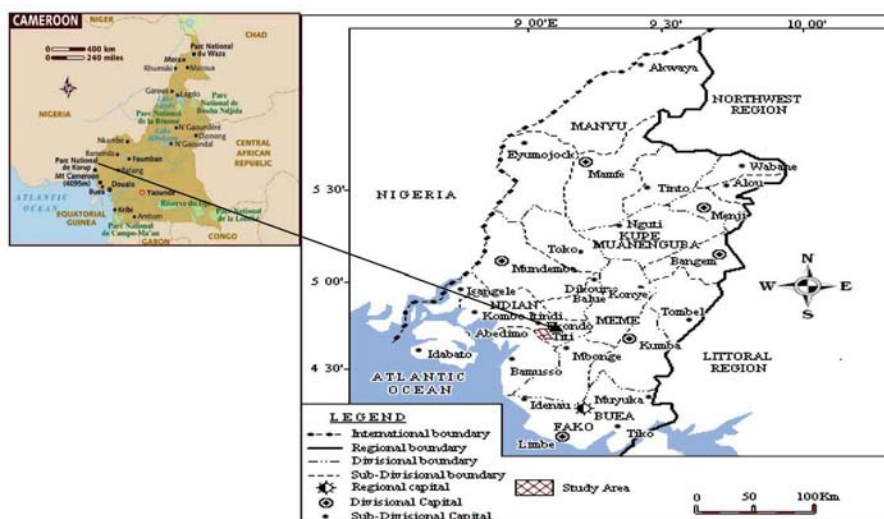


Figure 1. Location of Ekondo Titi in the South West Region of Cameroon

2.1.1 Research Methods

Using field observations and direct interviewing of specific authorities in this areas such as the Mayor of Ekondo-Titi Rural Council (ERC), local farmers, proprietors of small holder schemes, administrative authorities, Pamol management officials and retired workers of Pamol, primary data was generated. Ekondo Titi does not have any major water distribution agency (CDE or community water). The only attempt to supply pipe borne water has been through the efforts of Pamol Plantations which provides water supply (albeit erratic) to its workers who are lodged at the Camps in Lobe Estate and Lipenja. A stratified random sampling was done in which 10 out of the 36 villages found within the Sub-Division were sampled (Table 1). 200 questionnaires were distributed in which 164 was received giving a response rate of 82%. The questionnaire consisted of issues related to the potentials, challenges and opportunities for developing a water supply scheme that will be sustainable. In addition, it also captured issues related to the changing characteristics of major streams within the locality. The data on population evolution were obtained from Cameroon Statistical Yearbook, ERC and BUCREP. The population projection for 2015 and 2020 were done so as to give a clear picture of the approximate number of people who will be demanding water from the locality. The formula below was adopted for projection:

$$P3 = P1 + N/n (P2 - P1)$$

Where; P3 = Population of the year to be projected.

P1 = Population of the previous year.

P2 = Population of the current year.

N = Period P1 and P3 (years).

n = Period P1 and P2 (years).

Table 1. Distributions of Questionnaires in the Sampled Villages

Villages	Number of Questionnaires	Response Received	Response rate
Ekondo-Titi	55	47	85.45
Lobe Estate	55	49	89.09
Lipenja	30	24	80
Bekora	10	7	70
Bogongo I & II	10	6	60
Lobe Town	12	9	75
Njanga	8	5	62.5
Bafaka Balue	10	8	80
Masore	5	5	100
Ekwe	5	4	80
Total	200	164	782.04

Source: Field work, 2015.

3. Result

Ekondo Titi Sub Division has witnessed a substantial increase in her population which has contributed to its growth. As Pamol Plantations and other small holder schemes, including the port facilities attract more migrants into the town, so has the pace of urbanisation accelerated. The population moved from 21112 in 1976 to 60000 in 2010 (Figure 2). This more than two fold increase has been characterized by the massive colonisation of forested land which formed part of the catchment area. In addition, soil erosion, pollution and sedimentation of streams have been rampant.

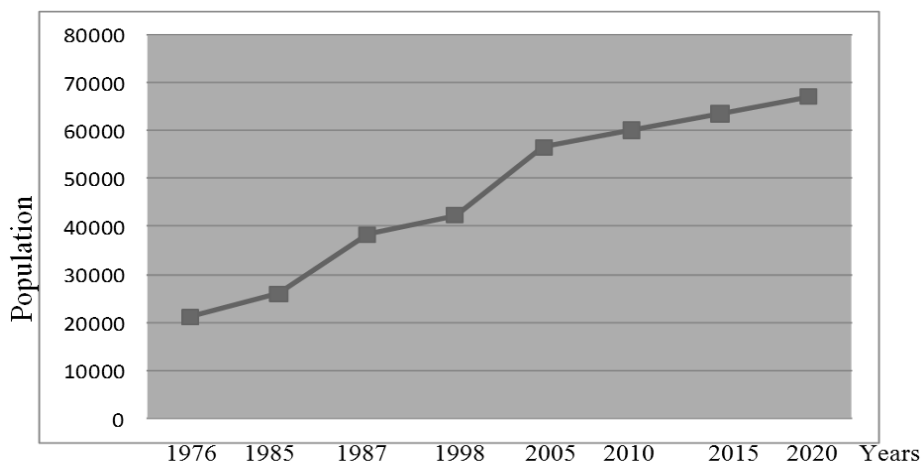


Figure 2. Population Trends in Ekondo-Titi Sub-Division

This situation has significantly altered the flow characteristics of the major streams which used to serve as an adequate source of water supply for the population in the past (Table 2). The above situation goes to confirm that the water resources in Ekondo-Titi are shrinking due to the destruction of watersheds and catchments areas. This deforestation has led to a reduction in stream flow with some perennial streams becoming seasonal. There has been a decrease in the volume of streams and the extinction of some rivers. “Ekondo Water”, “Ndiba” and “Mbanga Water” have decreased in volume while “Jungle Bay Stream” and “Bridge” have disappeared due to massive deforestation (Etongo, 2007).

Table 3. Flow Characteristics of Streams in Ekondo-Titi Urban from 1960-2010

Streams	1960-1970	1970-1980	1980-1990	1990-2010
Ekondo Water	Continous flow	Reduction in volume	Further decrease in volume & cultural eutrophication	Seasonal flow & cultural eutrophication more intense
Jungle Bay	Continous flow	Seasonal flow	Gradual disappearance as its volume reduces	No longer exists
Mbanga Water	Continous flow	Reduction in Volume	Further decrease in volume	Almost disappearing and characterized by massive sedimentation
Bridge	Continous flow	Reduction in Volume	Further decrease in volume	No longer exists
Ndiba	Continous flow	Reduction in volume	Further decrease in volume	Intermittent flow
Highway Stream	Continous flow	Reduction in volume	Further decreases in volume	Intermittent flow

Beach stream	Continuous flow	Reduction in volume	Further volume	decreases in	Significant reduction and massive sedimentation
--------------	-----------------	---------------------	----------------	--------------	---

Source: Etongo, 2007; Field work, 2010.

At the same time, water pollution is evident as the oil mills pump their effluents into the nearby streams while stream sedimentation has been overwhelming. Consequently, the local poor who depend on these streams for their livelihoods have been left with degraded streams. They, therefore, converge at the few available boreholes and wells to fetch water whose quality is questionable. Such pressures on water resources serve as possible media for the proliferation of water borne diseases. It then becomes a task for the rural populations who need to initiate a community water development scheme or water project for their livelihoods.

Despite these potentials, this Sub-Division suffers from inadequacy in potable water especially during dry season. Unlike in some urban areas where women and children congregate for water at the few flowing taps, the situation of Ekondo-Titi is different as the few wells and boreholes which are judged by the population to be clean suffer from pressure due to the congregation by different families (Figure 3). The few taps which were introduced by Pamol in Lobe Estate and Lipenja (Pamol Camps) scarcely flow all year round (Figure 4).



Figure 3. Pressure at a Well in Ekondo Titi



Figure 4. Pipe Borne Water in Lobe Estate: A Legacy of Pamol Plantation

It is important for stakeholders within and out of this region to come together to seek plausible solutions to the water problems plaguing this Sub-Division. Community participation which, to an extent, has been a success story in most rural communities of the North West Region should be given due consideration and sought as a panacea to this perennial problem.

A sustainable water supply framework for Ekondo Titi Sub Division should consider three key actions, namely, limiting catchment degradation, embarking on catchment rehabilitation and also opting for water harvesting on a large scale (Figure 5).

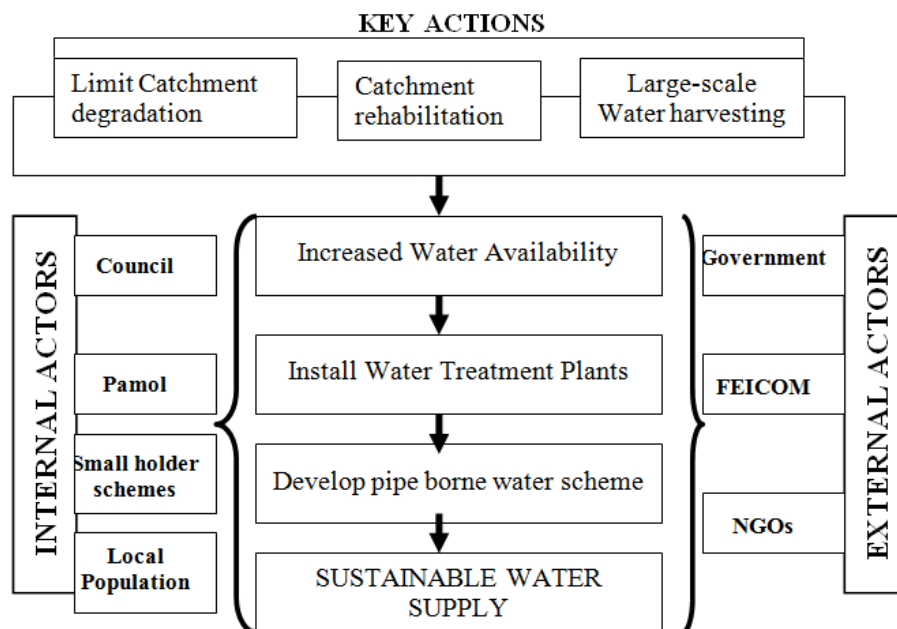


Figure 5. Model for Sustainable Water Supply and Management in Ekondo Titi Subdivision

The degradation of the nearby forests contributes to catchment degradation. To limit catchment degradation, it is necessary to set a limit to the expansion of plantations which encroach and degrade

the forests. This could be made possible by encouraging Pamol plantations and other private plantations to adopt a more intensive form of oil palm cultivation which makes use of improved and high yielding oil palm species so as to obtain substantial yields without necessarily expanding the plantations. In this respect, the Research Department of Pamol should solicit some research expertise from Malaysia which adopts modern technological oil palm production methods so as to improve on their oil palm species. This will help to sustain yields even if the hectareage is reduced. Given the high cost involved in obtaining these high yielding species, small-holders schemes can organize themselves into cooperatives and pull their resources together.

There is a need to introduce a reforestation project along the Masore-Ekondo Nene forest Axis so as to stabilize the degrading water catchment situation. This should be accompanied by the introduction of more water tolerant species so as to enhance underground water recharge and consequent stream flow. However, a major challenge to this action is the increasing population and demand for land for food crop production, settlement and for the establishment of oil palm and cocoa plantations.

For a town that is blessed with an equatorial climate, it is logical that resources should be galvanized by the council, Pamol and small holder plantations, and a levy be made to the local population to enable the procurement and installation of large-scale water harvesting gadgets which can augment potable water supply for the population. This initiative could also be supported by the government, NGOs and FEICOM since it essentially targets community development.

The collective contributions towards the implementation of these targets by the internal and external actors will increase the availability of water, ensure the creation of water treatment plants and pipe borne water installations both at the household and public levels. This will augment or improve on the potable water supply situation of Ekondo Titi on a sustainable basis.

However, the extent of success in achieving this objective rests, in a large part, on the ability to overcome a number of obstacles or barriers which presents itself. These threats include population increase, expansion of plantations, land use dynamics, poor waste management, the lack of finance and the existence of apathy by the various stakeholders. Consequently a number of issues must be considered in order to ensure success for the population.

4. Discussion

There is a need to design a Water Management Plan which takes into consideration all the possible ways of rehabilitating the water catchments and providing alternative measures to water supply. This will then be backed by the harnessing of these catchments and the distribution of water through the pipe borne system to the population. The plan should involve the authorities of Pamol, Small holder schemes, the Council, the Sub-Divisional delegations of Environment and Nature Protection as well and Forestry and Wildlife, including the local population. A shared vision should be the outcome of such a management plan which will promote the wise use of the forest and the stream for the collective benefits of the population.

Generally, government action concerning the provision of pipe borne water in Cameroon has been much geared towards the urban areas with little consideration for rural dwellers. It therefore becomes necessary to engage in community development strategies to improve on the situation. Community development schemes have met with some success in ameliorating the socio-economic situation of most communities in the North West Region of Cameroon. It is wise that such initiatives are introduced in the South West Region and particularly in Ekondo-Titi and Ndian Division in general for the development of this region. The creation of such a scheme will bring a sigh of relief to the local population which is suffering from the problem of water scarcity and associated water borne diseases. The community can initiate a development scheme and solicit help from the government and other rural development agencies like the South West Development Authority (SOWEDA), the Rumpi Project, other NGOs such as the Swiss Development Agency (Helvetas) as well as from the government.

A participatory approach towards community development scheme especially water supply within Ekondo-Titi will be working more in the right direction of meeting part of the Millennium Development Goals come 2015 which calls for the availability of abundant and safe water supplies to humankind. This is a very noble objective whose achievement could signal a success story and guarantee sustainable water supply in Ekondo-Titi.

Reversing or halting the trend of deforestation is important in ensuring catchment recharge. Gomez-Pompa (1991) recommended that to reverse the trend in deforestation, major changes in land management policy will be necessary; the success in reversing deforestation will depend on political leadership and appropriate policy changes. If protected areas and management of natural forests are included as important parts of the global solution to deforestation, land use planning and zoning will be needed on a scale vastly greater than we see in the tropics today.

The introduction of other economic activities will help to reduce the trend of deforestation since it will divert the attention of the local population from the forests to take advantage of these new economic opportunities. The introduction of such economic opportunities can be facilitated by the tarring of the Kumba-Ekondo-Titi-Mundemba High way which will guarantee the flow of goods and services into and out of this area. This is in line with the geographic axiom; “where a road passes, development follows”. It should be noted that this could solve the problem given that approximately 80% of the population is engaged in oil palm plantation cultivation which means that forest loss is evident.

As a short term measure, the practise of water harvesting should be encouraged. This area receives rainfall in 8 months so it is necessary to suggest that the council should construct a water harvesting tank that can store water during such rainy months, treats and distributes to the population during the dry season. Better still, the government could assist the population by subsidising the different households so that they can individually install water tanks to help them harvest and store some water.

In another dimension, the Ekondo Titi Council should solicit funds from FEICOM (Special Council Support Fund for Mutual Assistance) with the proposal of embarking on the distribution of potable

water to the population of Ekondo Titi. Such a proposal will be attractive and will reserve the deserved attention considering the crucial role water plays in the development of communities.

Water and socio-economic development are mutually dependent. Water is a valuable but vulnerable natural asset when, properly managed, it can be an instrument for poverty alleviation and economic recovery. However, when poorly managed, water can rather serve as a limiting factor in poverty alleviation, resulting in poor health and low productivity, food insecurity and constrained economic development (World Water Forum, 2000). A major factor contributing to the rapid destruction of forests in Ndian (Ekondo-Titi included) is the proliferation of agro-industrial and small-holder palm plantations that contrary to traditional farming systems, require total removal of forests. The creation of Pamol Plantations has introduced multiplier effects as it has led to the growth of small-holder plantations which, in combination with Pamol, account for the massive forest loss which is already affecting the hydrology of the area leading to water scarcity. A logical framework for sustainable water supply needs to take into full consideration, the need to bring all the actors to the central stage to manage the remaining forest and to rehabilitate the degrading catchments for successful water supply to this growing and emerging urban centre. While community development efforts could be laudable, it is necessary to note that institutional support from the government and other donor agencies could better assist in putting in place the necessary measures to redress the problem.

References

- American Institute of Biological Sciences. (2001). *Excerpts from International Union of Forest Research Organization-IUFRO*. Occasional Paper No 5.
- Balgah, S. N. (2007). Population Growth and Land Use Dynamics in Buea Urban Area, Cameroon. *Loyola Journal of Social Sciences*, XXI(1), January-June 2007.
- Coleridge, S. T. (n.d.). *The Rime of the Ancient Mariner the Lyrical Ballads*.
- Down to Earth No. 69. (May, 2006). *Biodiesel and the Expansion of Oil Palm Plantations: The New Demand for Biofuel is Putting More Pressure on Community Land*. Retrieved from <http://www.walhikalsel.org/eng/index.php?option=comcontent>
- Esoko Magazine. (February, 2008). *Ndian: Heartbeat of the Nation*. Published by Ndian Divisional Chiefs Conference (NDICCO).
- Etongo, B. D. (2007). Land Use Dynamics and Vegetation Change in Ekondo-Titi Sub-Division. In *S. W Province of Cameroon* (Unpublished M.Sc). Thesis FSMS Department of Geography, University of Buea.
- FAO Corporate Document Repository. (2006). *Forests, Sediment and Water Quality*. Retrieved from <http://www.bsponline.org/bsp/publications/africa/127/congo> Accessed on 10/07/2008
- Gleick, P. H. (2002). Dirty Water: Estimated Deaths from Water-Related Diseases 2000-2020. Pacific Institute for Studies in Development, Environment, and Security. In *Pacific Institute Research Report*. Retrieved from

- http://www.pacinst.org/reports/water_related_deaths/water_related_deaths_report.pdf
- Gomez-Pompa, A., & Whitmore, C. T. (1991). *Rainforest Regeneration and Management*, 6. Retrieved from <http://www.rainforestconcern.org>
- Helvetas Cameroon. (2003). *Village Water Supply Caretakers Manual*. Gospel Press Bamenda.
- Helvetas Cameroon. (2003). *Village Water Supply Caretakers Manual*. Gospel Press, Bamenda, Cameroon.
- Helvetas Cameroon. (2003). *Water Management Committee: Training Manual Gospel Press*. Bamenda Cameroon.
- Jonch-Clausen, T. (2004). *Integrated Water Resources Management and Water Efficiency Plans by 2005, Why, What and How?* Global Water Partnership, Stockholm, Sweden. Retrieved from <http://www.gwpforum.org/gwp/library/TEC10.pdf>
- Kimengsi, J. N. (2006). *Rainfall Characteristics and Its Implication for Agricultural Production in Ekondo-Titi Sub-Division* (Unpublished B.Sc). Dissertation, FSMS, Department of Geography, University of Buea.
- Kimengsi, J. N. (2008). The Contribution of Pamol Plantation and Its Associated Environmental Impacts to the Development of Ekondo-Titi Sub-Division. In *South West Province of Cameroon* (Unpublished Master of Science Thesis). FSMS, Department of Geography, University of Buea.
- Lambi, C. M. (2001). *Environmental Issues: Problems and Prospects*. Unique Printers, Bamenda.
- Mambo, O. (2008). The Virgin Forests of Ndian. In E. Magazine (Ed.), *Ndian: Heartbeat of the Nation*. Published by NDICCO.
- Sakwe, N. S. (2001). *The Growth and Development of Ekondo-Titi Sub-Division: An Emerging Urban Centre* (Unpublished B.Sc). Dissertation, FSMS, University of Buea.
- Stoker, H. S., & Spencer, L. S. (1976). *Environmental Chemistry: Air and Water Pollution* (2nd ed.). Scott, Foresman & Company, Illinois USA.
- UNICEF. (2010). *Water, Sanitation and Hygiene*. Retrieved from http://www.unicef.org/media/media_45481.html
- White, S., & Alekseev, I. (2005). Global Environmental Issues. In *FAO Corporate Document Repository*. (2006). *Forests, Sediment and Water Quality*. <http://www.bsponline.org/bsp/publications/africa/127/congo> Accessed on 10/07/2008
- World Bank. (1999). The World Bank's Forest Policy Implementation Review and Strategy Development-FPIRS, Prepared by World Rainforest Movement. *Forest Peoples Programme and Environmental Defense Fund*.
- World Bank. (2006). *Sustainable Land Management: Challenges, Opportunities and Trade-Offs*. The World Bank, Washington DC.
- World Development Report. (2006). *Equity and Development*. A Co-Publication of the World Bank and Oxford University Press.
- World Health Organization and UNICEF. (2005). *Water for Life Making it Happen*. WHO/UNICEF

Joint Monitoring Programme for Water Supply and Sanitation. *WHO Library Cataloguing-in-Publication*. Data. Retrieved from
<http://www.un.org/waterforlifedecade/factsheet.html>