ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 10, Issue, 10, pp.74873-74878, October, 2018

DOI: https://doi.org/10.24941/ijcr.32750.10.2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

WATER RESOURCES UTILIZATIONAND SUSTAINABLE RURAL LIVELIHOODS IN MWINGI SUB-COUNTY, KITUI COUNTY, KENYA

***Dr. Samuel K. Mutukaa**

School of Education, Humanities and Social Sciences, South Eastern Kenya University

ARTICLE INFO

Article History:
Received 24th July, 2018
Received in revised form
28th August, 2018
Accepted 27th September, 2018
Published online 31st October, 2018

Key words:
Water Resources,
Utilization,
Sustainable and Rural Livelihoods

ABSTRACT

Water resources are essential to a country's economic growth and economic development if they are effectively utilized by converting into tangible goods and services within an economy. However, the utilization of resources varies from one resource to another and in different areas. In arid and semi-arid lands, water resources play an important role in sustaining rural livelihoods as well as wildlife and plants. In Mwingi Sub-County, Kitui County and particularly in Tseikuru division, rural communities are assumed to be highly dependent on water resources for their rural livelihoods but its utilization is in dilemma. The Sub-County is endowed with abundant water resources despite the persistent food crisis in the district over the years. The purpose of this study is to investigate the factors that affect utilization of the available water resources as a mean of improving of rural livelihoods for the rural communities in Tseikuru division of Mwingi Sub-County in Kenya. Specifically, the study sought to investigate the challenges faced in tapping available water resources for sustainable rural livelihoods in Tseikuru division of Mwingi Sub-County and to establish appropriate strategies that can be used for effective water resource utilization for sustainable rural livelihoods in Mwingi Sub-County. This study was based on Sustainable Livelihood Framework by Scoones in conceptualizing livelihoods and rural poverty. In this study descriptive research design was used. The study used a target population of 3,980 households and a sample of 150 respondents was selected using simple random sampling in the three locations of Tseikuru division of Mwingi Sub-County. The data was collected by administering questionnaires to randomly selected community. The primary data was collected by use of questionnaires while secondary data was collected from documented materials and other research work done by other researchers. The data was processed and analysed using tables, frequencies and percentages. Arising from this study, it can be concluded that, water resources in Tseikuru division are adequate to support sustainable rural livelihoods and that water resources contribute very little to the improvements of the people's livelihoods in Tseikuru division. This study also concluded that local people face numerous challenges in attempt to exploit available water resources to enhance their livelihoods such as poor government policies, lack of funds and inappropriate technology. The study recommended a number of strategies that can be adopted for effective utilization of water resources to enhance livelihoods of the local people despite the fact that these strategies have not been integrated into the development planning. These strategies include: first, developing and utilizing appropriate strategies not only for water but also for agricultural production and other alternative productive activities such as fish farming. Secondly, capacity building of local people on the appropriate strategies that can be used for water utilization is very vital. Thirdly, this study further recommended the creation of incubation centres to enhance skills transfer for rain water harvesting and utilization. Finally the study recommended integration of water resource utilization strategies into the development planning for Mwingi Sub-County for achievement sustainable rural livelihoods.

Citation: Dr. Samuel K. Mutukaa. 2018. "Water resources utilizationand sustainable rural livelihoods in Mwingi sub-county, Kitui County, Kenya", *International Journal of Current Research*, 10, (10), 74873-74878.

INTRODUCTION

Water is a basic resource for development and economic growth in most developing countries. Human beings depend on water not only for intake but also for food production. Approximately 1.5 billion people in the world depend on ground water for their drinking supply (Tietenberg, 2006) and Agriculture is the largest consumer of water among other resources.

****Corresponding author:*** **Dr. Samuel K. Mutukaa,**
School of Education, Humanities and Social Sciences, South Eastern Kenya University.

According to Brundtland Report, (1987) entitled "Our Common Future of the World Commission on Environment and Development (WCED)" diversification of the water resource base in ways that will alleviate both poverty and ecological stress is hampered by disadvantageous terms of technology transfer, protectionism and declining financial flows to those countries that need international finance. In Thailand, through the Mekong Valley water projects, large areas of land are irrigated for rice cultivation, fish ponds which help to reduce food shortages and malnutrition (Mitchell, 1989). Natural resources (land) have been optimised and its productivity increased through resource utilization in Egypt

and Sudan by diverting River Nile for irrigation (Mitchell, 1989). The establishment of Millennium Development Goals (MDGs) by the United Nations approved by 189 nations in September 2000, articulated the goal of halving the number of people living under absolute poverty by year 2015 (UN, 2000). In the Sub-Saharan Africa (SSA), Agriculture is the most important economic activity supporting over 67 percent of the population, but 60 percent of these depends on water and rain-based rural economies, generating in the range of 30-40 percent of the countries' GDP (World Bank 1997). Over 200 million people do not have sufficient food and this is 30 million more than a decade ago (and nearly 60 million more than 20 years ago). About one-third of the people of SSA are malnourished, with more than 60 percent of these in East Africa; in West Africa the number of malnourished people has fallen dramatically (IGAD, 2001). In Kenya after independence, the country set an objective of providing a secure safe water supply to the entire population and for the livestock by the year 2000 as a pre-requisite for rural development (Tippet & McCarth, 1980). The objective has been constrained by many factors. First, very high population growth of nearly 3.8% per year Second, insufficient financial resources from the government to construct new schemes as planned, operate and maintain the existing ones. Third, the fact that more than 60% is arid and semi arid with little surface water resources while underground studies have not been comprehensively done to know the potential of water available. In 1994-1996 Kenya development plans, the objectives included: Fourth, adoption of water distribution practices and water pricing policies which ensured that social objectives are not ignored, Fifth, provision of incentives for efficient water use and penalising wasteful or environmentally harmful water practices and sixth, recognition of the principle of cost-sharing so that people can make contribution towards the provision and maintenance of water services (McPherson et al., 1984).

Statement of the Problem: Natural resources are essential to economic development if they are effectively utilized and converted into tangible goods and services within an economy. However, the utilization of resources varies from one resource to another and in different areas. In arid and semi-arid lands, water resources play an important role in sustaining rural livelihoods as well as wildlife and plants. In Mwingi Sub-County and particularly in Tseikuru division, rural communities are highly dependent on water resources for their rural livelihoods but its utilization is in dilemma. The district is endowed with abundance of water resources despite the persistent food crisis in the district over the years with high prevalence of poverty with 65.5% of the people living below poverty line (Mwingi Sub- County Development Plan 2012-2018) and 66.5% of the household living in absolute poverty and among the worst hit by famines and food insecurity (WMS, 2000). The available water resources have the capacity to transform the extensive arable land with fertile soils of Mwingi Sub- County into a grain basket of the rural communities and make poverty and food shortages a thing of the past. The district has fragile eco-system that is being pushed to the limit due to increasing population pressure, deforestation, growing vulnerability to climatic shocks, re-current prolonged periods of droughts leading to crop failures which makes tapping of available water resources as a land use option. However, despite all these water resources, there is inadequate objective information to qualify these claims. This study therefore seeks to investigate the factors that affect utilization of the available water resources as a means of improving rural livelihoods for the rural communities in Tseikuru division of Mwingi Sub- County in Kenya.

Purpose of the Study: The purpose of this study was to investigate of the challenges faced in tapping available water resources for sustainable rural livelihoods in Tseikuru division of Mwingi Sub- County. Specific objectives were:

- To establish the levels of water resource utilization from different water sources in Tseikuru division of Mwingi Sub- County.
- To investigate the challenges faced in tapping available water resources for sustainable rural livelihoods in Tseikuru division of Mwingi Sub- County.
- To establish appropriate strategies that can be used for effective water resource utilization for sustainable rural livelihoods in Mwingi Sub- County.

Hypothesis of the Study

Ho_1: There is no significance relationship between water utilization and the type of water resources-base in Tseikuru location of Mwingi Sub- County in Kenya.

Theoretical Framework: This study was based on Sustainable Livelihood Framework that was developed by Scoones (1998) for conceptualizing poverty. According to Ian Scoones (1998) a sustainable rural livelihood is a livelihood that can cope with and recover from stress and shocks, both now and in the future, while not undermining the natural resource base. The utilization of (SLF) has been seen as important for poverty reduction by the Department for International Development (DFID, 1999) where a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. The sustainable livelihood principles indicate that poverty focused development should be people centred, responsive and participatory, multi-conducted in partnerships sustainable and dynamic. Chambers & Conway (1992 observed that, livelihood is a set of capabilities, assets (stores, resources, claims and access) and activities that provide the means for people to meet their basic needs and support their well-being. A livelihood is sustainable when it can cope with and recover from stresses and shocks maintain or enhance its capabilities and assets, while not undermining the natural resource base. The Sustainable Livelihoods approach is the emphasis on the analysis of assets through a framework of five types of capital: natural, human, financial, physical and social capital. Carney (1998) asserts that Sustainable Livelihood analysis helps to identify a number of different options for supporting livelihoods but development programmes and projects. The emphasis is laid on identifying and negotiating with partners and primary stakeholders, the best entry points that can have a significant impact on the livelihoods of the poor. Therefore, this study focused on the natural capital and particularly the water resources and it's the challenges facing water utilization for improved rural livelihoods of Tseikuru communities in Mwingi Sub- County in Kenya.

The Research Methodology

The Research Design: The procedure used for carrying out this research study was descriptive research design. This design was chosen because it uses individuals as a basic unit of

analysis and it helps in collecting the original data that describes a population that cannot be observed directly. Polit & Hunger (1999) described research design as the blue print or outline for conducting study in such a way that maximum control is exercised over factors that could interfere with validity of the research results. The information was gathered through survey method by use of questionnaires and semi-structured interviews. These were later analysed to determine the possible answers to the research hypothesis and provided relevant information needed to achieve the research objectives.

Population of the Study: The population of the study consisted of households in Tseikuru division of Mwingi Sub-County living proximity to water sources in Kenya, Eastern province as shown in the study area. Tseikuru division was selected using purposive sampling. Maxwell (1996) describes purposive sampling as a strategy in which particular settings, persons selected deliberately in order to provide important information that cannot be obtained. The study is based on the fact that Tseikuru bonders Tana River which is a major source of water in the region. This study targeted a total population of 3,980 households. The average number of members per household was 6 as per the 1999 National census.

Table 1. The population of Tseikuru division

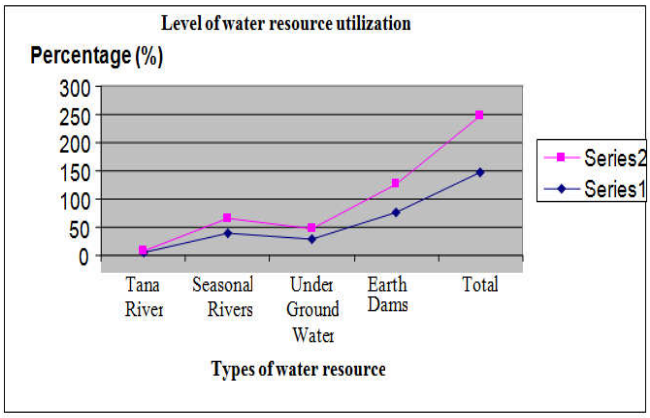
Location	Total population	No. of Households
Tseikuru	11,940	1,990
Musavani	7,164	1,194
Masyungwa	4,776	796
TOTAL	23,880	3,980

Source: Mwingi Sub- County Commissioner's office, (Census, 1999)

Table 2. The sample size from Tseikuru Division

Location	No. of Households	Households Near water<5km	Nx30%	Sample size
Tseikuru	1,990	275	275*0.3	82.5
Musavani	1,194	134	134*0.3	40.2
Masyungwa	796	91	91*0.3	27.3
TOTAL	3,980	500	500*0.3	150

Source: Mwingi Sub- County Water Office annual Report 2012.



Source: Research data

Figure 1. Levels of water utilization from different water sources

Sampling Design and Sample Size: In this study, the sampling technique used was simple random sampling technique in order to arrive at the desired sample. All family members were given equal chance of responding to the questions.

A simple random sampling is a probability sampling technique where each and every item in the population has equal chance of being included in the sample (Pizam, 1999). This technique was chosen because it's easy to use, economical and ensures that all elements have equal chance of being included in the sample. The study area was selected using purposive sampling technique because it is located adjacent to major water resources such as Tana River among others. Hence a random sampling technique was used to select respondents from different households. The community members from the three locations of Tseikuru division were first selected using simple random sampling technique.

The key informants were sampled from the division using purposive method in order to get relevant information concerning the technical aspect of water issues in the division, and to get in-depth information to verify the respondent's responses in the study area. In this study a sample of one hundred and fifty (150) respondents was selected using simple random sampling in the three locations of Tseikuru division of Sub- County district. To do this the researcher obtained a list of the total number of households in Tseikuru division by locations, from the Sub- County Commissioner's Office, Mwingi and the household proximity to water resources from the Mwingi Water Office. The sampling frame composed of all the households living adjacent to water resources in less than 5 kilometres in the division. According to Mugenda & Mugenda (1999) a minimum of 30% of the target population is enough to be included in the sample which is representative of the entire population under study.

Data Collection Procedures: In this research study, the data was collected from both primary and secondary data sources. The main research instruments to be used in data collection were questionnaire complemented by use of semi-structured interviews. Semi-structured interviews were used to collect information from the key informants who will select from Non Governmental Organizations (NGOs), and Civil servants. The data was collected by the principal researcher with the help of one (1) research assistant using a list of households provided by Sub- County Commissioners office on population and statistics for the three locations of Tseikuru division of Mwingi Sub- County. The research assistant was thoroughly trained before the exercise in order to understand the process. Appointments were made in advance with the key community informants to avoid missing the respondents. Before giving questionnaires, the researcher explained the respondents in details the aim of the research and went through the questionnaire with them first. The questionnaires were be administered to the community stakeholders after agreement with the respondent at each household while drop and pick letter method will also be used for the case of busy key informants. By using the questionnaire, members of the community were asked the same questions in the same sequence and provided information in the same way for all the stakeholders.

Primary Data Sources: Primary data was collected from the field survey using questionnaires as the principle research instrument and semi-structured interviews. In this study, both open and closed ended questionnaires were employed to gather information relevant to this study. These were both open and closed ended questions in order to capture all the information and opinion of the respondents. Quantitative data was collected through the questionnaire method.

Secondary Data Sources: Secondary data was also used to complement the primary data. This data was gathered from documented materials relevant to the area study. These included textbooks, research papers, economic surveys, statistical abstracts, journals, newsletters, annual reports and unpublished work from research institutions, Moi university library, Mwingi Sub- County office, Tseikuru divisional headquarters, government printer and archives. The secondary data was used as a basis to confirm and contrast the findings in the study. The key informants were interviewed using both the questionnaire and open-ended structured interview questions to provide in-depth information concerning water resources in the Division and verify the response from other members of the community.

Data Analysis and Interpretation: The data analysis involved the survey data collected by the principal researcher from field from the three locations of Tseikuru division of Mwingi Sub- County. These locations included Tseikuru, Musavani and Masyungwa locations of Tseikuru division. It was noted that, out of 150 questionnaires issued, 2 were not returned and the data analysis was carried out using 148. Hence the response rate in this study was 99% which was considered to be adequate. This study employed both quantitative and qualitative data analysis techniques. The quantitative techniques for data analysis used in this study were a combination of both descriptive and inferential statistics. The descriptive analysis was used to describe what was going on the data and included tables, frequencies and percentages. The analysed data was presented and interpreted through simple frequency tables. The data was analysed using SPSS program version 17.0. The inferential analysis is concerned with estimating whether the characteristics of relationships found in the sample could be expected to exist in the population, thus allowing for generalization of the sample statistics to the population parameter (Blaikie, 2003).

Hypothesis: In this study the one hypothesis was tested at 0.05 significance level. The Chi-Square analysis was run using SPSS Program to establish the significance relationship between water utilization and the type of water resources-base in Tseikuru location of Mwingi Sub- County. The Pearson Chi-Square value was 0.526 meaning that the results were not statistically significant. Hence rejected alternative hypothesis at 0.05 level of confidence. Hence, there was no relationship between water utilization and the type of water resources-base strategies in Tseikuru location of Mwingi Sub- County. This means that utilization of water resources does not contribute most of the water-based livelihood strategies that are important to improve people's livelihoods such as crop and livestock farming, fishing or irrigation. The qualitative data analysis was undertaken through structured interviews composed of open-ended questions. This was mainly to qualify and appreciate the findings of the qualitative research. The qualitative data analysis started on the collection of data from the respondents and the key informants. The data was edited, clarification of words were made and organized based on topical issues raised during the interview schedule to answer the open-ended questions.

RESULTS AND DISCUSSION

Levels of water resources utilization from different water sources: *The first research objective sought to establish the levels of water resource utilization from different water sources in Tseikuru division of Mwingi Sub- County.*The results from (figure 1) above indicates that, the most utilized type of water resource is earth dams with 51.4%, followed by seasonal rivers with 26.4% , then under ground water with 19.6% and the least utilized type of water resource is Tana River with only 2.7% respondents. When the respondents were asked to comment on the extent to which the available water has been utilized, out of a total of 148 respondents interviewed,

Table 3. Reasons why water Resources has been under-utilized

Challenges of Water use	Low quality and Salinity		Lack of money		Lack of information		Lack of technology		High level Of Illiteracy		Poor Government policies	
Frequency/ Percentage	f	%	f	%	f	%	f	%	f	%	f	%
Strongly Agree	42	28.4	74	50.0	59	39.9	71	48.0	66	44.6	105	70.9
Agree	56	37.8	63	42.6	63	42.6	65	43.9	48	32.4	39	26.4
Neutral	15	10.1	6	4.1	18	12.2	7	4.7	5	3.4	2	1.4
Disagree	22	14.9	4	2.7	4	2.7	2	1.4	19	12.8	2	1.4
Strongly disagree	13	8.8	1	0.7	4	2.7	3	2.0	10	6.8	0	0
TOTAL	148	100	148	100	148	100	148	100	148	100	148	100

Source: Research data

Table 4. Strategies of ensuring Sustainable Water Resource utilization in the Area

Strategies of sustaining available water use	Construct water canal from Tana river		Protection of water catchments areas		Capacity Building of water users		Improved level of technology		Enforce law on ownership of water resources		Rehabilitate existing water infrastructures	
Frequency and Percentage	f	%	f	%	f	%	f	%	f	%	f	%
Strongly Agree	67	45.3	67	45.3	58	39.2	56	37.8	8	5.4	40	27.0
Agree	70	47.3	72	48.6	76	51.4	78	52.7	14	9.5	80	54.1
Neutral	9	6.1	4	2.7	8	5.4	10	6.8	20	13.5	5	3.4
Disagree	2	1.4	4	2.7	2	1.4	2	1.4	17	48.0	14	9.5
Strongly disagree	0	0	1	0.7	4	2.7	2	1.4	35	23.6	9	6.1
TOTAL	148	100	148	100	148	100	148	100	148	100	148	100

Source: Research data

(142 (95.9%) said that the available water resources in the region is under utilised and only 6 (4.1%) which said it was optimally used. The study found out that most utilized type of water resource is earth dams with (51.4%), followed by seasonal rivers while the underutilized type of water resource is Tana River with only (2.7%) but which forms the main water resource.

Challenges faced in taping of available water resources for sustainable rural livelihoods: *The second research question sought to investigate the challenges faced in tapping available water resources for sustainable rural livelihoods in Tseikuru division of Mwingi Sub- County*. The table below shows the results obtained from respondents on reasons for under utilization of water resources. From Table 3 above, the findings indicated that, the main reason why water resources have remained under-utilized is because of poor government policies with 97.3% of respondents with agree and strongly agree. 92.6% of the respondents cited lack of money as problem with agree and strongly agree, 91.9% of the respondents cited lack of technology as problem with agree and strongly agree, 82.5% of the respondents cited lack of information as problem with agree and strongly agree, 77.0% of the respondents cited illiteracy as problem with agree and strongly agree and 66.2% of the respondents cited low quality and salinity as the main challenge on agree and strongly agree basis. The main challenge facing the local communities in tapping of the available water resources and why water resources have remained under-utilized is because of poor government policies, lack of money and lack of technology.

Strategies for Effective Water Resource utilization: *The third research question sought to establish appropriate strategies that can be used for effective water resource utilization for sustainable rural livelihoods in Mwingi Sub-County.* The results were presented in table 4 below. The results from the (Table 4) above indicated that, on the basis of both combined agree and strongly agree, the best strategies for ensuring sustainable water resource utilization in the area includes: Protection of water catchments areas (93.9%), construct water canal from Tana river (92.6%), capacity building of water users (90.6%), improved level of technology (90.5%), rehabilitate existing water infrastructures (81.1%) and enforcing law on ownership of water resources with (14.9%).

Conclusion

The levels of water utilization in different sources, reasons why water has been under utilized and the problems facing management of available water resources were studied. Arising from the findings two key conclusions has been derived: First, this study concludes that water resources in Tseikuru division have a potential to support sustainable rural livelihoods by making use of different water sources such as Tana River water, Earth dams, under ground water and seasonal rivers.
However, the local communities are not benefiting from the available water resources to improve their livelihoods. This is because the level of water utilization for productive purposes that may contribute and boost the economic development of the region is very small. The Tana River which forms the main water resources is the most under utilized resource. Secondly, this study concludes there are numerous challenges that act as impediments to the utilization and exploitation of available water resources for improved rural livelihoods. This is evidenced by poor government policies concerning water development in the area, insufficient funds to exploit water resources, lack of technology, lack of information, high levels of illiteracy with of the populations who has never attained secondary education or higher, low quality and salinity of water which is an obstacle to water use. Thirdly, this study identified various strategies that can be adopted for effective utilization of available water resources to enhance rural livelihoods of the local people. These strategies can be integrated into the sectoral and regional development planning. They include: Protection of water catchments areas, construction of water canals from Tana River for irrigation, capacity building of water users, use of improved and appropriate technology and rehabilitate existing water infrastructure.

Recommendation

Arising from the conclusion of this study, the following recommendations have been derived. The key stakeholders should take measures to enhance utilization of abundant water resources through the following means: (i) Developing and utilizing appropriate strategies not only for water but also for agricultural production and other alternative productive activities such as fish farming. The tapping of Tana River water resource base into irrigated agriculture. Tana can has a big potential of turning Tseikuru division into bread basket if these water resources can be properly utilized for agricultural production (ii) Capacity building of local people on the appropriate strategies that can be used for water utilization is very vital. Capacity building needs community mobilization through extension services by the government (extension water officers), the private sector and other development partners. This can be done through training of community local leaders on basis knowledge such as pump repairs, spare parts of hand pumps of borehole machines and how to operate the water pumps, book keeping, small pump repairs, and formation of water committees and how to operate water kiosks and other simple maintenance services. (iii) Creation of incubation centres to enhance skill transfer for rain water harvesting and utilization. Hence Provision of expertise and required level of technology to exploit water resources. The choice of technology should be community driven, based on appropriateness because ownership and acceptability of the proper management of the existing water works by the households is the key to sustainability, and (iv) The integration of water utilization strategies into the development planning and strategies for Mwingi district in order to ensure sustainable rural livelihoods

Suggestions for further Research: This research is based on water resources and sustainable rural livelihoods in Tseikuru division of Mwingi Sub- County. These water resources include Tana River, earth dams, ground water from boreholes and seasonal rivers. Therefore a further research is useful: (i) A research is needed to examine the challenges facing commercialization of underground water resources in Tseikuru division of Mwingi Sub- County. (ii) A study is useful to determine the role of capacity building as strategy for awareness creation on improved water utilization in Tseikuru division of Mwingi Sub- County.

REFERENCES

_____Mwingi Sub- County Water Office Annual Report 2012.

Blaikie, N. 2003. *Analysing Quantitative Data from description to explanation*. SAGE, London

Brundtland, G.H. 1987. *Our Common Future*: The Brundtland Report on World Commission on Environment and Development (WCED).Oxford University Press.

Carney, D. 1998. *Implementing the Sustainable Rural Livelihoods Approach*: Sustainable Rural Livelihoods: What contribution can we make? CARNEY, D. (eds). Progress and Possibilities for Change. DFID, London.

Chambers, R. and Conway, G. 1992. *Sustainable Rural Livelihoods*: Practical Policies for the 21st Century. IDS, Discussion Paper 296.

DFID, 1999. *Department for International Development Sustainable livelihoods guidance sheets*. London Department for International Development. London

IGAD 2001. *Promotion of Crop Production in the Dry lands of IGAD region*. Proceedings of a Workshop, Oct. 29 - Nov.2, 2001. IGAD, Nairobi, Kenya.

Maxwell, J.A. 1996. *Quantitative Research Design*. An interpretive Approach. Applied social

McPherson, H.J., McGarry, M.G. and Latham, B. 1984. *Low-Cost Appropriate water and sanitation Technologies for Kenya*. Ottawa, Canada; Water International. 257p.

Mitchell, B. 1989. *Geography and Resource Analysis*. 2nd Edition, Longman London.

Mugenda, O.M. and Mugenda, A.G. 1999. *Research Methods. Quantitative and qualitative Approaches.* Acts press, Kenya.

Pizam, M. 1999. *Fundamentals of Tourism Research*, Dryden Press.

Plan 2012-2018. "Effective management for sustainable economic growth and poverty alleviation" Nairobi: Government Printer.

Polit, D.F. and Hunger, B.P. 1999. *Nursing research principles and methods*. 5th Edition, Philadelphia.

Republic of Kenya 2002. *National Development Plan. Mwingi* Sub- County Development

Research methods series: Thousands Oaks, SAGE: California

Tietenberg, T. 2006. *Environment and Natural resource economics*. 7th Edition. Pearson International Edition. United states of America.

Tippet, A . & McCarth, S. 1980. *Kenya National Master Plan Stage 1*. Volume 1.Summary and National Plan. Ministry of Water Development, Nairobi.

United Nations 2000. *United Nations Millennium Development Goals (MDGs*). [Online] Available: http://www.un.org/ milleniumgoals (Accessed: 20 October, 2018)

Welfare Monitoring Survey 2000. *Second Report on poverty in Kenya*, Ministry of Finance And Planning: Volume III, Welfare Atlas December, 2000.

World Bank 1997. *World Development Report, 1997.*

****