Factors Influencing Water Resource Governance among Pastoral Community at Mkondoa Sub-Catchment, Morogoro Region, Tanzania

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ABSTRACT: The importance of proper Water Resource Management with greater emphasis on ensuring sustainability, quality, accountability and community participation has become imminent as water resources increasingly become scarce (Harvey et al., 2007). Water resources management in Tanzania is governed under the National Water Policy of 2002 and Water Resources Management Act No.11 of year 2009. Other related legislations include Environmental Management Act No. 20 of year 2004, Forest Policy and Forest Act No. 14 of year 2002 and Water Supply Act No.12 of year 2009 among others. However the mechanisms, processes, and institutions through which all stakeholders articulate their priorities, exercise their legal rights, meet their obligations and mediate their differences is still missing. This study employed descriptive exploratory research design. Data collection was done by the use of both structured and semi structured interview to respondents who were both purpose and simple randomly selected, observation and focus group discussion. Review of reports from Districts and Basin offices and internet to access relevant secondary information was done. Results show that WUAs, LGAs and WSSAs lack relevant understanding, capacities, management and law enforcement as result water management generally remains non participatory, inefficient and expensive and increased water user conflicts in Kisangata and Ilonga WUAs of Mkondoa sub catchment, Morogoro region. The study propose participatory approaches best practices on water resource management at local level for embracement of Integrated Water Resources Management (IWRM). Community participation has become imminent as water resources increasingly become scarce (Harvey et al., 2007). Water resources management in Tanzania is governed under the National Water Policy of 2002 and Water Resources Management Act No.11 of year 2009. Other related legislations include Environmental Management Act No. 20 of year 2004, Forest Policy and Forest Act No. 14 of year 2002 and Water Supply Act No.12 of year 2009 among others. However the mechanisms, processes, and institutions through which all stakeholders articulate their priorities, exercise their legal rights, meet their obligations and mediate their differences is still missing. This study employed descriptive exploratory research design. Data collection was done by the use of both structured and semi structured interview to respondents who were both purpose and simple randomly selected, observation and focus group discussion. Review of reports from Districts and Basin offices and internet to access relevant secondary information was done. Results show that WUAs, LGAs and WSSAs lack relevant understanding, capacities, management and law enforcement as result water management generally remains non participatory, inefficient and expensive and increased water user conflicts in Kisangata and Ilonga WUAs of Mkondoa sub catchment, Morogoro region. The study propose participatory approaches best practices on water resource management at local level for embracement of Integrated Water Resources Management (IWRM). Community participation has become imminent as water resources increasingly become scarce (Harvey et al., 2007).

Key Words: Water, social-economic, environmental, participation, sustainability

ACRONYMS

AWP: Annual Work Plan
BWB: Basin Water Board
BWO: Basin Water Office
CBOs: Community Based Organizations
CBWRM: Community Based Water Resource Management
CBWRMA: Community Based Water Resource Management Approach
COWSOs: Community Owned Water Supply Organizations
WCA: Water Consumer Association
CWC: Catchment Water Committee
DWS Ts: District Water and Sanitation Teams
EFA: Environmental Flow Assessment
EIA: Environmental Impact Assessment
ESAs: External Support Agencies
EWURA: Energy and Water Utilities Regulatory Authority
FBOs: Faith Based Organizations
GWP-TAC: Global Water Partnership-Technical Advisory Committee
HACH: Human Advancement and Creativity House
HH: House Hold
IWRM: Integrated Water Resources Management
IRC: International Rescue Committee
JKUAT: Jomo Kenyatta University of Agriculture and Technology
LFA: Logical Framework Analysis
LGA: Local Government Authority
m.a.m.s.l: Meters above mean sea level
MIS: Management Information System
MDGs: Millennium Development Goals
MoW: Ministry of Water
MS TCDC: MS Training Centre for Development and Corporation
NGOs: National Governmental Organizations
NWB: National Water Board
NWSDS: National Water Sector Development Strategy
PBWB: Pangani Basin Water Board
SCWC: Sub-Catchment Water Committee
SMART: Specific, Measurable, Affordable, Realistic, and Time-bound
SPSS: Statistical Package for Social Science
SIS: Surface Water
SWOC: Strengths, Weaknesses, Opportunities, Challenges.
SEMA: Sustainable Environment Management
TMA: Tanzania Meteorological Agency
TTC: Teachers Training Centre
UNDP: United National Development Programme
USA: United States of America
USGS: United States Geophysical Survey
UWSAs: Urban Water and Sewerage Authorities
UWSSP: Urban Water Supply and Sewerage Program
URT: United Republic of Tanzania
VTC: Vocational Training Centre
WATz: WaterAid in Tanzania
WASH: Water Sanitation and Hygiene
WCA: Water Consumer Association
WRBWB: Wami/Ruvu Basin Water Board
WRBWBA: Wami/Ruvu Basin Water Board Approach
WRM: Water Resources Management
WRMA: Water Resource Management Act

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It; as per WRMA No 11 of 2009, it implies the rights of and practices in relation to water resources that have been practiced by communities pursuant to Part VIII of the act. Therefore water user associations are the lowest institution responsible for water resource management at the community level. However in WSSA No 12 of 2009 water user association can also be formed by two or more water user committees to manage water facility that is serving number of villages of communities. Water user association can also be made by two or more water authorities through Water clustering regulation of 2013 of the United Republic of Tanzania for the purpose of increasing its effectiveness and efficiency on WASH services delivery.

DEFINITION OF TERMS

**Basin water Board:** is a water governance body designated to identify and resolve critical water issues and to take on a range of responsibilities for water management within its jurisdiction which is defined by the hydrological geographic borders rather than political boundaries. In Tanzania mainland, Basin water board established under WRM Act No. 9, section 22 that provide procedures on appointment of its members, roles and responsibilities and its power defined (URT, 2009).

**Beneficial use of water:** It is defined in the WRMA No. 11 as the use of water for social, economic and environmental purposes including but not limited to domestic water supply, irrigation, generation of electric power, livestock watering and dipping, industrial production, fishing, and the maintenance of the aquatic system. The same law part VI (protection of water resource), section 35 and 36 as well as part VII (water permitting and licensing) section 49, indicates preferences in water allocation in areas where water resource is scarce and not sufficient enough to support number of competing water needs.

**Catchment Area or drainage basin:** a watershed or a catchment area is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel (USGS, 2016). It is an extent or an area of land where all surface water from rain, melting snow, or ice converges to a single point at a lower elevation, usually the exit of the basin, where the waters join another body of water, such as a river, lake, reservoir, estuary, wetland, sea, or ocean. In the WRMA No 11 of 2009, it clearly defines a catchment as the surface area and underground stratum of land that collects water to supply of source of water.

**Customary Water right:** the term is also used interchangeably with water right or water permit in this study. The customary water right refers to the right of a user to use water from a water source. In Tanzania’s water law (WRMA No. 11 of 2009), it implies the rights of and practices in relation to water resources that have been practiced by communities or individuals since time immemorial in the belief that they create binding rights and obligations. The holder of the water right or permit is responsible and required by the law to use water efficiently and protect the sources.

**Ground Water:** in this study it implies water naturally stored or flowing below the surface of the ground and not apparent on the surface of the ground. Ground water foundation in US, define ground water as the water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifer.

**Pollution:** according to the WRMA No 11, 2009 and as used in this study, define Pollution in relation to water resources as any direct or indirect alteration of physical, thermal, chemical or biological properties of the water resource so as to make it less fit for any beneficial purpose for which it is or may reasonably be expected to be used or harmful or potential harmful to the welfare, health or safety of human beings and any aquatic or non-aquatic life or property or the environment.

**Sub catchment Committee:** means a Committee established by WRM Act No 11 of 2009 part IV under section 29 for the purposes of managing a sub-catchment. Sub-Catchment Water Committee (CWC/SCWC) has responsibility of coordination and harmonizes integrated water resource management plans in catchment and resolve water related conflicts in the catchment. The Committee brings together Councils to the management of water resource management and act as advisory local institution in Water supply planning.

**Surface water:** as per WRMA No 11 and WSSA No 12 of 2009 means all water flowing over the surface of the ground, or contained in a spring or natural lake or reservoir or swamp and all water contained directly underneath a river bed. The study report uses the term as described by the two water legislations.

**Water Authority:** according to the WRMA No 11 and WSSA No 12 both of 2009 of the united republic of Tanzania, water authority means the water supply and sanitation authority established by the law for the provision of WASH services to the community. The authority have mandate to manage water facility and development of water sources for sustainable WASH services.

**Water use permit or Water permit:** is the authorization by the basin to an individual, groups or institution to use water for various purposes as per the provision of Water resource management act No.11 of 2009. The permit is associated with responsibilities including environmental protection and protecting water from pollutions.

**Water User Association:** can be defined as a group of water users, such as irrigators, who pool their financial, technical, material, and human resources for the operation and maintenance of a water system. According to WRM Act No 11 of 2009 Water user Associations means an entity established by the users of water resources within a specified area pursuant to Part VIII of the act. Therefore water user associations are the lowest institution responsible for water resource management at the community level. However in WSSA No 12 of 2009 water user association can be formed by two or more water user committees to manage water facility that is serving number of villages of communities. Water user association can also be made by two or more water authorities through Water clustering regulation of 2013 of the United Republic of Tanzania for the purpose of increasing its effectiveness and efficiency on WASH services delivery.

INTRODUCTION

1.1 Background to the study

Water is fundamental for sustainable development. It affects inter alia sanitation, health, poverty alleviation, disaster reduction, and ecosystem conservation, and cuts across all Sustainable Development Goals, (WATz, 2016). In addition, the ever growing vulnerability that is induced by global and local changes such as population challenges, climate changes and variability, socio-economic issues and environmental degradation, can result in increasing both the frequency and severity of extreme events, including droughts and floods (UNESCO, 2009). Integrated Water Resource Management work toward optimizing the available natural water flows, including surface water and groundwater to satisfy competing water needs. In an ideal world, water resource management planning has regard to all the competing demands for water.
and seeks to allocate water on an equitable basis to satisfy all uses and demands (Grafton et al., 2011). Waste water treatment, water recycling and demand management measures are being introduced to counter the challenges of inadequate water supply. In addition to problems of water quantity there are also problems of water quality. Various studies have proved that pollution of water sources is posing major problems for water users as well as for maintaining natural ecosystems (IRC, 1997, HACH, 2011, Thulani, 2012). SEMA annual report in 2013 and Tanzania Integrated Water, Sanitation and Hygiene (iWASH) Program report (2014), noted that there are low understanding on water policy of 2002 and its related water laws in Wami/Ruvu basin among stakeholders (Manyaku et al, 2013). The assessment done in Mkondoa sub catchment indicates that water governance and management (Policy and law awareness), enforcement and compliance are inadequate and ineffective (HACH, 2011) that had contributed to frequent conflicts among users. During focus group discussions, it was clearly revealed poor stakeholders’ participation, inadequate communication and lack of accountability mechanisms among parties had contributed to difficulties in achieving collective responsibility to management of water resource. However discussion with basin staff show that there are inadequate water resources data and information, as well as inadequate capacity both in terms human and financial resources that limit monitoring of both underground and surface water. Tanzania experienced rapid expansion, of its population at a rate of more than 6% per annum (URT, 2002), which is exerting enormous strain on the delivery of various services including water and sanitation services. With the role of Tanzania Government, through the Ministry responsible for Water, changing to that of coordination, policy and guideline formulation, and regulation, five levels of water resources management were identified by water resource act No 11 of 2009 to enhance and harmonize efficient use of water. The institutional framework is at its infancy stage, being developed in order to sustainably manage the water resources. The National water Board and Basin Water Boards are in place, while the Catchment/sub catchment committees and Water User Associations are being formulated and are at different stage of establishment. This is institutions face number of challenges including lack of permanent offices to execute their duties and responsibilities effectively.

1.2 Problem Statement
Discussion with Wami/Ruvu Basin Water Office in its efforts to manage water resources show that it is facing a lot of challenges that includes, little knowledge on the WRMA No 11 of 2009 and its regulations among stakeholders, uncoordinated water resources development activities, growing of water demand which brings conflicts among water users and water sources pollution due to unsustainable human development activities close to water sources. This is attributed with lack of established Catchment committees and WUAs which are very critical as they provide the institutional mechanisms for addressing water needs, allocating water use and conflict resolution at sub-catchment and local levels (WEMA, 2011). In Wami/Ruvu basin, there are evidence of conflict that had costs life between farmers and Pastoralists competing for water. There are inadequate water governance practices due to various reasons such as new enacted law and policy not well disseminated to users and stakeholders, formation and support of Water User Associations for management of sub catchment water resources still weak, water users permit (Licensing) not known to majority of water users, overlapping mandates of different institutions, clarity of role and responsibility between LGA and WRBWB, weak monitoring of water resources, lack of quantifiable data of the available water resources and different water use and weak financial capabilities of WRBWB to support operational activities within the basin. In his speech, the then Minister of water honorable Professor, Mark Mwandosya addressing to the water week in 2009 noted that there is decreasing water resource and it is estimated that water supply per person had decreased from 2,700 M2 in 1999 and to 2225 M2 in 2009. However the decrease is expected to be as low level up to 1,500 M2in 2025 and if the problem not addressed it will lead to serious shortage of water and stiff competition among water users. Basin annual report 2015 noted that, in Mkondoa sub-catchment Wami WUA had water users with water use permit status (17%) who consume about 5674.16 liters of water per second in which out of these, 5000 lts/sec is for irrigation and the remain is used for domestic, industrial sector and other production activities. The majority of water users (about 83%) have no water right consuming large amount of unregistered water. This is clear indices of poor water governance in the area. Interview with Community in Ilonga and Kisangata areas revealed that Livestock Keepers are also potential water users operating as individuals taking their cattle directly to the River. Such practice reported by the community to contribute to river beds destruction thus affecting normal flow of river water, floods, pollution and over utilization of the water resource. The practice was also reported to cause destruction of farms and produces, damage irrigation canal and other water facilities for domestic water use, cause serious soil erosion as a result un-ended conflict in the area (PANESA and ARNAB, 1990). This study therefore, explore the role of policy and legal framework and local institutional set up to pastoral farming in water resource governance at local level to bridge the gap of inadequate water resource governance and management practices in Ilonga and Kisangata WUAs Mkondoa sub-catchment.

1.3 Research Objectives

1.3.1 General Objective
The general objective of the study is to assess factors affecting water resource governance among pastoral community at Mkondoa sub-catchment.

1.3.2 Specific Objectives
The specific objectives of the research study are as mentioned here below:-

(a) To evaluate the role of policy on water resource governance in Ilonga and Kisangata WUAs Mkondoa sub-catchments.

(b) To determine the role of local level institutions( WUAs, Water Committee, Water User Groups, Village Government, Ward development Committee, farmers associations, Catchment Forums and other Non-state actors) on water resource governance in Mkondoa sub-catchment.

(c) To determine effectiveness of the Pastoral community participation on water resource governance in the Mkondoa sub-catchments.
1.4 Research Questions
The following are the main research questions answered by the research study
(a) What are the roles of policy on water resources governance in the Ilonga and Kisangata WUAs Mkondo sub-catchment?
(b) How are the roles of local institutions in water resource governance in Mkondo sub-catchment?
(c) How pastoral community is involved to improve water resource governance practices in the sub-catchments?

1.5 Significance of the Study
IWRM play a key role in addressing water resource management challenges (Bekele, 2011). However, experience with SEMA had shown the progress towards implementation has so far varied widely depending on the area, capacity, political will, and understanding of the concepts and their implementation approaches. Implementing IWRM at the river basin level is an essential element to managing water resources more sustainably, leading to long-term social, economic and environmental benefits (Merrey et al, 2005). A river basin approach provides a practical framework, defined by geographical and hydrological characteristics that involves downstream and upstream basin wide issues as well as incorporating environmental and socio-economic aspects (Doe et al, 2004). Agricultural food production and water resource management is an increasingly global issue that is fostering an important and growing debate. Chartres and Varma in 2010, laid down a six-point plan for solving the world's water problems which are; improve data related to water, treasure the environment, reform water governance, revitalize agricultural water use, manage urban and industrial demand and empower the poor and women in water resource management. Discussion with basin office staff noted that there is no continuous monitoring program of water quality parameters and the environment in the basin is being degraded and polluted. Agriculture has expanded as a function of population increase leading to deforestation, and water is being extracted from the basin for agricultural irrigation, industry, and household use. The potential consequences of these threats are reduced river flow, changes in seasonal flows (pulsing), nutrient loading and water contamination from agro-chemicals, and water contamination from washing and sewage. Inadequate water governance had contributed to poor water management practices resulting to un-ended conflicts related to water shortages. This study explores experience so as to help in addressing water resource management challenges in Tanzania. It aims at capturing the impacts and effectiveness of water policy, laws and regulations on water resource governance. The study report contributes to the understanding of knowledge, identifies the capacity gaps and potential roles of the community on water resources management at sub catchment level and explores key issues in WRM practices that consequently affect sustainability of water supplies in the sub catchment. It provide break through to successful management of water resources, provide recommendations for interventions through empowerment of the community. To the academician, the research can be applied by other researchers as reference for further studies expected to be carried out and link with the development interventions.

1.6 Scope of the Study
The study was carried out in Mkondo sub catchment, and involved two WUAs of Kisangata and Ilonga situated in Kilosa district of Morogoro region. Kisangata and Ilonga WUA comprises of four wards with 9 villages. This study explore existing organizations at local level working on water resource management, their role and responsibilities and how effective its presence in Kisangata and Ilonga on contributing to conflict management in the area and sustainable use of water resource for today and future generation.

1.7 Research Limitations
Despite existence of several legislations, water policy and regulations, implementation and enforcement of these policy and regulation was noted to be a challenge. Although WRMA states that management of water resources should be integrated, the challenge seems to lie in translating the act into specific district programmes which will be reflected at the community level for implementation. This study therefore aims to uncover the limiting factors that had contributed to poor implementation of water policy and its related laws and regulation at local level. The limitation of the study lies within the frame work of the study itself. One of the limitations noted was the geographical position of the study area. Kisangata and Ilonga are situated in mountainous areas of Kilosa district and the area is associated with lack of roads. Lack of time on primary data collection made the assignment more challenging. However focus group discussion required a meeting with community members who were also busy with their daily work. To mitigate the mentioned above challenge a researcher involved Wami Ruvu basin and Kilosa district staff on data collection. A team of 16 staff was formed and oriented on questionnaires for a one day and divided into two groups to facilitate the exercise. Local leaders at ward and village level were involved in identifying potential water users to their respective villages. Prior information was sent to the study area and time table for field visit arranged and shared to all villages. WUA leaders accompanied data collection team of staff to the respective site.

LITERATURE REVIEW

2.1 Review of Literature
Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources (Walmsly and Pearce, 2010). It is a sub-set of water cycle management. Water resource management planning has regard to all the multiple competing needs for water and seeks to allocate water on an equitable basis to satisfy all uses and demands. The rise in water demand combined with the decline in water supplies can have dire consequences for communities. Water is necessary to support all “biological life, natural processes, communities, the economy, society, and future generations” (Arnold; 2009). Current water consumption practices are unsustainable and must be altered. Many rural and urban areas around the world are facing challenges to the supply of water (Strasser, 2003). A key method of addressing water shortage is water conservation. The success of conservation measures depends on public support and behavior change and it is known that the public is generally supportive of water conservation measures while little is known about the dependence of water conservation attitudes and behavior on geographical location.
and the water situation at specific locations (Gilbertson, et al 2011). The IRC report of 2010 gave several examples to demonstrate the importance of community involvement in developing community-based solutions to water related problems (Taylor et al, 2011). In South Africa for example, the report noted that, the Tonga water resources management project had a strong community health education component that resulted into understanding of the association between community activities around water sources and incidence of waterborne diseases. The same report had demonstrated similar case trends in Kalomo (Zambia), where by the local community was mobilized to manage provision of water services, and protected a catchment area. It is therefore, important empowering the stakeholders with capacity to negotiate for a meaningful participation, if they cannot be able to air their views it might be as good as not involving them at all. Discussion with Kilosa district council noted that a basin approach is the systematic approach of management of water resources for wide management of the stream and environmental flow from upper stream to the downstream. In Tanzania the Ministry of water through established basins offices has supported development of Integrated Water Resources Management Development and Plan (IWRMD&P) of which some water basin offices have approved IWRMD&P and others not yet approved (WB, 2016). IWRM promotes the coordinated development and management of water, land and related resources, in order to maximize the result of economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. In Tanzania water resources management is managed through nine hydrological zones or river basins for purposes of water resources management in which all plans for allocation, control and utilization are highly coordinated (WB, 2016). These basins are; Pangani, Wami/Ruvu, Rufiji, Ruvuma and Southern Coast, all of which drain into the Indian Ocean, and Lake Nyasa, Rukwa, Tanganyika, Victoria, and the Internal drainage basins of Lake Eyasi, Manyara and Bubu depression. The current national water policy of 2002 aims at comprehensive, integrated and holistic management of water resources, with basins as the unit for planning, resource mobilization and implementation of integrated plans. Its main objective is to involve community in the planning process in a participatory approach and fully considers all of the environmental, ecological and socio-economic concerns of basin stakeholders (NAWAPO, 2002). Despite of the Government efforts, SEMA which have outstanding experiences in working in partnership with basins water offices in Tanzania noted that the nature and characteristics of these basins vary significantly from geographical and hydrological characteristics, management and governance practices and also tenure of services (SEMA, 2014). Challenges identified by SEMA report of 2014 includes; multiple threats through increased erosion, land-use change and deforestation, pollution, climate change and uncoordinated water abstraction. However the same report also show there is widespread and extension of seasonality with lack of rainfall and drying of the river which in the near future if current unsustainable development outcrop continues, it may result to disaster. Other challenges noted includes; lack of organized structures that had been a reason toward inadequate representation of communities to WUG’s and WUA’s, Low awareness of existing water policies and its legislation and regulation, overlapping of legal practices among different actors(By-laws, policy, Acts i.e. EMA of 2004, WRMA of 2009 and Irrigation Act and its amendments of 2013, land Act of 1998), increased erosion and resources degradation due to bad farming practices adopted at community level, land-use change and increased deforestation, water conflicts between users and uses, pollution (solid/liquid waste dumping/discharge) and destruction of water sources and climate change had contributed to shortage of water resource and increased competition for the resource, uncoordinated water allocation and abstractions (over exploitation of resources), limited resources by BWO’s (Financial, Human Resources and Physical (Monitoring equipment’s) just to mention a few. (IDB et al, 2014) The mentioned challenges hinder effective implementations of WRM henceforth increased threat on water resources and other interrelated challenges including food and water security. Tanzania through water sector development programme have piloted an approach which aimed at achieving participatory management at full capacity through capacity building to an organized grassroots level structure with full representation of community members with multiple uses and interest on the water resources sub sector. The piloted approach is called Community Based Water Resources Management (CBWRM) based on Dublin principles for water resources management that stress three key aspects which are social equity, economic efficiency and ecological sustainability. The approach empowers community to manage environment and natural resources sustainably. In this context, community and other stakeholders involvement is vital for effective water resources management, water supply and sanitation interventions of which without sustainable utilization of water resources will bring big loss to installed infrastructures henceforth food insecurity and other water related problems (Habib et al, 2008). As such the need for community based organized structures is essential for effective implementation of Water resources management and development.

2.2 Theoretical Framework of the study

Poor access to safe and clean water, sanitation, hygiene practices and lack of safe water influences susceptibility to infections of water borne and sanitation related disease such as diarrhea, helminthes and others (Moeller, 2005). Poor water resource management practices contribute had been reported to contribute to inadequate WASH services putting majority of young people, women and men at risk of getting communicable diseases that could have been prevented by improving access to clean and safe water to the community (Manyaku, 2013). IWRM had been noted to be an essential element to managing water resources more sustainably, which facilitates involvement of downstream and upstream water users (Molden, 2007). The main question being answered by this study is whether the theory of water resource governance as laid out in the NAWAPO of 2002 (URT, 2002) and its legislations, the water act No 11 and 12 of 2009 (URT, 2009) are leading to a betterment of the management of the resource in Mkondoa sub-catchment. In year 2004, drawing an experience from six countries in Southern Africa including Tanzania on water resource governance, Mazungu (2004) came with four points at theoretical level that are the basics of this study. The first point, improved governance, rather than stakeholder participation, should be the indicator of democratization in water resource management. Second, the same Mazungu study noted that, water practitioners should be conscious of the fact that effective stakeholder participation...
depend on a conducive governance regime at the national level, which lies outside their purview and third, uncritical adoption of the neoliberal concept of beneficial use of water, where water that is being productively used cannot be re-allocated without extreme difficulty, tends to forestall what is essentially a political process. A fourth point which is also related to the previous theoretical point, stakeholder participation without significant restructuring of ownership and access rights, runs the risk of tokenism. The mentioned above four theoretical points are critical in determining the level of dimensions of Water resource governance. Tanzania effort to address water resource challenges had been in development of water policy and legislation that together with many other things provides a framework the main five level of water governance. From my experience working in local NGO in water sector, one of the biggest concerns for our water based resources in the future is the sustainability of the current and even future water resource allocation. A balance between what is needed by humans water needs and what is needed in the environment is an important step in the management and sustainability of water resources. The 1992 Dublin Conference held in preparation for the United Nations Conference on Environment and Development (UNCED) (Earth Summit) in Rio de Janeiro the same year come outcome of the Dublin Principles that are the founding pillars of IWRM (GWP-TAC, 2000). These principles are; first, fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment and therefore water development and management should be based on participatory approach, involving users, planners and policy makers at all levels (ICWE, 1992). Second, women play a central part in the provision, management and safeguarding of water. The need to incorporate gender issues on IWRM is a key to achieve sustainable development is required to achieve equity and inclusion in water governance. Third, water has an economic value in all its competing uses and therefore should be recognized as an economic good (Mazingu and Kujinga, 2002) Water, sanitation and hygiene (WASH) are crucial building blocks for development. They improve the quality of life and health, advance education, reduce poverty and malnutrition, increase child and maternal survival, drive economic growth and contribute to gender equality and dignity (iWASH, 2015). The same report noted that rural households typically need and use water for livestock, irrigation, home gardens, or other local uses. Planning and design of water services in rural areas peri-urban areas in Tanzania are still not based on peoples multiple water needs because the water sector is organized for single use system (USAID, 2014). Multiple Water Use (MUS Model) approach is an approach to water service where the design starts with recognizing and planning for peoples multiple water needs. It is the sum of the institutions, services, resources and infrastructure that allows communities to effectively and inclusively manage their water resources for domestic and productive uses (Mikhail et al, 2008) including environment and biodiversity need of water and therefore MUS is a holistic approach one particular form of integrated water resource management that is being introduced in Tanzania to improve both WASH services and sustainable use of the resource. Inherent to this approach of water services is participatory planning of all stakeholders to avoid conflicts over allocations to different purposes or users (Hansen, H. S, et al 2008). Similar to MUS approach is a STRIVER Model that had been tested in Europe and Asia to four rivers. It starts with the lack of clear methodologies and problems in operationalisation of IWRM by developing interdisciplinary methods to assess and implement based on conceptual framework integrating issues related to natural, policy, social sciences and interactions with end water users (STRIVER Bulletin, 2007). The model however uses a river basin approach with strong emphasis on local stakeholder involvement and clear emphasis on enabling and supporting local capacity development. Tanzania's Development Vision 2025 aims at achieving an absence of abject poverty and attaining a high quality of life for all people and water resource management, water supply and sanitation features are one of the key agenda in this Development Vision (URT, 2000). Intrinsic to these overall targets, are the objectives of equity of access, water management capacity, and proper maintenance of water and sanitation systems, use of environmentally sound technologies, and effective water tariffs, billing and revenue collection mechanisms (URT, 2006). The Tanzania water policy is presently implemented through the Water Sector Development Program (WSDP, 2006 – 2025) as guiding documents to achieve its target. The National Water Sector Development Strategy (NWSDS, 2006) sets out the strategy for the National Water Policy (NAWAPO, 2002) implementation and in turn guides the formulation of the sub-sectorial investment programmes as inputs into the WSDP (PBWB, 2015). The main objective of NAWAPO 2002 is to develop a comprehensive framework for sustainable development and management of the Nation's water resources, to put in place an effective legal and institutional framework for its implementation (URT, 2002). The policy was developed to ensure that beneficiaries participate fully in planning, construction, operation, maintenance and management of community based domestic water supply schemes and consolidate their efforts in resource management. The policy had been formulated to address cross-sectoral interests in water, watershed management and integrated and participatory approaches for water resources planning, development and management in the country and also, lays a foundation for sustainable development and management of water resources in the changing roles of the Government from service provider to that of coordination, policy and guidelines formulation, and regulation (NAWAPO, 2002).

2.3 Conceptual Framework

Report from Wami Ruvu Basin in 2014 had highlighted some practical challenges on water resources management that includes, new acted law and policy not well disseminated to users and stakeholder and therefore making it difficult on enforcement, WUA's for management of sub catchment water resources still weak, water users permit (Licensing) not known to majority of water users, overlapping mandates of different institutions; clarity of roles and responsibilities between LGA and WRBWB, weak monitoring of water resources, lack of quantifiable data of the available water resources and different water use, and weak financial capabilities of WRBWB to operate and support community in water resources management related activities. The main factors influencing water governance practices to pastoral farming addressed by the study are policy and legal framework that includes water rights and licensing mechanism, Ministerial laws and regulations and Local level institutions such as WUAs and its members (Water user groups, Water Committee, Irrigators, Livestock keepers, Large and small scale farmers, Private and
public companies and Institutions), Village Government, Police, Local Militia, Village and Ward Tribunal, Judiciary at local level and Ward Development Committee and Non state actors (Investors in Agriculture and livestock keeping, Faith based Organisations (FBO), Non-governmental Institutions (NGO), Community Based Organisations (CBO), Agricultural and Marketing Cooperative Organisations (AMCOs), Serving and Credit Cooperation’s (SACCOs) and other unregistered community based groups) working in the area. Their activities and performance have influence on water governance in many ways and their impacts depends on stakeholder power relation.

2.4 Review of Variables

2.4.1 Policy and legal framework

The Constitution of the United Republic of Tanzania (1977) is the supreme law, Article 14 guarantees every citizen the right to life and hence the right to access and use the country’s natural resources including land, water, forests, and minerals. All citizens are expected to have a stewardship responsibility over the natural resources, including water (Manyaku et al., 2013). The current policy framework for water sector is set out in the National Water Policy (NAWAPO 2002), which is oriented towards reaching the Sustainable Development Goals for water and sanitation and incorporates the overall development goals set out by the national Vision 2025 and the National Poverty Reduction Strategy. Together with these policies in practices, the Water Resources Management Act No.11 of 2009 (WRMA) and Water Supply and Sanitation Act No.12 of 2009 were enacted. The institutional framework provided for under the National Water Policy (2002) and Water Resources Management Act (2009) is quite elaborate and inclusive. In order to effectively manage water resources in Tanzania, NAWAPO 2002, has set out appropriate levels of management through which people can participate and also gives mandates to communities being responsible for local level management of allocated water resources, mediation of conflicts, participate in preparation of water utilization plans, conservation and protection of water sources and catchment areas. The policy aims at to achieve effective and efficient water use, enforcement of the law and implementation of conditions of water rights (NAWAPO, 2002). In light of the above, communities can therefore participate through established Water User Associations, the only institutions responsible in water governance at local level by the law. The establishment of WUAs is in line with National Water Sector Development Strategy (NWSDS) of 2006 and the WRM act No 11 of 2009 (URT, 2009). The Water Resources Management objective of the NAWAPO (2002) is to develop a comprehensive framework for promoting optimal, sustainable and equitable development and use of water resources for the benefit of all Tanzanians based on clear set of guiding principles. For participation to take place the NAWAPO provides that WUAs or Water User Groups (WUGs) are the appropriate level for engagement of community on water management. The institutional framework for WRM as elaborated in the NAWAPO (2002) identifies five water management levels namely the national, basin, district, catchment/sub catchment, and community or Water User Association. WUAs have a responsibility for local level management of allocated water resources.

(a) Water Policy and other Ministerial Policy

In 2011, Kimaro reported that Tanzania have 200mcu liter per annum water reservoir (less than 1,000 cu liters per annum) which clearly show there is a growing challenge on use and management of water in the country. Formulated energy policy, agricultural and livestock policy, rural development, land and human development policy as well as other policies give little attention on water resource management rather emphasizes the supply of water to meet policy objectives and target. Such conflicting policies will never derive the country toward collective responsibility on management of water resource. To manage better water resource there is a need to consider different levels on water use and management giving attention in the priority areas in the country that are in critical need for sustainable development. Discussion with community members in Ilonga and Kisangata shows that, there are several competing water uses in the sub catchment for irrigation, livestock, and wildlife, environmental and domestic purposes. Effective monitoring and regulation of water use is therefore critical from the standpoint of assessing the integrity of the water distribution system, issuing permits, and collecting water use fees. Though the Water Act (2009) establishes a regulatory framework for water allocation and use, experience show the culture of registration of water use has not yet taken root in the sub catchment in Wami basin (SEMA, 2012). Water user survey conducted in 2013 by SEMA show that 80% of water users interviewed have not applied for water use permits. This has led to several water use conflicts between downstream and upstream water users. Lack of a strong regulatory framework has often resulted in excessive water use by the upstream water users (mostly farmers) leading to significant reductions in flows and serious negative impacts on downstream water users (mostly Pastoralists) as a result contributing to unresolved conflict in Kisangata and Ilonga WUAs, Mkondoa sub catchment between livestock keepers and farmers.

(b) Water Rights

Community revealed little awareness and understanding on water resource management and related policy and laws. In Kilosa district, discussion with head of department of water noted that individuals with financial capability in the community construct local canal and diverge river water for irrigation purposes without permission from Basin office that are responsible by the law to offer water use permit or right. Most of canals pass number of meters to different farms plots and the owner of the canal charge the service of irrigation water to the water users that created un-ended water conflicts to the community. However, the owners of the canal don’t consider the provision of water to the whole community and including marginalized community members and therefore denied their right to access water for domestic and production purposes.

2.4.2 Local Level Institutions

The WUA members are smaller informal and/or formal Water User Groups including individual or groups of irrigation water users, fishermen, pastoralists and representatives from other user of water. WUAs are responsible for promoting fair water sharing among their members; drafting and enforcing water use rules in accordance with their constitutions; and providing support to the basin water board in water resources management at the local level. Other Local level institutions working water resource management includes water
Committee, Large and small scale farmers, Private and public
companies and Institutions, Village Government, Police, Local
Militia, Village and Ward Tribunal, Judiciary at local level and
Ward Development Committee and Non state actors (Investors in
Agriculture and livestock keeping, Faith based Organisations
(FBO), Non-governmental Institutions (NGO), Community Based
Organisations (CBO), Agricultural and Marketing Cooperative
Organisations (AMCOs), Serving and Credit Cooperation’s (SACCOs)
and other unregistered community based groups working in the
area on water as well as LGAs projects and catchment and sub
catchment Committees and Catchment forums. Discussions with the
Kilosa districts council staff noted that the local authorities are
responsible for planning and development of water in accordance
with basin plans, protection and conservation of natural resources in
the villages and wards. The Councils have the responsibility in
establishing by-laws on the management of water resources and conflict resolution in accordance with established laws and regulations. In addition the District Councils have to make assessment of water demands of their respective districts and participate fully in the preparation of Basin plans. Unfortunately this has not been the case in the study areas. Interviewing both the Wami Basin and respective district councils, showed a broad communication gap and also the catchment committee which are platform for opening up the gap have not been established. However discussion with District Water and Sanitation Teams (DWSTs) shows that district councils are responsible for water supply and support local communities in identifying needs and preparing community water supply plans. That means services are provided based on a demand-response approach. Village governments have social services and environment committee responsible primarily on water use, guardians and managers of water sources. However experience had shown that village leader’s participation in decision-making, planning, management and implementation of water resources and development do not exist. Each village has a water supply committee with the responsibilities of managing the water sources and collecting fees to maintain the supply network, ensure sustainability and prevent pollution. Water committees sometimes clash with village governments and Water user’s associations over their responsibility and mandate (SEMA, 2013). In some areas of the study, farmers’ associations/groups (Irrigation Water User Associations) that manage water for irrigation tend to be stronger in subcatchment areas with irrigation infrastructure and not always inclusive within the village government structures (WATz, 2012). Community Owned Water Supply Organizations (COWSOs) are legally authorized by the law at the community level to own, manage, operate, and maintain the water supply systems on behalf of the community. COWSOs are in the form of a Water Consumer Association (WCA), Water User Groups (WUG), Cooperative Society or other groups recognized by law. COWSOs meet all their operations and maintenance costs through charges levied on water consumers. Although WUA and COWSO are defined separately, in reality its members are the same people.

(b) Non State Actors
WUA capacity depends also on the capacity of the water user groups and effective engagement of local NGOs, CBOs and FBO in sub catchment on issues related to Water governance. Civil society organisations had been working on addressing community development challenges and because they are formed by the community themselves they represent them much better. Survey conducted noted that there are few NGOs directly engaged in water resources. The existing non civil society organisations are environmental based NGOs that can be incorporated in WRM future developments. However, informal institutions such as water user groups are operating in the area and using water with no permit posing a challenge to management of the resource.

2.4.3 Water Governance
One of the biggest concerns for our water-based resources in the future is the sustainability of the current and even future water resource allocation. As water becomes scarcer the importance of how it is managed grows vastly. Finding a balance between what is needed by humans for domestic and production purposes and what is needed in the environment is an important step in the sustainability of water resources. The National Water Board had been responsible for policy orientation and development, determining water resources management objectives and information management systems as well as defining the boundaries of the Basins and sub-catchments (URT, 2002, and URT, 2009). Basin Water Board is responsible for approving Basin plans and budgets, approving water use permits, conflict resolution, and being an operational (water resources assessment, pollution control etc.) (WB, 2007) and planning unit for water resources at basin level while Catchment committee works on coordinating catchment and inter-district plans. District have the roles assisting communities in planning, development and management of their rural water supply schemes, formulating by laws for protection of water sources and Community Water User Associations the institution at local level perform local water allocations among competing uses, operation and maintenance of their schemes. Water resources management in Tanzania is governed under the National Water Policy of 2002 and Water Resources Management Act No.11 of year 2009. Other related legislations include Environmental Management Act No. 20 of year 2004, Forest Policy Forest Act No. 14 of year 2002 and Water Supply Act No.12 of year 2009 among others. The collaboration between WRBWO and stakeholders in the catchment such as Local Government Authorities, private sector, Police, District officials and Civil
Society Organisations (CSOs) was reported to be not effective. Current interest in water governance and approaches such as integrated water resources management place further demands on monitoring and assessment tools since they involve a shift from only monitoring hydrological data to monitoring data related to policy processes (Jacobson, M et al, 2013). To my experience data collection and assessment and monitoring systems are areas that are neglected or underdeveloped by many basin offices in Tanzania.

3.0 RESEARCH METHODOLOGY

3.1 Research Design
The research design used is descriptive exploratory survey method at collecting necessary primary and secondary information. Different categories of respondents from the community were both simple random and purposely sampled for the interview on status of water resource management, governance and practices.

3.2 Target Population
Wami/Ruvu Basin includes two major rivers of Wami and Ruvu with an approximate area of 40,000 km² and 17,700 km² respectively. It has coastal rivers located to the southern part of Dar es Salaam which makes the total area of the whole basin to be 72,930 km². The research conducted in Mkondoa sub-catchment of Kisangata and Ilonga WUAs comprises of nine villages in four wards at Kilosa district with a total of 55,079 people as per Tanzania national census of 2012.

3.3 Sampling Technique and Sample Size
Both purpose and simple random sampling techniques used on collection of primary data. Interview and focus group discussion was done to 28 heading of local institutions such as NGO, CBOs, FBOs, Water User Groups, WUAs, Village Water Committees, Group of Irrigators and Livestock Keepers as well as Companies operating in the areas. Interviews was also done to local leaders, key informants, LGA staff at local level that were purposely sampled such as WEOs, VEOs, Village Chairpersons, Councilors and head of department from water, land, environment, health and natural resource management. 120 Community members were randomly selected for interviews from 9 villages. Water users in the village visited and interviewed and measurement were taken on location amount of water, types of facility used and purpose of water extraction. In every village at least 5 people random selected from the lists of head of household community members interviewed.

3.4 Data Collection Methods

3.4.1 Primary Data Collection
Primary data collection done by using semi structured interviews questionnaires, documentation by camera and amount of water use measurements was done to all potential water users. A total of 16 staff involved in data collection from SEMA (6), Wami/Ruvu Basin (4) and 4 from Kisangata and Ilonga WAU and 2 from District level. Data collection orientation to staff involved was conducted and review of questionnaires was done. Focus group discussion conducted where by participatory methodologies and techniques employed to ensure full participation of the group irrespective of their age, sex, education and income background. Data and Information collection tools were mainly through semi structured interviews with the target group. Interview also carried out to District management team, Water and Sanitation authorities and Basin officials to obtain required both primary and secondary data. Physical observation and site visits to all developed and undeveloped water sources and water users and measurement of quantity of water they are using and verifying if registered or unregistered water user was done.

3.4.2 Secondary Data Collection
Review of secondary information was done by reviewing of district study existing documents and annual reports to obtain secondary information from Kilosa district. Wami Ruvu basin office reports and Morogoro region office annual reports accessed to obtain relevant information. The use of internet in accessing relevant secondary data from authorized publisher was also done.

3.5 Data Analysis and Presentation
The collected data analyzed both manually and using Excel Computer programme to compile relevant information and trends on management of water resource and status of water supply in Kisangata and Ilonga WUAs. SPSS computer programme employed to carry out analysis of data. Data presentation is done in form of tables, individual narration and figures.

4.0 RESEARCH FINDINGS AND DISCUSSION

4.1 Socio-economic activities in Mkondoa Sub-Catchment
The main economic activities in the Mkondoa sub-catchment are agriculture and livestock keeping which constitutes more than 80% of all household population. Food crops which are mainly produced are horticultural crops mainly vegetables that depend much on irrigation, Maize, Rice, Sweet potatoes and Beans which are sold in local markets while cash crops produced are Sisal, Sun flower, Finger millet, Cotton and Sugarcane. Livestock keeping is done by Maasai and Sukuma who came with their cattle looking for pasture in the area the most livestock kept are Cattle, Goats, Sheep, Donkeys and Chicken while, hunting, bee-keeping and to a lesser extent fishing. In the basin, there are no significant industrial developments. The Wami River provides the main source of water for its industrial uses. Most other people in the area they are self-employed as merchants, traders, artisan and other who are few they are formally employed in public and private institutions. Unemployment rates are as high as 25-40% in both urban and rural areas. Land can basically be divided into five: agricultural (37.5 per cent), natural pasture (33.5 per cent), Mikumi National Park (22.5 per cent), forest reserves (5.5 per cent) and urban areas, water and swamps (1 per cent) (KDC, 2010). Both agriculture and livestock grazing are practiced on general, village and private lands, while Mikumi National Park and forest reserves are controlled areas and state owned. There are a few village forests established from general lands and are included in the pasture land category.
4.2 Research Findings

4.3.1 Characteristics of the Respondents
The characteristics of the respondent’s parameters include age, sex, marital status, education level, household income and size and occupation. Sex of respondents is very important for judging the participation of both, in different household activities and in decision making, social and economic activities for development. The study involved both male and female in which the majority 60.8% were male and 39.2% female and most of them (86.7%) aged between 15-60 years the most productive age in the study area while 13.3 % range from 60 years and above. This signifies the dominance of males on water governance and focus group discussion noted that the participation of women is limited to the use of water for domestic purposes, while men were revealed to use water for production activities such as livestock, irrigation and commercial activities exposing them to ownership of household resources. The Marital status differs among respondents, 62.2% of respondents were married while 28% singles and the rest widows, separate and divorced. This implies most of the respondents have families and therefore there is high demand of water for different purposes to cater families multiple water needs. Tanzania Labor force has been growing by an average of 3 percent per annum and in 1999, it was estimated to be 16.0 million people (Shitundu, 2003). The same study noted that over half of the labor force was in the age group 15-29 years and around 80 percent was living in the rural areas employed mainly by agriculture and only about 8.5 percent of the labor force had post-primary education or training, women represented slightly less than half of the Labor force. This report relate with the findings in the study area. The education level in the study area varies among respondents, 71.7% have primary education, 22.5% have not attended school giving them less opportunity to the labour market while secondary education and above were noted to be 5.8%. The level of education had correction with the occupation and income of respondents. The results showed that majority of respondents are farmers (82.6%) and most of them irrigating crops, pastoralists were noted to be 16.7% but also reported to be herding large number of cattle’s increasing more water pressure while 0.7% have formal employment in the study area. In Kisangata and Ilonga the majority 75.8% of the interviewed community members were earning between Tshs 100,000-1,000,000/= while the highest earner (5.8%) were earning Tshs 3,100,000/= and above. The results imply the majority in the study area are living in poverty below one USA dollar per day. With the current economic inflation that is persisting in the country it becomes very difficult to afford basic standard of human needs. This findings correlate with the Tanzania Government report 2012 that showed, 21.3 per cent of the Tanzania’s population (about seven million people) are very close to the basic needs poverty line.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Responses</th>
<th>Frequency</th>
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<tr>
<td>Age of respondents</td>
<td>15-20 years</td>
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<tr>
<td></td>
<td>21-35 years</td>
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<td>36-45 years</td>
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<td></td>
<td>Above 60 years</td>
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<tr>
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<td>Employed</td>
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<tr>
<td>H/H average Income (Tsh)</td>
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<td>11-15 Members</td>
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Table 4.1. Characteristics of the Respondents in Kisangata and Ilonga WUAs

4.2.2 Main water source, use and permitting in Kisangata and Ilonga
Household sizes have impacts on income expenditure and the ability to cater other family needs. However the bigger is the size of the household the more it consumes in terms of water and other services. Results reveal that 60% of household has average House Hold (HH) size 1-5, 37.5% has 6-10 people and 2.5% of household has 11-15. Therefore data reveal indicative water use at household level for various activities such as domestic, irrigation and pastoralism to meet family needs. The major water uses are irrigation and domestic in Kisangata and Ilonga. Discussion with Wami/Ruvu basin staff revealed that Mkondoa sub catchment has a lot of potential water sources for development to help community access affordable WASH services. However, the main source of water for extraction in Kisangata and Ilonga to meet peoples demand differs from ward to ward. Data collected from the field indicate that 73.6% of the community using water for domestic activities such as cooking, washing and other domestic activities, while 26.4% using water for production
purposes such as irrigation, livestock keeping and brick making for house construction. Therefore the determination of the amount to be left is usually based on current level of water need and use. When there is water shortage it was reported community adapt by digging a local shallow wells to nearby water sources, other dig hole to extract underground water along dried rivers and some of the villagers they contribute money for drilling of new wells, while 17.5% said to have adapted by reducing the rate and amount of water uses at household level. The combination of domestic and livestock keepers appeared the big group of water users by 80.3%, in reality their water consumption is low as 15%. Large amount of water (80%) is used by large scale farmers who own old water use rights. In addition there are small scale farmers who are also livestock keepers in the study area. The water rights are supposed to be evaluated regularly so as to allow proper utilisation of the resource. However discussion with the basin staff revealed monitoring is not done and hence this had contributed to over utilisation of water by large scale farmers, creating conflicts with small peasants and livestock fighting for water. Additionally, the amount of water allocated in the water rights is higher than the current situation of respective rivers flow. While water allocations and use should be associated with application and holding of water use permit, it was found out that many small scale users have no water use permits due to low awareness on the requirements by the policy and laws. The findings revealed that 57.5% of the people are satisfied with the level of access to water supply and 36.7% of respondents are using public water taps, 20.8% get water directly from river streams, 9.2% from borehole, 27.5% from shallow wells, while 5% using unprotected water spring. Detail is shown to the figure 4.1 here below.

The findings revealed that 57.5% of the people are satisfied with the level of access to water supply and 36.7% of respondents are using public water taps, 20.8% get water directly from river streams, 9.2% from borehole, 27.5% from shallow wells, while 5% using unprotected water spring. Detail is shown to the figure 4.1 here below.

According to the Tanzania water policy (NAWAPO, 2002), access to WASH services is clearly elaborated and in rural areas access should be at 400M radius and within half an hour walking distance. In Kisangata and Ilonga results shows majority of the community fetch water within the specified distance by the policy and law. The data show 73.3% of the respondent fetch water in less than 400M and the rest get water more than 500M which is against National Water Policy (URT, 2002). However the quality of water and the type of water facilities to offer quality sustainable water services was noted to be questionable. Data from field reveal that 56.7% of respondents use hand pump and 5.8% electric or diesel powered pump, while 2.5% fetch water from unimproved local canal and 35% of respondents fetch water direct from water sources, details on existing water facilities and accessibility is shown to the figure 4.2. This signifies that in Kisangata and Ilonga there is less availability of improved water facilities offering safe and clean water to meet the multiple water demands of the community members. Lack of improved water facility was said to accelerate water conflicts among competing needs. 72.5% of respondent noted that the available water infrastructures do not satisfy the needs of water users. The main reason given includes; inadequate water facilities compared to large population to be served by a single water point or tape, 20% of the water infrastructures were noted to be designed for single use and hence failing to meet multiple demands of water users and 7.5% of the infrastructure situated long distance to the people residents against water policy of 2002 that require water points to be within 400M radius and 30 min walking distance as maximum limit for rural population.

Figure 4.1: Sources of Water and use in Ilonga and Kisangata

Figure 4.2: Existing Water Facilities.

Figure 4.3: Accessibility of Water Points
Inadequate access to safe drinking water and improved sanitation facilities often affects women and girls disproportionately; increasing their work burden, impairing their health, safety and wellbeing (SEMA, 2015). The same report also noted this impact begins at childhood and carries on through life and across generations. Interventions to improve access to sanitation and drinking water therefore play a crucial role in improving gender equality and women and girls empowerment both of which are major determinants of women’s health. The study findings noted that 48.3% of respondents had affected by stomach fever, a disease associated with poor water and environment sanitation followed by Malaria affecting 25.8% of respondents, while 25% said to have affected by bilharzias, diarrhea disease, worm and 0.8% of respondents said they don’t know which diseases related with poor water and environment sanitation do often affect their household members. Detail is shown to the figure 4.4.

4.2.3 Water Resources Management practices
Discussion with different stakeholders in Kisangata and Ilonga indicated that despite existence of several legislations, enforcement is still a challenge. Although WRMA No 11 of 2009 states that management of water resources should be integrated, it was revealed that, the challenge seems to lie in translating the act into specific district programmes. The study found out that the NAWAPO of 2002 and WRMA of 2009 are not well understood by key stakeholders such as head of departments in district council, Councilors, WEO, VEO and village chairpersons. Also, there is a weak involvement of stakeholders in WRM as well as poor communication between Wami/Ruvu basin and stakeholders in the sub-catchment. There is little law enforcement on water sources protection to the community due to low awareness and to some areas negligence was reported. Blaming each other among users reported such as large scale farmers and small scale water users. "I am wondering that, we large scale farmers respect the law but villagers do not", argued one investor. Large scale farmers reported that no defaulter has been prosecuted in the court of law for environmental degradation and water source destruction. Contrary, small scale farmers condemn the investors. "I wish I know which law binds these investors, they are blocking the river, their farms are zero meter from the river, yet nothing has been done, who should take them to court?" commented one villager a livestock keeper in Mbwade village. However data from the field reveal that 95.8% majority do not know existing National water policy of 2002 and legislation No 11 and 12 of 2009, such scenario give them little chance to be part of the implementation processes. Few of the respondents (4.2%) were noted to be aware but their knowledge limited to some areas of water sector such as the importance of safe and clean water for drinking, hygiene and sanitation, WUA activities and practices related to conservation of water sources and procedures in formation of water committees and water user associations. Most of water related conflicts in the Mkonda sub-catchment are caused by water shortages especially when it approaches the dry season of the year. Parties involved in conflicts are downstream water users and upper streams and it involves big water users vs. small peasants and farmers and livestock keepers. The study reveal the conflict between farmers and livestock keepers had cost lives and is common in the area. Mbwade and Ilonga village is not only in the downstream but also has many water users including investors who pauses much of the tension to this villages when water is not enough. The competition affects the highly marginalized groups who mostly depend on the same water sources for domestic purposes (drinking, cooking, washing, and vegetable production). Relatively there is few water supply projects among the visited villages (only 40%), the rest do compete with investors by direct use of water from the surface water. Also waste water disposal influence conflicts as it was claimed that investors dispose waste waters directly into the same rivers that are used by other downstream water users. In Kisangata and Ilonga, data show that 55% of respondents reported to have the existence of water related conflicts and more than 50% reported occurrence is more than twice in year. The main reasons associated with these conflicts are inadequate leadership, lack of improved water supply facilities to meet water demand both for domestic, health and production purposes. Frequency of conflict occurrence, its causes and approach of resolution is illustrated to the Figure 4.6 here below.
WASH facilities, awareness creation on water and environmental policy, laws and procedure will contribute to reduction of conflict occurrence in the study area by 6.6%. Community participatory planning and implementation is only possible if citizen are aware and attendance to public meetings is paramount important. Study indicate that majority of respondents (71.7%) do not attend to the public meetings called by the village government, WUAs, water committee or any other institution that work on water resource and environmental management whereby issues related to challenges on water governance can be discussed. This had contributed to less understanding of policy, laws and regulations governing implementation of WASH projects and inadequate involvement of community members in the policy implementation and therefore contributing to the conflicts persistence in the area between different water users.

### 4.2.4 Institutional framework, roles and responsibility

Wam/Ruvu Basin Water Board was established to manage and to develop water resources. The Board comprise of 10 members. The chairperson is the head of management and the Basin Water Officer is the Secretary to the Board and head of the Basin Water Office. The BWO is responsible for daily activities of the Basin. The Basin is supposed to have five units: Finance, Procurement, Manpower management, Public relations and customer services. Also there are four sections which are stakeholder assessment and awareness creation, water resources monitoring and assessment, water resources protection, enforcement and environment, and water resources planning and research (see Appendix 2 illustrated by the Organization structure). These are included in administration, Hydrology, hydrogeology, Environment, Community Development and Finance which are in place and functioning. However, staff is limited both in number and in capacity. Discussion with the Basin staff revealed currently the basin is facing a number of challenges that hinder effective WRMD. They include a weak structure that lacks an organized institution such as WUA at the catchment level, no organized institutional framework for CBWRM such as catchment Committee and forums, weak working link between WRBWB and its constituent LGAs in the context of IWRM. This hinders effective communication, integrated plans and delays processes such as issuance of water use permits. In addition, there is poor involvement of LGAs in WRMD, weak revenue collection mechanisms and poor water resources assessment. Besides, there is a poor database for water resources, water demands and water users. In the same way there is a limited understanding on the need for multi-stakeholders involvement in the catchment. Moreover, shortage of personnel and financial resources affect effective water allocation, monitoring and management. However village governments are involved in everything to their areas of jurisdictions specifically on planning, implementation of plans and monitoring and evaluation and these also includes setting up fundraising strategy and local resource mobilisation. Focus group discussion shows that village government plays a key role in conservation of catchment areas and water sources. Village leader’s calls for public meetings to discuss issues related to water and provide good platform for participation of the community on issues related to water challenges. Public meetings help in awareness creation, and also in establishing village rules related to conservation of environment and water sources, educating community and monitor cost contribution.

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**Figure 4.6:** Conflict frequencies of occurrence and causes in Kisagata and Ilonga

**Figure 4.7:** Conflict Resolution Approach

The study explored traditional and all kind of informal practices that were used in conflict resolution. It was found out that village government is the immediate mediator. Results shows that 25.8% of respondents resolve the conflicts by consulting village government that have the responsibility of law enforcement and therefore some members had been reported to pay a fine, and other punishments depends on level and impacts of the conflicts. However the trustiness of the village leaders was noted to be very low and the rest of the community feel they are helpless from village government because of corruption and inadequate enforcement of rules and regulations and hence 17.5% opted for mediation by elders, tradition leaders and influential persons in the village. Community members believes that availability of improved
from the community to support development of water sources projects, enforcement of rules and regulations. During focus group discussions it was also clearly noted that the level of community participation differ from village to village depending on leadership and management in place. Effectiveness of village leaders was noted in effectiveness of institutionalisation of by laws. Result show that 65.8% of the respondents accepted their villages have bylaws on water resources management and environment conservation while 34.2% of the respondents said that they don’t have village bylaws used in protection of water resource and environment. Lack of village bylaws was noted to contribute to deforestation and water pollution as a result conflict occurrence and persistence.

4.2.5 Local level Non State Actors
Community members revealed that there are few local Non state actors working on WASH sector in the study area. Study revealed these local Institutions, 25% are involved in awareness creation and environmental education, agriculture activities, religious work and health care to address development challenges in Mkondoa sub-catchment. Among them 10.7% are private companies mainly conducting large scale farming using water for irrigation, 14.3% farmers associations and 35.7% of the respondents accepted to know some of the organization but didn’t know their work and whether for business or non for profit organizations (Figure 4.8). Study also revealed 42.9% of the organizations leadership is through elections, 32.1% through appointment and 25% lack leadership success plan and procedures. However 50% of the organizations leaderships don’t have time limit and 71.4% of the Non state actors has constitution which guide day to day organization operations, grant power, duties and responsibilities, while 28.6% has no constitution and 3.6% are private individual companies in which changes in leadership cannot be done easily. Lack of effective leadership in these organizations affects WUAs performance. Study found that WUA members are also members of local institutions and hence their effectiveness has large impacts on water governance. Results also show majority of the organization (75%) do not have water permission and reason given includes lack of education and knowledge on the importance of water permit and some of the community members don’t know the procedures of getting water use permit while others use water directly from source such as river, dams, swamps and wells. Some of the organizations in Kisangata and Ilonga are companies and investors that produce large quantity of liquid waste. Results show, only 10.7% of organizations have liquid waste dumping permission but also the practice of dumping by some organizations (3.6% of the organizations) was noted to be directly to the river and also lack monitoring practices which is the requirement by the law, while 89.3% don’t have liquid waste dumping permission. Such practice was also noted to cause water pollution and contribute to fresh water scarcity, increase costs of water treatment and water conflicts among surface water users in Kisangata and Ilonga.

4.2.6 Policy, Law, Rules and Regulation at Local level
Discussion with different stakeholders in Kisangata and Ilonga revealed policy conflict of interests toward achieving collective responsibility on sustainable water resource management. Tanzania Environmental Policy of 1997 provides the framework for making fundamental changes that are needed to bring environmental considerations into the mainstream of decision-making in Tanzania. The overall objectives that are related to water resource management includes; to ensure sustainability, security and the equitable use of resources for meeting the basic needs of the present and future generations without degrading the environment or risking health or safety and prevent and control degradation of land, water, vegetation and air which constitute our life support systems (URT, 1997). To conserve and enhance our natural and manmade heritage, including the biological diversity of the unique ecosystems and
improve the condition and productivity of degraded areas, including rural and urban settlements, in order that all Tanzanians may live in safe, healthy, productive and aesthetically pleasing surroundings as well as raising public awareness and understanding of the essential linkages between environment and development, and to promote individual and community participation in environmental action. The formulation of environmental policy was followed by enactment of Environmental Management Act (EMA) of 2004. The policy and regulation provides the legal and institutional framework for the sustainable management of the environment. It is a comprehensive a legislation that includes compliance and incentive mechanisms for environmental management at all levels of governance, from the national level to the sub-national level, involving district and village representatives in the management of environmental resources and enforcement of the law. Other policy related to water resource management includes Tanzania Land and Agricultural policy. The objective of the National Land Policy is to promote and secure land tenure system, to encourage the optimal use of land resources and to facilitate broad-based social and economic development without endangering the ecological balance of the environment (URT, 1997). The policy seeks to establish, support and guarantee a secure land tenure system, which will facilitate the sustainable use of resources and land management. It also seeks to ensure that sensitive areas, such as forests, river basins, areas of biodiversity and national parks are not allocated to individuals for the purpose of development activities. According to the policy, the President owns the land in trust for present and future generations. The policy recognizes two main types of tenure -customary (deemed) land rights, and granted right of occupancy. Since only these two types of tenure are recognized in the policy, forest resources in the unreserved or general land are open access resources due to unclear ownership, absence of security of tenure and formal user rights, and have thus been under constant pressure for conversion to other competing land uses. The National Agricultural Policy 2013 aims at addressing challenges that continue to hinder the development of the agricultural sector. These include low productivity, over dependence on rain-fed agriculture, inadequate agriculture support services, poor infrastructure, weak agro-industries, low quality of agricultural produce, and inadequate participation of the country’s private sector in agriculture, environmental degradation and crop pests and diseases (URT, 2013). The policy main objective therefore is towards increased investment in agriculture and greater involvement of the private sector in the production and provision of support services to the farming community. Discussion with community in Ilonga and Kisangata revealed confusion on laws. Department of Land in Kilosa district had given plots for construction within 60M along river bed. The land policy and its regulation focus on equity distribution of land and appropriate land use while catchment areas, forestry and other public lands are not given land right for occupancy as a public property to be protected by the public exposing them to invasion by the community members as land pressure increases. National irrigation Act No 5 of 2013 recognises EMA of 2004 but its implementation was noted to be a challenge due to lack of improved irrigation technology. However in protecting catchment areas the agricultural act allows cultivation and other agricultural activities 7M away from river stream and such practice is against water policy of 2004 and WRMA No 11 of 2009. Focus group discussion and data collected from the field revealed that 10.8% of respondents noted inadequate water supply facilities had been a reason contributing to inadequate implementation of water policy and other related laws and regulation. Lack of improved water facilities to cater multiple water needs had resulted to pollution of water sources, destruction of existing water facilities and miss use of the facilities. It was also noted existence of heavy machinery and livestock going directly to the river for water. In Ilonga and Kisangata some residents have land right and constructed heavy industries and houses within 60M along river beds against the law and most of large and small farmers are farming zero distant from river sources. However lack of WASH facilities had been due to poor contribution of people in terms of labour and cash in improving and managing water sources and established water facilities to offer clean and safe water. Response from the community (67.5%) revealed also there are few organizations working on development of water sources and management. The existing organization such water committee work on management of water facilities installed to their village by donor or Government projects, leaving aside the responsibility of involving community members on water sources protections. Such practices contribute to difficulties in implementation of Tanzania water policy of 2002 and its regulations.
4.2.7 Existing Capacity of Kisangata and Ilonga WUAs.
WUAs are only established organization at local level to manage water resource, bringing different actors toward a common goal. Discussion with Kisangata and Ilonga WUAs showed that they have not been able to achieve objectives for which they were established and hence the need to build and develop their capacities so that they are able to discharge water resources management function such as control of water pollution, water allocation, conflict resolution, ensure equity and promote stakeholder participation. WUA are responsible by the law to establish and supervise by laws within their area of jurisdiction to manage water resource. Result from field show that 65.8% of the respondents revealed that there are by laws used in water resources management and environment but the main challenge had been the ability to enforce. During stakeholders meeting it was also noted poor coordination of stakeholders, low awareness on Water policy and related laws and regulations (Police, District staff, WEO, VEO, Village leadership, development partners and Judicial system) had been a reason toward inadequate of bylaw enforcement in the area and existence of poor sub catchment protection practice hence conflicts occurrence. Kisangata and Ilonga WUAs were established and leaders elected regularly as per their constitutions. Discussion with community members and respond shows that majority of 78.5% they don’t know duties and responsibility of the WUA which is the only level close to the people responsible for water resource management. Only 18.4% of the respondents admitted to know duties and responsibility of Wami/Ruvu basin, WUAs and village government in water resource management and they are also aware on the roles of village water committee such as protection of water catchment, water use permitting, and collection of water user fees, supervision and by law enforcement and monitoring of water source development plan.

4.3 Land Uses, Environment and Climate Change
Discussion with community members revealed there is high level of understanding on impacts of climate change and therefore number of efforts had been made to adapt. Several solutions suggested by the community to reduce the impacts of climate change such as planting trees, avoid overgrazing and increasing awareness, strict enforcement of bylaws and other acts. Also, establishment of an organized structure was suggested to carry out the day to day water monitoring and conservation of water sources and environment. “Water has no manager, this why destruction is high, there should be a clear organized body to monitor water availability, allocations and conservation, Wami/Ruvu has to carry out its responsibility effectively”-urged Mr. John Saroto, Livestock keeper in Ilonga. However, 24.2% of respondents are not aware of climate change and therefore not involved in environment conservation and water resource management initiatives. This situation expose them to difficult condition and hence failure to participate in implementing various national policy and acts especially related to water resource management and environment conservation. It was noticed that the implementation of the water legislation on protection of catchment areas might be hindered by unavailability of enough land for settlement, farming and grazing. “The main influence on destruction of the water sources and environment is that we, the indigenous have been squeezed in marginal land such as on hills as a result destruction is high”-commented Kisangata villager. In the same order, some villagers in highlands who are living near the water sources showed less importance of conserving water sources and environment as they do not benefit from that water as downstream dwellers. In this regard there are water benefits that do not only limited to sharing water but also the benefits from the resource. This is the context of awareness and utilization of water resources which is connected to land ownership. The proportion of land ownership appeared to be an influencing factor to encroachment of water sources. Lack of land use plans and alternative water sources and economic activities are other hindrances. Most of the people are heavily dependent on farming (upper stream) and livestock keeping (Lower stream). As the number of livestock increase, so is the need for pasture and water. However it is not enough regarding the number of cattle and the distance. As villages lack demarcated areas for settlement, farming and grazing management becomes difficult. Community members also suggested that it should be explored what can be done within the 60 meters zone, if the ownership changes or not. Result from Kisangata and Ilonga show that 68.7% of respondents revealed existence of conflicts related to land issues and the conflicts occurrence is more than twice per year. Such conflicts had cost life to some villages. Village and Ward land tribunal had been an important tool in land conflict resolution through mediations, but there work was noted to be not trusted due to corruption practices and hence causing more conflicts. However majority of respondents (60%) revealed that there is awareness on land policy and its acts but the challenge had been its effectiveness in implementation and help reduce conflicts at local level. The level of understanding on climate change at local level was also noted in which majority believed to be caused by lack of environmental protection. Result from field show that 88.3% agree that there is changes of today’s environment compared with 10 years ago where by 75.8% noted water sources are decreasing, 5.8% of respondents noted on soil loss of its fertility, 4.2% noted disappearance of tree species, 1.7% of respondents said water sources are becoming dirty and destroyed, 0.8% noted rain seasons changes, while 11.7% of respondents said there is little/no changes on environment. Identified indicators of the impact related to climate changes by the community members include decrease rainfall amount and rainfall variability, decline of water quantity and quality, drying of water sources, soil infertility, disappearance of some biodiversity, decrease of pasture land, floods, livestock loss, disappearance of some animal species, disappearance of wetlands, diminishing of pasturelands and change in season patterns, and increased drought. Other indicators include decrease in production, increase in temperature and increase in pests. Likewise, at the level of village government several indicators of climate change such as loss of biodiversity and soil infertility were reported.
Main reasons of impacts of climate change that had exposed more community members to vulnerability factors includes; land clearance for farming, immigration and rapid deforestation, bad farming practices, overgrazing, human activities along river beds, population increase, bush firing, poverty, leasing of fertile land, mining and mineral extraction, settlement in water sources, continuous farming, and lack of village land plan. The causes and impacts of climate change are known by the community members. The need and desire to mitigate or to cope with climate change was demonstrated by the dwellers in the catchment. Several solutions were suggested to reduce the impacts of climate change such as planting trees, avoid overgrazing and increasing awareness, strict enforcement of bylaws and other acts. Other approach suggested includes terracing farming, prohibition of bush firing, harvesting livestock products, promotion of organic farming and use of integrated pest management, demarcation of buffer zone along rivers and other water bodies and zero grazing.

### 4.5 Discussions

Despite the clear suggested solutions of reducing the impacts of climate change on water, it was noticed that the implementation of the same might be hindered by unavailability of enough land for settlement, farming and grazing. In the same order, some villagers in highlands who are living near the water sources have no improved water facilities to cater their WASH needs and therefore showed less importance of conserving water sources and environment as they do not benefit from that water as other downstream dwellers. Lack of improved WASH facilities had great impact on participation of community members in water resource governance. To enhance participation, sustainable WASH services are key for the community to support protection of water sources. In this regard their water benefits are not only sharing water but also the benefits from the resource. This is the context of awareness and utilization of water resources which is connected to land ownership as well. The proportion of land ownership appeared to be an influencing factor to encroachment of water sources. Lack of land use plans and alternative water sources and economic activities are other hindrances. Most of the people are heavily dependent on farming and livestock keeping. As the number of livestock increase, so is the need for pasture and water. As villages lack demarcated areas for settlement, farming and grazing management becomes difficult. In addition, it was reported that leaving 60 meters free from any human activities in either side of the water source such as river is a difficult law. The 60 meters order is according to EMA No. 20 of year 2004 section 57 (1), and WRMA No.11 of year 2009 section 34. "This knowledge of 60 meters is not new, the challenge is its implementation since 60 meters will mean taking the whole farm of the owner"-commented a villager in Ilonga. In Ilonga village, one villager commented, "implementing 60metres will mean shifting people from this village". In the same order strategies of utilizing the land within sixty meters such as developing bee keeping projects can be suitable alternatives. On the other hand, the benefit of leaving 60 meters was well stipulated by villagers the law aims to leave the course of the river and its nature intact, reduce evaporation and infiltration and attracting rainfall. Also weak leadership and politics were stated as some of the challenges. This was noted in Ilonga where the village chairperson was invaded and hit by livestock keepers who were grazing within prohibited 15 meters area from the furrow. When the village chairperson took initiative to stop them from grazing he was beaten. Although he took the case to court at Kilosa he lost the case. Unfortunately, this information was only discovered during this study and was not reported to the Basin authority. Likewise, in other villages the village government and independent environment, water and security and defense committees have not executed the bylaws. In addition low awareness on the benefit of conserving water sources and laws such 60 meters zone is also a challenge. People have lived and conducted the same activities the same way for decades. Others had valuable building and big investment hence; they do not understand the human influence in climate change and decrease of rainfall and water. However, some of the communities were reported to have been given land offer within sixty meters of the river bed year before 2009 in which WRMA was enacted. Moving them require costs for compensation beyond Basin and WUA capacity creating another challenge in implementation of water policy and its related acts and regulations. Moreover, there is a gap between large and small scale farmers. Speaking to them separately, the study found out that both sides have good views on conservation and utilization of water resources. However, they do condemn each other as a result there is no cooperation on conservation of water and environmental resources. Such relationship hinders effective and integrated water resources.

<table>
<thead>
<tr>
<th>Reported indicators of climate changes</th>
<th>Causes of climate change</th>
<th>Existing adaptation and mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drying of water sources, Soil infertility, Decrease of pasture land, Disappearance of some plant species, Contamination and destruction of water sources, Decrease of wet lands, rainfall amount, arable land, Seasonal changes, Drought, Disappearance of some animal species, Increased temperature, Decreased water sources, decreased coldness and harvests, increase in insects and diseases, Global Warming, Floods and decreased livestock</td>
<td>Land clearance for farming, Rapid deforestation, Overgrazing, Farming in rivers banks, Population growth, Planting of eucalyptus Will of God, Bush firing, Poverty, Settlement in water sources, Leasing of fertile land, Mining and mineral processing, Continuous farming, Expansion of settlement, Lack of land use plans at village and others noted to have no clear reason</td>
<td>Afforestation, Awareness creation on environmental conservation, Terracing farming, Prohibit bush firing, Water sources conservation, Reduce the number of livestock, Enforcement of by laws, Less use of pesticides, Rainwater harvesting, Leaving of buffer zone from the sources, Zero grazing, Hills conservations</td>
</tr>
</tbody>
</table>

**Table 4.2 Identified Climate change indicators, causes, adaptation and mitigation plan**
management. It could be of great importance if both sides are brought together as far as water and environmental management is concerned. Bringing them together is through WUAs memberships and ensures that there is good representation of large scale farmers and small farmers.

5.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

5.1 Summary of findings
Water Resources Management and Development (WRMD) in the Mkondoa sub catchment faces a number of challenges of which the underlying factor is capacity gap of Wami/Ruvu basin office. The challenges are inadequacy of financial and human resources and lack of effective community based organization that had contributed to effective participation among stakeholders. As a result there is less water resources assessment and demands, monitoring of water allocations and use, and conservation of water resources and environment. Hence, the available water and demands is unbalanced. Likewise water quantity and rainfall have decreased and rainfall variability is high. Notwithstanding with the situation, the collaboration between Basin office and stakeholders in the catchment such as Local Government Authorities and other local institutions is not effective. The study identified ineffective participation of the community members, poor governance and management of water resources due to the infancy of the Basin and inadequate funds allocated for WRMD. It was also discovered that there are informal practices that to a certain extent have helped the communities to protect water resources. However, still there is a need for the Basin to be capacitated to support and activate the community initiatives for best environmental sustainability practices while considering equity and inclusion in water allocation. In addition, the study found out water use conflicts between large and small scale water users, large scale water users and villages and also between large scale water users and between villages as well farmer and livestock keepers. Discussion with district departments and civil societies showed that IWRM is not in their usual business, there is less integration among neither district departments nor with CSOs working with communities. Furthermore, the study found out that WRMD in Mkondoa sub catchment lacks organized structure for CBWRM; there is weak working link between WRBWO and water stakeholders in the catchment such as LGAs. Also, there is poor database for hydro-meteorological resources, water demands and uses. These shortcomings are influenced by inadequate financial and personnel resources and limited understanding WRM and supply matters. These factors hinder effective WRMD as there is little water resources assessment, water allocation, monitoring and management. Moreover, there are weak revenue collection mechanisms that in turn affect allocation, control/regulation and monitoring at Basin level. Also it was found out that climate change and destruction of environmental resources are high. For example, evidence showed that water sources have been destroyed, deforestation is high, and water and rainfall have decreased. In the same way agricultural productions have decreased. For example, the impacts of climate change are influenced by human activities such as expansion of settlement, deforestation, farming and overgrazing in water sources. The causes are influenced by rapid population growth, inadequate land to villagers, lack of land use plans and low awareness. Other issues in WRMD include low awareness of policies and legislations and low law enforcement. In addition, despite villages having by-laws, they are not fully enforced. Some of the conflicts have been reported in WRBWO but are pending due to inadequate resources to attend them and others were not reported due to low visibility of the Basin. Besides, the sense of water ownership and initiatives and obligations of the community for WRM was found to be very low.

5.2 Conclusions
Governance of water resources in Tanzania is under the National Water Policy of 2002 and Water Resources Management Act No.11 of year 2009. Other related legislations include Environmental Management Act No. 20 of year 2004, Forest Policy Forest Act No. 14 of year 2002 and Water Supply Act No.12 of year 2009 among others. Water Resources Management and Development (WRMD) in the Mkondoa sub catchment faces a number of challenges of which the underlying factor is capacity gap of the basin board. The challenges are inadequacy of financial and human resources and lack of community based organization for Water Resource Management and Development. As a result there is less water resources assessment and demands, monitoring of water allocations and use, and conservation of water resources and environment. Hence, the available water and demands is unbalanced. Likewise water quantity and rainfall have decreased and rainfall variability is high and this is due to human activities chat have direct impact to climatic changes. Notwithstanding with the situation, the collaboration between WRBWO and stakeholders in the catchment such as Local Government Authorities is not effective. Study findings show the water governance in Mkondoa sub-catchment is non participatory and not inclusive. The community understanding on NAWAPO and WRMA was noted to be low. Their knowledge was found to base on areas of boiling drinking water, conservation of water sources and formation of water committees. Low awareness on the policy and the act affect management of water resource negatively. The situation calls for WRBWO attention and other development partners to translate and disseminate policy and act to water users and other water stakeholders for proper implementation. On the other hand, enforcement of WRMA is limited not only because of low awareness but also due to non-availability of translated or simplified copies to the district departments, villages, institutions and individuals. Therefore, for proper implementation, the policy and the act need to be translated and disseminated and awareness should be raised to all the water users and policy implementers. The awareness will also stimulate the demand for Basin services like water use permits, drilling permits and waste discharge permits. This can contribute to the payment of water use fee and hence increase the Basin’s revenue. Water management in the Mkondoa sub catchment is complex as it is connected to land tenure, decrease of water and rainfall while population and water demands are increasing. Destruction of environment and water sources is high due to settlement, deforestation, farming and livestock keeping factors related to increased population pressure. Impacts of climatic change such as rainfall variability and increase of temperature have been experienced and realized at community level. Discussion with local leaders noted that Water and rainfall have decreased, and rainfall variability prevailed in the area. There is low level of
awareness on water policy of 2002 and it acts that make its enforcement a challenge. It was also noted clearly that national legislations and by-laws is weak due to low monitoring, lack of organization body at catchment level, weak village government and low capacity of Wami/Ruvu basin in terms of human resource and financial capacity. Since water demands are higher than available water, therefore a need of exploration of alternative water sources such as groundwater and rainfall harvesting. There are water related conflicts in the catchment that affect water management and proper water utilization. Poor relationship and lack of cooperation between large and small scale farmers and downstream and upstream water users hinder effective water management. Current interest in water governance and approaches such as integrated water resources management place further demands on monitoring and assessment tools since they involve a shift from only monitoring hydrological data to monitoring data related to policy processes (Jacobson et al., 2013). Experience by SEMA noted that, data collection and assessment and monitoring systems are areas that are neglected or underdeveloped by many basin offices in Tanzania. To meet these demands, UNDP (2003), establishes four areas of water governance that are also dynamics and complex in measurement of water governance and indicators can also be developed to capture on the dimensions. The four fundamental dimensions of water governance include; social dimension, which focuses on equity of access to and use of water resources, economic dimension, which highlights efficiency in water allocation and use, political dimension, which focuses on providing stakeholders with equal rights and opportunities to take part in various decision making processes and an environmental dimension, which emphasizes sustainable use of water and related ecosystem services and support. Such approach of water governance monitoring had not been effectively applied to capture challenges related to water resource management practices.

5.3 Recommendations

Good governance practices of any natural resources depends on the stakeholder institutions, such as the catchment councils to act independently and to make independent decision (Burkey, 1998) for the betterment of themselves. Lack revenue collection and weak capacity of WUAs had contributed to inadequate governance practices that had resulted to conflicts among users, un-coordinated water use, destruction and pollution of water sources and depletion of water as well as water scarcity to meet multiple demands. Awareness creation on NAWAPO of 2002 and its legislation will raise understanding among stakeholders and help them participate in implementation of the policy. However this can be followed by strengthening of WUAs in terms of skills and other resources such as support of office and tools to help them carry day to day duties and responsibilities. This will finally enhance transparency and accountability mechanism through participatory approach at community level and realization of needs and wishes of the stakeholders. Discussion with Basin office show catchment forum although present but due to financial difficulties it had held once its meeting. Catchment forum is very important as it brings together stakeholders from discussion and also elects a representative to Board of the basin where decisions are made. Facilitation of catchment forum by the Basin office to conduct its meeting is recommended. This can be done by allocating certain percentage of revenue collected from water users to catchment committee and WUAs that could help them cover office costs and held their statutory and other emergency meetings. Effective communication and coordination of stakeholders in Mkondoa sub-catchment can help achieve collective responsibility. However WUA membership need to be reviewed as at present to be a member one of the condition you must have water permit. In the study area only few big farmers with financial capability have water use permit and small farmers lack water permit and they therefore do not qualify to be members of the WUA. Such situation excludes small farmers to the water governance and hence limits them to participate in decision making processes to issues that affect them. Corruption practices by WUA leaders and village governments reduce trustiness to this institution serving community members at local level. Fight of all sort of corruption will increase trustiness and promote participation of community members and other stakeholders in implementation of water policy and its legislations. Establishment of alternative economic activities like horticulture, bee keeping and poultry is significant to give relief to land. Awareness creation on conservation and protection of environment and water sources is required. The knowledge can be imparted to water users and villagers and pupils and students. Educating the young generation can help in intrinsic understanding and growing with the knowledge. Awareness creation on water policy and its legislation, strict enforcement of legislation and by laws is required and there should be village land use plans to demarcate areas for different uses such as settlement farming and grazing. Conservation and protection of environment and water sources with campaign such as forestation should be conducted at village level and be facilitated by WUA leaders, village water and environmental committees. Establishment of alternative sources of water such as rainwater harvesting in institutions like school and drilling boreholes for irrigation is recommended to ensure sufficient WASH services in the areas. Design of the development water projects should consider and look on its broad spectrum the concept of multiple water uses to cater different water demands at community level. This will help in accessing sustainable WASH services and management of water resources. Groundwater is the potential water sources; its recharge zones should be identified and conserved. Use of alternative and environmental friendly energy such as solar power in order to reduce deforestation for charcoal and firewood is also recommended and there is a need to develop an effective Database Management System that can include water quantity, quality, uses, climatologically data and land use plans. However, there also a need of improving irrigation technology and infrastructure by large scale farmers such as using sprinklers and drop irrigation rather than furrow irrigation and cementing the furrows or transporting water using pipes rather than earth furrows.

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REFERENCES


[43]. Tanzania, United Republic of, (1997). National Environmental Policy, Vice President Office, Government Printer, Dar es Salaam, 4-32
APPENDICES

APPENDIX 7.1

Wami/Ruvu Profile

Wami/Ruvu Basin is one of the nine River and Lake Basins of Tanzania established under Water Act No. 42 of 1974 of Water Utilization (Control and Regulations) with its amendments No. 10 of 1981. The newly established Water Management Act Number 11 of 2009 repeals the fore mentioned Acts. The basin was established in 2002, and it operates under the Wami/Ruvu Water Board (WRWB) and the overall in charge is the Water Officer who is also the secretary of the Board. Wami/Ruvu Basin Water Board has the mandate to manage water resources in the basin.

Location of the Basin

Wami/Ruvu Basin is located to the Eastern side of Tanzania, which lies between Longitudes 350 30’ 00” to 400 00’ 00” E and Latitudes 050 00’ 00” to 070 30’ 00”. The Basin covers an area of about 66,820 km² covering the six regions, Dar es Salaam, parts of Coast, Morogoro, Dodoma, Tanga and Manyara. It has two major Rivers of Wami and Ruvu covering an area of 43,946 and 18,078 km² respectively. The Coastal sub basin which consist Mpiji, Sinza, Mlalakuwa, Msimbazi, Mbezi, Mzinga and Kizinga rivers covers an area of 4,796 km².

Water Resource Governance

With the role of Government, through the Ministry responsible for Water, changing to that of co-ordination, policy and guideline formulation, and regulation, five levels of water resources management were identified, which includes:

- **National Water Board:** policy orientation and development as well as water resources management objectives and information management systems are determined. Also the boundaries of the Basins and sub-catchments are defined.
- **Basin Water Board:** approving Basin plans and budgets, approving water use permits, conflict resolution, and being an operational (water resources assessment, pollution control etc.) and planning unit for water resources
- **Catchment committee:** coordinating catchment and inter-district plans.
- **District:** assisting communities in planning, development and management of their rural water supply schemes, formulating by laws for protection of water sources
- **Community Water User Associations (WUAs):** perform local water allocations among competing uses, operation and maintenance of their schemes.
The above institutional framework is at its infancy stage, being developed in order to sustainably manage the water resources. The National water Board and Basin Water Boards are in place, while the Catchment/sub catchment committees and Water User Associations are being formulated and are at different stage of establishment. The Wami/Ruvu Basin responsibilities are to approve water use permit, monitor and regulate water use according to the availability, control and take legal measures against water source polluters, resolve water use conflicts, collect different water user fees and use them for office operation, sensitize on the sustainable use of water resources, facilitate the formation of Water User Entities, facilitate the formation of catchment/sub-catchment committees, operate and maintain water resource monitoring stations, assess and monitor the quantity and quality of water in the basin, coordinate the Integrated Water Resources Management plans and participate in water sources protection programs.

Water Resources Management Challenges
Wami/Ruvu Basin Water Office in its efforts to manage water resources is facing a lot of challenges, to mention few, are little knowledge on the Water resources management act Number 11 of 2009 and its regulations among stakeholders of the Wami/Ruvu Basin, un-coordinated water resources development activities, growing of water demand which brings conflicts among water users and water sources pollution due to unsustainable human development activities close to water sources.

Catchment committees and Water User Associations (WUAs)
Establishment of Catchment committees and WUAs is critical as they provide the institutional mechanisms for addressing water needs and conflict resolution at sub-catchment and local levels. Their approach aims at participatory management of water resources at grass root level and takes part in decision making of measures against water resources issues. In the process of forming the Catchment committees and WUAs, the concept of WRM and different mandates of key stakeholders should be understood by all WRM implementers.

Operation of the established WUAs
The established WUAs are helping the Basin to implement its responsibilities at the grass root levels. Still in their infancy and only beginning to evolve, they need a big support from the basin in order to operate sufficiently through capacity building in various areas such as;

i. Awareness raising on the new Water Resources Management Act number 11 of 2009 and Water Policy of 2002
ii. Office building and operation
iii. Water user fee collection to facilitate the WRM activities
iv. Provision of water sources facilities
v. Preparation of Water Use Plan
vi. Awareness building on good land use
vii. Water Quality and quantity Monitoring
viii. Construction of new intake structures which are cost effective and water saving

Topography
The basin is covered by low lying and mountainous landscapes as follows;

(i) Mountainous landscapes
- Uluguru mountains located south east, the source of Ruvu River (altitude 400 to 2500 m.a.s.l)
- Nguru Mountains located west of Kilosa (altitude 400 to 2000 m.a.s.l)
- Rubeho Mountains located west of Kilosa (altitude 500 to 1000 m.a.s.l)
- Ukaguru Mountains located west of Kilosa (altitude 400 to 1000 m.a.s.l)
- Nguu Mountains located western part of Wami River (altitude 400 to 2000 m.a.s.l)

(ii) Low lying land
- Mkata plains (Altitude 400-800 m.a.m.s.l)
- Lower Wami (Altitude 200-400 m.a.m.s.l)
- Kisaki located south east of Uluguru mountain (altitude 140 – 200 m.a.m.s.l)
- Kimbiji and Mbezi located to the southern coastal area of Dar es Salaam (altitude 50 – 100 m.a.s.l)

Drainage Pattern
The Basin is sub divided into three Catchments (Ruvu, Wami and Coast) in which seven sub catchments (Kinyasungwe, Mkondoa, Wami, Upper Ruvu, Ngerengere, Lower Ruvu and Coast) are found. Many rivers in Wami catchment originate from Chenene, Nguru, Nguu and Rubeho Mountains and flows eastward towards the Indian Ocean. Most rivers in Wami basin are seasonal while few are perennial. Originally, some of Ruvu river tributaries were perennial originating from Uluguru Mountains and flow eastward towards the Indian Ocean. Error! Reference source not found. shows the major rivers in the Wami/Ruvu Basin.
Soils
Generally, the catchment is characterized by 12 main types of soils namely: Cambisols, Ferralsols, Acrisols, Fluvisols, Luvisols, Lixisols, Arenosols, Leptosols, Nitisols, Vertisols, Planosols and Haplic Phaeozems. The dominant soils are Cambisols which covers parts of Bagamoyo, Kisarawe, Mkuranga, Morogoro Rural, Dodoma Urban, Bahi and Chamwino. The map below shows the distribution (Error! Reference source not found.).

Geology
The geology of the catchment is mainly dominated by:-

Precambrian: Mostly occur in the Chenene Hills (Dodoma), Kiborian Hills (Mpwapwa) and rolling hills of Ikowa, Milima wa Nyoka in Dodoma Kongwa and Uluguru Mountains and in the western part of the Ngerengere sub-basin. These rocks are mainly granitoid, gneisses, granulites and crystalline limestone meta-sediments and meta-igneous rocks with synorogenic granite, schist and gneiss and gneisses, granulites and crystalline limestone.

Usagaran:- Occupy Rubeho Mountains in Kilosa area and Ukaguru Mountains, Wota Mountains and area around Lumuma. In the north they occupy Nguru Mountains. They consist of biotitic muscovite gneiss and schist, metadorerite and metagabro, Migmatitic biotite gneiss and hornblende.

Jurassic rocks occur in the eastern margin of the Uluguru Mountains and elevated rolling hills between the Ruvu and Wami rivers. They consist of course sandstone, mudstone, and oolitic limestone deposited under the marine environment (Kapilima, 1988)

The Karoo rocks occupy south-eastern area of the Uluguru Mountains. The rocks consist mainly of sandstone, and shale deposited in the shallow fresh to brackish water. Their ages may vary from Permian to Triassic (Kent at al, 1971).

Cretaceous rocks lie on the elevated rolling hills. They consist of clay, shale, calcareous’ sandstone, sandy limestone and mudstone.

Tertiary and Quaternary (youngest strata in the basin): occur in the catchment area of the Ngerengere River near Morogoro Municipality, and in the elevated rolling hills and floodplains along the Ruvu River, Kibaha, and Bagamoyo and extend up to Dar es Salaam. Pleistocene to recent sediments exists in the area developing as alluvial deposits all detrital deposits resulting from the operations of modern rivers, colluvial deposits alluvium in part but also containing angular fragments of original rocks such as talus and cliff debris, and coastal deposits. Mbugas depression fills and beach deposits.

Neogene Rocks: These are found in floodplains of Mkata, Mpwapwa, Kongwa, Dodoma and along Wami, Mkondo, Kinyasungwe Rivers and along Saadan and Bagamoyo to Indian Ocean. The deposit consists of calcareous crust, red-brown soils, alluvium, fluvial and sandy clay, and clayey sand with minor lenses of pure sand/clay, gravel and silt. In coastal areas inter bedded sandy clays and clayey sands with minor lenses of pure sand or clay are found. Error! Reference source not found. shows the distribution of different geology within the basin.
Appendix 7.2

**WAMI/RUVU BASIN ORGANISATION STRUCTURE**

![Diagram of WAMI/RUVU Basin Organisation Structure]

*Figure 7.5: Organization Structure WRWB*