

**EFFECTIVENESS OF LAW ENFORCEMENT IN WILDLIFE AND FOREST
RESOURCES MANAGEMENT: A CASE STUDY OF JUHIBU AND JUHIBEKO,
TANZANIA**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

Global supply of wildlife and forest resources products is increasingly strained by illegal activities. Incorporate of law enforcement to reduce illegal activities in Protected Areas is increasing. There is considerable debate on effectiveness of law enforcement to deliver conservation outcomes. Explore the factors influencing effectiveness of law enforcement in JUHIBU and JUHIBEKO in Babati and Kondoa districts was pertinent. A total of 150 households and 52 law enforcement staff were interviewed using semi-structured questionnaire. Illegal activities and patrol efforts between 2012 and 2014 were collected. Non-parametric statistics, paired t-test and ordered logistic regression model were used for data analysis. A total of 159 patrol trips were conducted on foot and vehicle, each trip lasted for 16 to 20 days and ranged from 2 to 4 trips per month with an average of 12 to 17 villages scouts. Investment on patrol efforts were significantly higher in JUHIBU (67%) than JUHIBEKO (32.37%). Illegal activities detected were livestock grazing, charcoal production, hunting, farming and 167 poachers were arrested between 2012 and 2014. Mean illegal activities detected were not significantly different between JUHIBU and JUHIBEKO ($Z = -0.746$, $p = 0.456$). Patrol efforts in JUHIBU and JUHIBEKO were negatively and positively correlated with illegal activities respectively. Management effectiveness was significantly higher in JUHIBU (48%) than JUHIBEKO (34%). Poor implementation of budget, politics, and low cooperation from regulatory bodies break down the chain of law enforcement. Punishment, transparency and experience significantly positive influenced the effectiveness of law enforcement. Community participation and law enforcement organ is likely to improve the condition of wildlife and forest. Working environment for game scouts and forest guards should be improved through provision of patrol gears, salary, rewards, health insurance and job contract.

Enhanced prosecution units, intelligence network, practice of good governance and benefits sharing is highly encouraged.

DECLARATION

I, **Charles Onesphory Tarimo**, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor concurrently being submitted in any other institution.

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Date

The above declaration is confirmed by:

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Date

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DEDICATION

This work is dedicated to my Mother Donistar Damian Mbuya without her encouragement and support at childhood stage I would not be in this position of academic level.

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LIST OF ABBREVIATIONS AND ACRONYMS

ARKFor	Advancing REDD+ in Kolo Hills Forests project
AWF	African Wildlife Foundation
CBC	Community Based Conservation
CBFM	Community Based Forest Management
CBOs	Community Based Organization
EP	Experience
HADO	Hifadhi Aridhi Dodoma
JFM	Joint Forest Management
JUHIBEKO	Jumuiya ya Hifadhi ya Tarafa za Berekona Kolo
JUHIBU	Jumuiya ya Hifadhi ya Burunge
LAMP	Land Management Program
METT	Management Effectiveness Tracking Tool
MNRT	Ministry of Natural Resources and Tourism
NGOs	Non Government Organizations
PAs	Protected Areas
PES	Payment for Ecosystem Services
PS	Punishment
REDD+	Reducing Emissions from Deforestation and forest Degradation
SI	Source of Income
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
TAS	Tanzania Shillings
TFS	Tanzania Forest Services
TME	Tarangire-Manyara Ecosystem

TS	Transparency
URT	United Republic of Tanzania
USAID	United States Agency for International Development
VGS	Village Game Scout
WMA	Wildlife Management Area
WR	Working Relation
WWF	World Wide Fund for Nature

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Natural resources such as oil, forest, gas, wildlife and minerals are an essential part of society, as sources of income, culture, identity and development (Barma *et al.*, 2012). It is estimated that half of the world's population remains directly dependent on natural resources (Barma *et al.*, 2012). Developing countries depend on wildlife and forest resources as primary source of their livelihoods. During colonial period, local community interacted freely in harmony with wildlife and forest resources: and so gained food, building materials, firewood and medicine. The introduction of CBC in the 1990s was a result of challenges associated with “fine and fence” management regime which excluded local community in utilization of wildlife and forest resources (Songorwa, 1999; Haule *et al.*, 2002; Wilfred, 2010). Also management of protected areas under fine and fence did not consider the rights, wants and needs of the local community (Haule *et al.*, 2002; Masozera *et al.*, 2006).

Community Based Conservation in wildlife and forest sector intended to involve local community in management of those resources in various forms. The forms include Wildlife Management Areas (WMA), Community Based Forest Management (CBFM) and Joint Forest Management (JFM) in a village or government land (Vihemäki, 2005; Wasonga *et al.*, 2010; Dyer *et al.*, 2014; Treue *et al.*, 2014). The intention behind community participation is to ensure effective management of the wildlife and forest resources, to curb illegal harvesting, more benefits accrued to the local communities, increased accountability and transparency in decision making.

Despite of sharing responsibilities empirical studies indicate that still there are various human activities (poaching, deforestation) that jeopardize wildlife and forest resources (Roe and Nelson, 2009; Gandiwa, 2013). Most of illegal human activities are due to poor institutional arrangement, lack of property rights, and poor governance (DeGeorges and Reilly, 2009; Roe and Nelson, 2009; Brack, 2012). Indeed, ensuring sustainable management of wildlife and forest resources, laws and regulations are instituted and enforced through law enforcement organs (Nutakor *et al.*, 2011; Robinson *et al.*, 2012; Wiafe and Amoah, 2012). Nevertheless, law enforcement not only responds to crime for the purposes of discharging punishment but also deters others from committing offences (Struhsaker *et al.*, 2005). However, there is considerable debate on the effectiveness of law enforcement organ to deliver conservation outcomes (Knapp, 2012). Nevertheless, without a clearer understanding of why enforcement has been ineffective, it would be difficult to improve law enforcement in a protected area (Nutakor, 2011). Hence, understanding surrounding factors in wildlife and forest is paramount importance in improving law enforcement.

1.2 Problem Statement and Justification

Reducing illegal exploitation of wildlife and forest resources is primary concern in most of protected area (Geldmann, 2013). Management of protected areas dependent on information on illegal and legal use of wildlife and forest resources (Gray and Kalpers, 2005). The Government of Tanzania shares responsibility with the local community and use law enforcement as a means of increasing governance equity, sustainability, reducing illegal activities and increase management effectiveness of wildlife and forest resources (Nielsen, 2011). For instance, JUHIBU and JUHIBEKO share responsibility of protecting wildlife and forest resources with local community using village game scouts and forest guards (Wilfred, 2010; John *et al.*, 2014). Use of village scouts and involvement

of community among other things intend to change attitude of local communities, lower the cost of law enforcement and provide useful intelligence information regarding illegal activities (Nahonyo, 2005; Kideghesho, 2006; Nyanghura, 2013).

Despite the efforts the effectiveness of law enforcement has often been questioned (Mukul *et al.*, 2014). Some authors revealed that: the chain of law enforcement such as detection, arrest, prosecution, conviction and punishment has not been effective in reducing illegal activities in a protected area (Kakira, 2010; Nutakor *et al.*, 2011). However, various studies explain the role of law enforcement and involvement of local communities in conservation (Kideghesho, 2006; Shahabuddin and Rao, 2010). The study by Struhsaker *et al.* (2005) found that, improved effectiveness of law enforcement is important short-term strategy for reducing illegal activities in protected areas. While the study by Kolahi *et al.* (2014) suggested that, the possibility of finding effective ways of managing and conducting law enforcement in the protected area is needed. Explore the factors influencing effectiveness of law enforcement in JUHIBU and JUHIBEKO in Babati and Kondoa districts was pertinent. The finding was important for creating a favorable work environments and improvement of law enforcement. In addition, the information was useful to policy makers, community and donors for planning effective law enforcement units and create good governance for wildlife and forest resources management.

1.3 Objectives

1.3.1 General objective

To assess the effectiveness of law enforcement in wildlife and forest management in JUHIBU and JUHIBEKO in Babati and Kondoa districts respectively.

1.3.2 Specific objectives

- i) To determine illegal activities and patrol efforts of anti-poaching units in each case.
- ii) To examine management effectiveness in JUHIBU and JUHIBEKO.
- iii) To determine factors influencing effectiveness of law enforcement in both wildlife and forest.

1.4 Research Questions

- i. What are the illegal activities conducted in JUHIBU and JUHIBEKO?
- ii. What is the relationship between illegal activities and patrol efforts in each case?
- iii. What is the condition of wildlife and forest resources in each case?
- iv. What are the management effectiveness of law enforcement in JUHIBU and JUHIBEKO?
- v. What are the local community perception towards corruption, relationship, participation, accountability and transparency in the management of wildlife and forest resources?
- vi. What are the factors influencing the effectiveness of law enforcement in wildlife and forest resources?

1.5 Conceptual Framework

Wildlife and forest policies in developing countries promote sustainable management and involvement of local communities in management of wildlife and forest resources. However, most of the state property regimes turn into open access regime because of inadequate personnel, institution change and lack of means of control illegal activities in protected area (Babili and Wiersum, 2010). The study assumed that over exploitation and destruction of wildlife and forest resources can be resolved by having effective law

enforcement and active involvement of local community. However, achievement of law enforcement in reducing illegal activities depends on social, economic, institutional, working environment and governance factors (Fig. 1). The attributes in each factor play significant impacts in ensuring effective law enforcement. Besides, motivation of law enforcement staff and local community are fundamental importance in law enforcement.

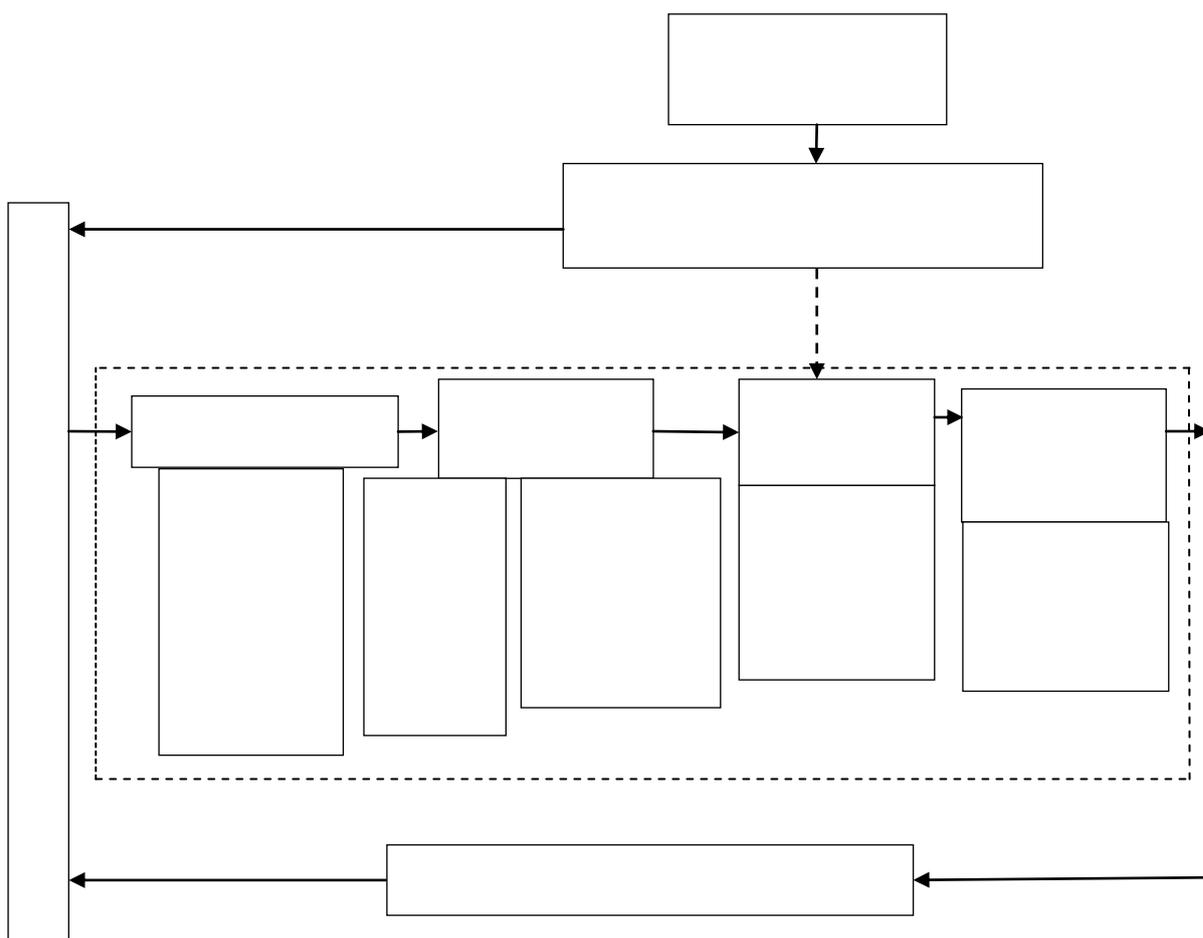


Figure 1: Conceptual framework for effectiveness of law enforcement

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview of Wildlife Management Area and Joint Forest Management

Management of wildlife and forest resources based on top-down approach give the state higher control over the wildlife and forest resources management, utilization and revenues collection (Knapp, 2012). Top-down method exclude community in the management of resources and increased burden to the government and not successful in halting the rapid decline of wildlife and forest resources (Haule *et al.*, 2002). In recent years conservation practitioners link conservation with sustainable development and using participation as the new driving force to give beneficiaries a greater opportunity to voice their preferences, needs and concerns about conservation initiatives (Gandiwa *et al.*, 2013; Lazaro *et al.*, 2013). Meanwhile, practitioners has raised awareness and strengthens partnerships between governments and rural communities in the management of wildlife and forest resources.

WMAs and JFM aims to engage communities in the management of wildlife and forest resources and generation of revenue through tourism activities. Establishment of WMA and JFM in Tanzania is supported by Wildlife Policy 2007 and Forest Policy of 1998. However, most of the villagers around protected areas have high expectations of generating income through tourism activities and conservation activities (Suich, 2013). Nevertheless, the revenue collected is mainly for the common property benefit, including schools, health facilities, roads and boreholes which has indirect impacts to household incomes and livelihoods. Hence, conservationists were convinced that wildlife and forest would disappear unless local communities accrued more benefits from PAs (Lotter and Clark, 2014).

In recent years there is little evidence in African countries towards contribution of CommunityBased Conservation Program in decreased illegal activities and increase effectiveness of conservation of wildlife and forest resources (Mfunda and Røskoft, 2011). The participation of the community is still considered to be the critical means of wildlife and forest resources management in many developing countries (Mukul *et al.*, 2014). In order for the partnership with local community in the management of wildlife and forest resources to be successful the enforcement of laws, motivation and incentive provision need to be effective (Alinon and Kalinganire, 2008). Ignoring one component is likely to result to the ineffective management of wildlife and forest resources (Alinon and Kalinganire, 2008).

2.2 Economic Theory of Incentives

Wildlife and forest resources are now widely recognized as important sectors in maintaining ecological services, generating incentives and development to local community (Magnus and Wang, 2013). Incentives are defined as inducements designed to influence or to motivate people to act in a particular way and accrued benefits of particular interventions (Robinson *et al.*, 2012). On the other hand, incentives can be financial and non-financial (Suich, 2013). Nevertheless, financial incentives usually bring immediate direct impacts on individual and development of community livelihood hence are often favoured over non-financial incentives (Juma, 2012; Suich, 2013). This study argues that, once financial incentives achieved is likely to enhance wildlife and forest resources conservation through active participation of the local community.

Involvement of local community in wildlife and forest resources management through village environment committee, game scouts, forest guards, benefits sharing, decision making, training, seminars and workshops are considered as incentives. Economic

incentives structure in PAs fails to reward intended conservation outcomes through tangible benefits or compensation for the community (Nielsen and Treue, 2011; Roberts and Jones, 2013).

Economic theory of incentives makes the implicit assumption that people are working hard when they expecting something in return include allowance, job promotion, training and recognition (Robinson *et al.*, 2012). Participatory approaches assume that, if local communities participate in the management of wildlife and forest resources, the gain benefits are expected to be so as they support conservation. However, several studies have criticized participatory approaches on the ground that it has failed to provide benefits to local community while promoting conservation (Haule *et al.*, 2002; Knapp, 2012). It is difficult to achieved sustainable wildlife and forest management unless local communities gain “incentive” for their effort of supervisethe resources on their communal land.

2.3 Expectancy Theory of Motivation

The expectancy theory of motivation explains the influence of individual to perform certain behaviors, action, or task. Motivation force is a function of three distinct perceptions such as expectancy, instrumentality and valence (Grant and Shin, 2011). Expectancy is the probability within employees that, if they work hard, their job performance will improve. Instrumentality is the reward employees think they will receive when job performance is improved while valence is value that individual places on the rewards which motivates to work (Grant and Shin, 2011). This study assumes that the effectiveness (responsibility, reliance relationship, respect and reflection) of law enforcement in wildlife and forest resources depending on incentives and staff motivation. Law enforcement staff (game scouts and forest guards) is motivated when their input that they invest in their work (time, hard work, knowledge, tolerance, skills) are balanced with

the outcome (job security, esteem, salary, employee benefit and recognition) that they received from their efforts (Grant and Shin, 2011). Hence, when inputs do not match with outcomes, motivate employees to reduce their input; indeed the performance/outcome of job tend to decrease. Nevertheless, the theory assumes that, both under and over rewarding employees can be detrimental to motivation. I argued that if game scouts, forest guards and local community are well motivated and involved in decision making they will see the need of protecting wildlife and forest resources. However, Alinon and Kalinganire (2008) pointed that, environmental governance, such as policies at the national, regional, and local level, affects the on-going changes in the management of wildlife and forest resources.

2.4 Wildlife and Forest Resources Governance

Governance refers to the process of administration and implementation of policies, legislation, regulations, guidelines and norms relating to ownership, access, control, responsibilities and sustainable management of wildlife and forest resources (Moore *et al.*, 2010). Governance is considered as interaction of rules institution, process and principles through which a society exercise power and responsibility to make and implement decisions (Brack, 2012). Key elements of good governance include equity, justice, and empowerment, predictability, rule of law, accountability, transparency, participation and sustainability. It is reported that, state accountability and transparency in managing wildlife and forest resources is weak due to poor governance, corruption and misuse of power which result to unsustainable use of wildlife and forest resources (Burn *et al.*, 2011; Manyika, 2013). Good governance increase efficient use of resources and community inclusiveness. However, Nyanghura (2013) shows the need of address the effect of leadership in ant-poaching units.

2.5 Law Enforcement Units and Working Environments in WMA and JFM

Achievement of WMA and JFM philosophy is guided by management authorities with equipped law enforcement units. Also, it depends on rules, regulations, strategies and livelihood strategies that are imposed towards the management of wildlife and forest resources. Ant-poaching unit is responsible for planning, coordinating operations, conducting surveillance and gathering intelligence information of illegal activities of wildlife and forest resources (URT, 2013). Work environments in wildlife and forest area in Tanzania falls under different government organs with different legislation. Hence, the effectiveness of law enforcement depending on the existing work environment in respective organ (Rutagarama and Martin, 2006; Gandiwa *et al.*, 2013). Work environments factors incorporate physical setting, job condition and institutional arrangement.

Investment in human resource is likely to stimulate effectiveness of law enforcement. However, empirical studies show that most plans in wildlife and forest resources management does not consider the need of human resource, thus law enforcement staff felt cheated because they not receive expected salary and they are not recognized as a permanent employee (Songorwa, 1999; Nielsen and Treue, 2011). However, poaching is extremely complex and require an understanding of the global poaching activities (Knapp, 2012). In recent years, poachers changed their tactics and use more innovative and sophisticated techniques. Hence, institutional capacity in a law enforcement unit, effective information gathering and analysing intelligence information so as to discover poaching network (Gandiwa *et al.*, 2014).

2.6 Effectiveness of Law Enforcement Institutions

Hardin's tragedy of the commons state that, degradation of natural resources does not result from any inherent failure of common property management, but from institutional

failure to control access to resources and enforce internal decisions for collective use (Wasonga *et al.*, 2010). The theory suggests that resources without clear ownership would be degraded (Wasonga *et al.*, 2010). Everyone would attempt to maximize utility in a short period, even when they could see long term availability declining. Institutions are defined as norms, rule and regulation governing behaviour within society (Maconachie *et al.*, 2009; Babili and Wiersum, 2010). Institutions are categorized into formal and informal (Maconachie *et al.*, 2009). Formal institutions are laws, regulation, standard and written rules of society while informal institutions are unwritten customs habits, practices norms and administrative procedures.

Both categories are mainly designed to coordinate individuals and a defining role in shaping the access of wildlife and forest resources and may also determine the rights of using resources in the community. In fact informal institutions can influence and provide a local mechanism for management of wildlife and forest resources, although may require legal support to ensure sustainability and enforceability (Maconachie *et al.*, 2009). Nevertheless, lack of coordination among institutions exacerbated by understaffing and a scarcity of funding has weakened the country wildlife and forest resource governance capacity. Wildlife and forest resources in Tanzania are not only managed by the government of Tanzania but there are also other actors (AWF, WWF, USAID) who play vital impacts in proposing, facilitating, funding and capacity building in management of wildlife and forest resources. For instance, AWF has played a central role in establishing JUHIBU and JUHIBEKO. However, there is little information on the roles of investors and conservation projects towards law enforcement. Wily and Mbaya (2001) argue that, long-term sustainability of protected areas and conservation efforts will depend on effective institutional mechanisms and interventions to address the causes of wildlife and forest resources loss. Meanwhile, audit office in Tanzania concludes that MNRT does

not fully ensure that the wildlife and forest resources law is effectively enforced (URT, 2013). Lack of institutional capacity and uneven decentralization of power in wildlife and forest resources management is considered as a challenge in implementation of law enforcement (Wasonga *et al.*, 2010). Every link in law enforcement chain depends on institution that can sustain the process of chain required (Nielsen and Treue, 2011).

2.7 Law Enforcement Economics

Enforcement economics model describes the key features of the law enforcement chain such as detection, arrest, prosecution, conviction and punishment provide to offenders (Kakira, 2010). I adopts the indicators of effectiveness of law enforcement from Interpol, such as poachers sign, arrested poachers, seized firearm, sized timbers, fine, convicted poachers, proceeding case in court. Economists measure the effectiveness of law enforcement by calculating a monetary disincentive value for enforcement. Enforcement economic shown that, when disincentive value is larger than the financial incentives that motivating illegal behavior is where law enforcement is effective (Kakira, 2010). It is reported that, people do commit offence if they expect higher profit than expected penalty (Moore *et al.*, 2010). However, the effective systems for prosecuting illegal activities in protected area and penalties provided to offenders is not well known in many countries (Nielsen and Treue, 2011; Lotter and Clark, 2014).

2.8 Land Use and Management of Wildlife and Forest Resources

Deforestation of tropical forests and their subsequent conversion to human-dominated land-use systems, such as agricultural land, is one of the most significant causes the loss of wildlife and forest resources (Guthiga, 2008; Kideghesho *et al.*, 2013). An area where agriculture provides low economic returns, wildlife and forest resources become the second main source of income. Indeed land use plans are crucial elements incorporate

conservation of wildlife and forest resources for sustainable development. However, increase in human population and poor land use plans has increased anthropogenic activities around PAs and increased ineffective of wildlife and forest resources management (Goswami *et al.*, 2014).

Land allocation in Tanzania in most cases associated with corruption (Mariki, 2015). Implementations of land use plans that demarcate the area for wildlife and forest conservation around community area need to take much effort on benefit sharing and compensation of community land. In recent years, their growing recognition of the global effort of protecting forests and combat climate change through REDD+ project and ensure proper land use planning.

2.9 Role of REDD+ in Management of Wildlife and Forest Resources

The Government of Tanzania ensured sustainable forest management and protection through embarked with Reducing Emissions from Deforestation and forest Degradation (REDD+) initiative. REDD is an international policy approach and positive incentive which aims to reduce emissions from deforestation, forest degradation, and enhancing forest carbon stock in developing countries (Lazaro *et al.*, 2013; Schaafsma *et al.*, 2014). REDD+ has significant potential for supporting the poverty alleviation, improving forest management policies, proper land use planning and generating financial benefits from carbon credit market (Bluffstone *et al.*, 2013). Government of Tanzania with AWF facilitate establishment of JUHIBEKO through ARKFor (*Advancing REDD+ in Kolo Hills Forests project*) which is funded by Norwegian government.

The ARKFor project in Kondoa District aim at improving local community livelihood based on conservation friendly micro-enterprises, sustainable agriculture and generate

revenue from carbon sales through involuntary carbon markets(John *et al.*,2014). Through REDD+ local communityin Kondoa District are provided with training for improving agriculture practice by using improved seed and restoring soil organic content through manure application. REDD+ project also combats livestock grazing, firewood collection and charcoal making by providing training and practice of using sustainable livelihood strategies (improving stove, zero grazing) which reduce illegal activities and dependent of wildlife and forest resources while stimulate the management of those resources. Implementation of REDD+ projects in Kolo Hills forest has formulated forest guard for controlling illegal use of forest resources (Matilya, 2012).

2.10 Overview of Wildlife and Forest Restrictions and Offences

The government of Tanzania through its Parliament and participation of different stakeholders establishment Policies and Acts that legalize the management wildlife and forest resources. All responsible institutions in wildlife and forest management work and managed forest and wildlife according to Forest Act No. 14 of 2002 and Wildlife Act No. 9 of 2009 respectively. The two Acts state various restrictions related to the protections and utilization of wildlife and forest produce (Table1).According to Forest Act forest produce is defined as anything which is produced by or from trees or grows in a forest or is naturally found in a forest include bark, branch wood, canes, charcoal, fibers, firewood, fruits, galls, gums, honey, latex, leaves, litter, natural varnish, poles, resin, roots, seeds, timber, trees, thatch, wattles, wax, wild silk, wood oil, and any other living or inanimate object (URT, 2002).

It is unlawful to hunt, fish, use or be in possession of any trap or weapons include snare, firearms, net, bow and arrow, gun, chainsaw, saw, poison or explosive substance used or capable of being used for the purposes of hunting or fishing (URT, 2002;URT, 2009).

Wildlife Conservation Act considers trophy as any animal alive or dead, and any horn, ivory, tooth, bone, claw, hoof, skin, meat, hair, feather, egg or other portion of any animal and includes a manufactured trophy (URT, 2009). National game means any animal declared as national symbols such as Giraffe (URT, 2009). While wild plants are those plant which are reserve and maintain biodiversity and genetic resources within the country or protected by international agreement (URT, 2002).

Implementation of Wildlife Act in WMA is facilitated by Wildlife Management Area regulation No. 206 of 2012, Village bylaws and WMA bylaw. The regulation in section 55 to 57 provides restriction on utilization of forest produce, bee and fisheries products in WMA. Utilization of those resources shall be done in accordance with the Forest Act, Beekeeping Act, Fisheries Act, General Management Plans or Resource Zone Management Plan and other relevant laws and regulations (URT, 2012). In section 55 (4) of WMA regulation state the offence related to tree cutting any person who fells trees in a WMA commits an offence and is liable on conviction. Also in Section 58 of WMA regulation provides restrictions related to extraction of minerals in WMA and extraction of other related products such as sand, gravel, stones and mineral resources of a similar nature shall be done in accordance with the approved General Management plan or the Resource General Management Plan (URT, 2002). Implementation of Forest Act in JFM is facilitated by Joint Forest Management Guideline, village bylaws and bylaws create by JFM according to forest act. However, it is pointed that, critical problem in management of wildlife and forest resources is that enforcement of conservation legislation is weak (Kolahi *et al.*, 2014).

Table 1: Various restrictions of wildlife and forest resources

Related Restrictions	Section in Wildlife Act 2009	Section in Forest Act 2002
Unlawful on grazing livestock in PAs	21	26, 84 (3)
Unlawful destruction of vegetation (fire, cutting)	18	17, 66, 70, 91(2)
Unlawful of dealing, exporting and possession of government trophy/ forest produce	84, 86	88, 59
Unlawful in entering in PAs without permission	15	84 (1)a
Unlawful of extracting mineral inside the PAs	20 (2)	26, 46
Unlawful of killing of young and female pregnant animal	56	
Unlawful possession of weapons inside Pas	17	26
Unlawful of killing nation game or remove/cut wild plant	26	67, 86
Restriction on human activities PAs borderline (settlement, farming)	74	26, 29
Unlawful of hunting, methods of hunting or capture of animal	40, 53, 65	26, 68b

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of Study Area

3.1.1 JUHIBU

3.1.1.1 Geographical location

JUHIBU (Jumuiya ya Hifadhi ya Burunge) is a Community Association of Conservation around Lake Burunge which was among the first WMAs gazetted in Tanzania. JUHIBU received user rights from the Wildlife Division in 2006 under facilitation of African Wildlife Foundation (AWF) and Babati District Land Management Program (LAMP). The WMA found is in Babati District and lies between Tarangire National Park to the South and East and Lake Manyara National Park to the North. JUHIBU comprises 10 villages (Mwada, Sangaiwe, Kakoi, Manyara, Maweni, Magara, Minjingu, Vilima Vitatu and Olasiti).

3.1.1.2 Climate and topography

JUHIBU is characterized by a bi-modal and irregular rains ranging from 300 to 1200 mm per annum and receives mean rainfall from 500 mm to 750 mm per annum. Short rains start in October and go up to January. Long rains are from February to May. The WMA is dominated by alkaline sand, alluvial loamy soil and covers an area of 283 km². The mean annual temperature is about 23°C with a minimum of 18°C and a maximum of 28°C.

3.1.1.3 Flora and Fauna in JUHIBU

The WMA is located in an important migratory corridor between Tarangire and Lake Manyara National Parks for species such as Elephant, Buffalo, Zebra and Wildebeest,

which regularly move between the two areas (Kideghesho, 2013). Lake Burunge in JUHIBU is an important area for water birds such as greater and lesser flamingo and a range of ducks and shorebirds. JUHIBU ecosystem is dominated by open grassland, open woodland vegetation, bush grassland, riverine forest and flood plain vegetation.

3.1.1.4 Socio- economic activities of community adjacent JUHIBU

JUHIBU is highly heterogeneous ethnically, with mostly Wambugwe in the Southern villages and a mixture of Waarusha and Maasai. There are also significantly large migrant populations who settled in many parts of JUHIBU village. Local community adjacent WMA participates in tourism activities, fishing, crop production, livestock keeping and farming for subsistence and commercial purposes. Major crops around WMA are cotton, maize, beans, sesame, sunflower and sorghum. The WMA is among the greatest commercial potential for tourism due to its location along the Arusha to Dodoma main road and between the two National Parks in Tanzania Northern tourism circuit and hence local community conduct handcraft business along the road.

3.1.2 JUHIBEKO

3.1.2.1 Geographical location

JUHIBEKO (Jumuiya ya Hifadhi ya Tarafa za Bereko na Kolo) is a Community Association of Environmental Conservation in Bereko and Kolo divisions located in Kondoa District in Dodoma Region in Tanzania. The association is managed by village environmental committee and collaborates with the government in the conservation of Salanka and Isabe forest. JUHIBEKO is formed by two catchment forest such Salanka (8337 ha) and Isabe (4249 ha) in the Northwestern and Northeastern part of JUHIBEKO respectively. The JFM comprises of 18 member villages such as Bereko, Masawi, Bukulu,

Kwadinu, Mapinduzi, Salanka, Humai, Filimo, Kolo, Itundwi, Mnenia, Kandaga, Masange, Kikore, Madege, Sauna, Mitati and Mkurumuzi.

3.1.2.2 Climate and topography

JUHIBEKO ecosystem has an average altitude of 1800m above the sea level with annual rainfall ranging between 800 mm to 900mm. However, the altitude of the area ranges from 1650 m to 2000 m above sea level. The prevailing soils are moderately fertile red sandy loams and clays with low water storage capacities which are suitable for the growth of short rains crops.

3.1.2.3 Flora and Fauna of JUHIBEKO

The natural vegetation of the area is mainly Miombo woodland dominated by *Brachystegia species*. However, numerous plant species are found in Salanka and Isabe forest such as *Brachystegia microphla*, *Brachystegia spiciformis*, *Pterocarpus angolensis*, *Porinaria caratifolia*, *Markhamia obtusifolia*, *Capparia species*, *Zimonia cafra* and *Rhus natalensis*. The forest is also dominated by primate's species, birds and small mammals.

3.1.2.4 Socio-economic activities of community adjacent JUHIBEKO

The social-economic activities for local communities in JUHIBEKO included farming, livestock, honey collection, charcoal production and livestock keeping. Various crops, including (maize, finger millet, beans, oilseeds, pigeon peas, sorghum) are grown for subsistence and commercial purpose (Likango, 2013).

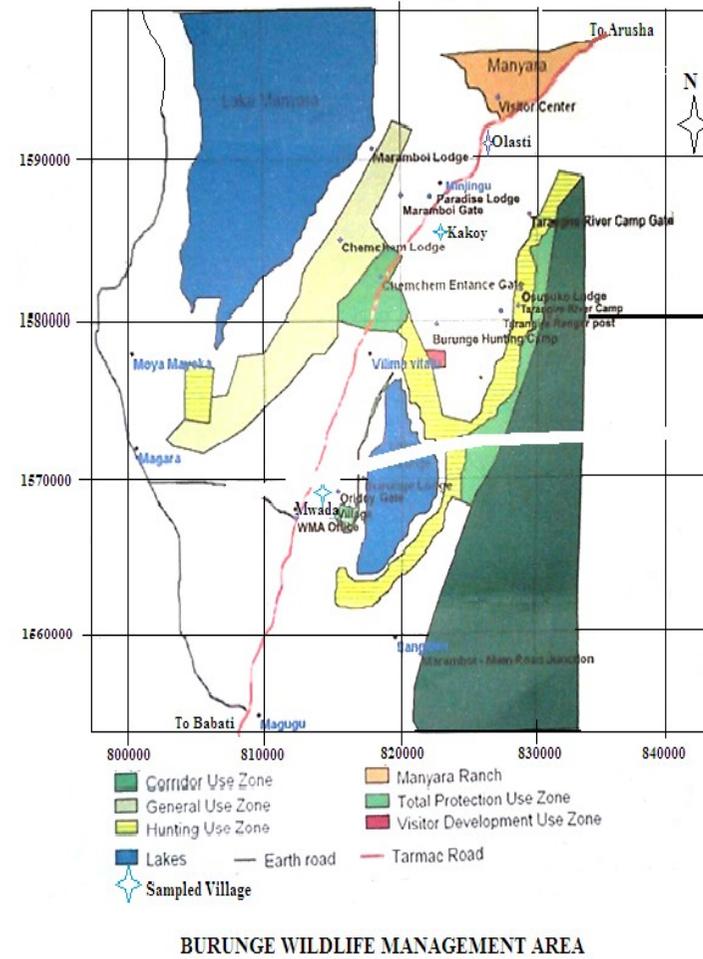
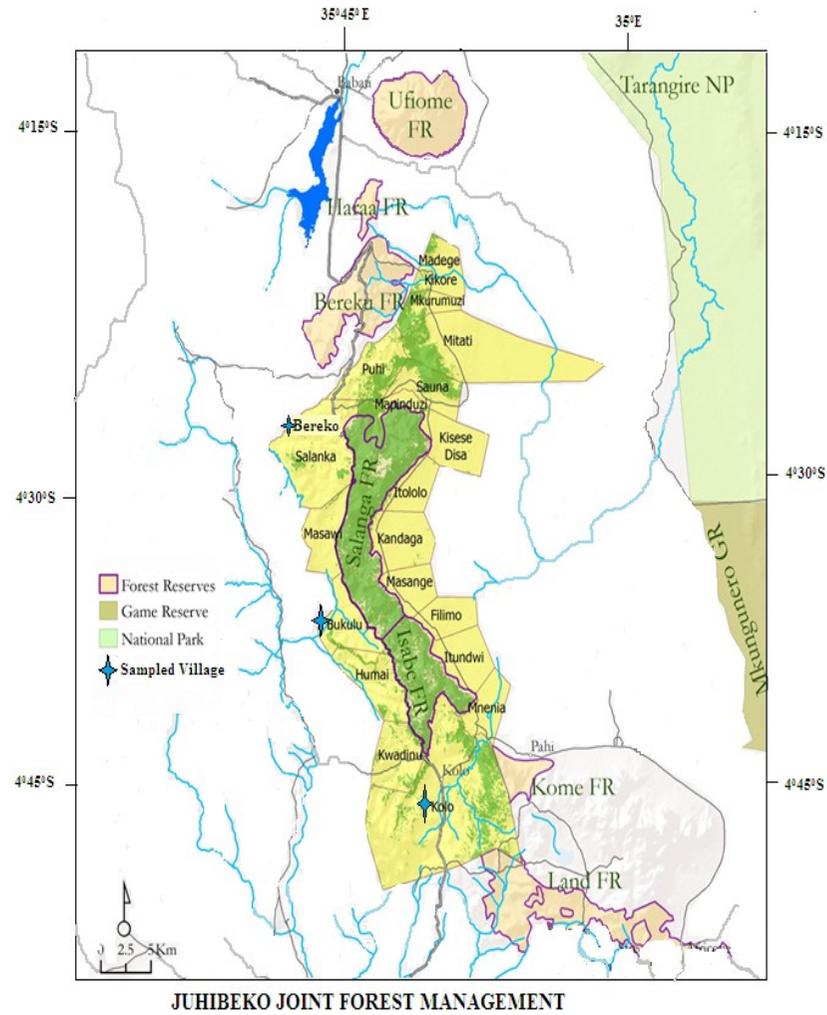


Figure 2: Location of study area JUHIBU and JUHIBEKO modified from AWF (2013)

3.1.3 Why JUHIBU and JUHIBEKO

Large group of Elephant, Buffalo, Wildebeest and Zebra migrate to Lake Burunge from Lake Manyara and Tarangire National Park during dry season. Isabe and Salanka forest in JUHIBEKO form an important component of Tarangire-Manyara Ecosystem (TME) by holding headwaters of the Tarangire River which is the only reliable water source for wildlife in TME. The dries of Tarangire River and Lake Burunge result in serious consequences to wildlife downstream, including local extinctions of some species in TME (Matilya, 2012). Hence, the two study areas are important areas for the ecological function of Manyara-Tarangire Ecosystem and economically important for the local community which need effective law enforcement for conservation of wildlife and forest resources.

3.2 Methods

3.2.1 Research design

The research design influences and determines the choice of the method to use in the data collection. Hence, across-sectional research design was applied in this study; the design was favored because of time and resource limitations (John *et al.*, 2014). Questionnaires were pre tested before the main survey to measure validity. Necessary changes were made so as to improve the data collection procedure.

3.2.2 Sampling techniques and sample size

Large sample size is more reliable to reflect a population mean and smaller sample size may be easier to manage and have less sampling error (Carmen *et al.*, 2007). Large or small samples are determinant of resources include time, funds and participants (Carmen *et al.*, 2007; Onwuegbuzie and Leech, 2007). The sample size was obtained by using simple random selection which allows each unit of the population to get an equal probability of inclusion in a sample. The sampling unit was households and law enforcement staff. A

checklist was used to guide discussion with key informers including WMA leaders, JFM chairperson, District Game Officer, District Forest Officer, Ward Executive Officer, Village Executive Officer, Lawyer, AWF official and TFS officer to capture their views on law enforcement.

3.2.2.1 Households sample size

Taking into account time allocated to conduct study and resources in collecting data in two CBOs, a sample of three study villages was drawn randomly from a total of 10 and 18 villages forming JUHIBU and JUHIBEKO respectively. Also the selection of village was based on accessibility of village and closeness to the WMA and JFM. The study villages from JUHIBU were Olasiti, Kakoy and Mwada, while from JUHIBEKO were Bereko, Bukulu, Kolo. Due to limited resources in term of fund, time and most of community during data collection were prepared their farm for cultivation hence 25 households were randomly selected from village registered book to constitute the sampling units that make a total of 150 sample households which represent true size of studied population (Table 2).

Table 2: Households sample size in JUHIBU and JUHIBEKO

CBOs	Village	Population per village	Households per village	Sample size	% of total households sampled
JUHIBU	Olasiti	3747	749	25	3.34
	Kakoy	4530	981	25	2.55
	Mwada	2828	622	25	4.02
JUHIBEKO	Bereko	2906	613	25	4.08
	Bukulu	1670	416	25	6.01
	Kolo	2886	656	25	3.04

3.2.2.2 Law enforcement staff sample size

The sampling units for law enforcement staff were game scouts, game rangers, forest guards, forest officers and members of the environmental committee. The sample size was randomly selected from JUHIBU and JUHIBEKO. Sample size was done by select staff who participated in law enforcement activities, work as game scouts, forest guards, forest officer and game ranger hence a total of 52 law enforcement staff were randomly selection (Table 3).

Table 3: Law enforcement staff sample size in JUHIBU and JUHIBEKO

CBOs	Law enforcement staff	Number of staff	Sample size	% of law enforcement staff sampled
JUHIBU	Game rangers	5	3	60.00
	Game Scouts	30	23	76.67
	Forest Officers	4	2	50.00
JUHIBEKO	Forest guards	23	10	43.48
	Environmental committee	72	14	19.44

3.2.3 Data collection and analysis

The study used both qualitative and quantitative methods in collecting data. Primary data from households and law enforcement staff was collected through a questionnaire. A Likert scale was used where respondents were presented with a number of statements and selected one of the statements while checklist was used to guide interview. Participatory observation was used to observe how game scouts conduct patrol activities in JUHIBU. However, participatory observation was not done in JUHIBEKO because there were no patrols conducted during data collection. Secondary data was collected from books, journals, internet and monthly reports from JUHIBU and JUHIBEKO. Non-parametric statistics was used for data which did not conform to a normal distribution while

parametric statistics (t-paired test) was used for data which conformed to a normal distribution. The ordered logistic regression model was employed to analyze factors which influence effectiveness of law enforcement. More details on data collection and analysis methods by specific objectives are provided in Section 3.3 to 3.5.

3.3 Determination of Illegal Activities and Patrol Efforts of Anti-poaching Units in each Case

The illegal activities and patrol effort were collected from monthly report for the past 3 years from 2012 to 2014 in both JUHIBU and JUHIBEKO. The data included, arrested poachers, seized chainsaw, collected snares, seized timber, poaching sign (carcasses, charcoal kilns, saw pits, foot print), fines, frequency of patrol, days on patrol, number of game scouts and forest guards on patrol. Patrol efforts in each CBOs was number of patrols conducted per month, multiply by the number of game scout/forest guard involved and patrol days used per month. Primary data on perception of illegal activities, patrol efforts and condition of wildlife and forest resources were collected through Likert scale (Appendix 1). Likert scale (5-point likert type) was used to collect data on households perception towards condition of wildlife and forest resources. Households were asked to state whether the condition of wildlife and forest has much declined, declined, stable, improved or much improved. In analyzing much declined and declined was given the value of 1 which indicates declining, while remaining stable were labeled as 2, also improved and much improved was given the value of 3 which indicates improved. Cross tabulation analysis was performed to explore and determined community variation among local people's perception toward condition of wildlife and forest resources. Data entry and analysis was performed using SPSS version 16 and Microsoft excels and come up with descriptive statistical table, mean, standard deviation graph and chart.

Non-parametric Friedman test was used to determine the variation of illegal activities and patrol efforts in the three years. Wilcoxon test was used to compare illegal activities and patrol efforts between years. The relationship between detected mean illegal activities per month and mean patrol efforts per month was also investigated by two tailed Spearman's rank correlations. All statistical tests were subjected $p < 0.05$ level of significance.

3.4 Examination of Management Effectiveness in JUHIBU and JUHIBEKO

This objective covered both management effectiveness and perception of the local community on governance practice in JUHIBU and JUHIBEKO. Management effectiveness was addressed through Management effectiveness Tracking Tool (METT) (Hocking *et al.*, 2000; Madoffe and Munishi, 2005). The tool was conducted through a series of 30 questions that address various issues that are necessary for achievement of management goals for JUHIBU and JUHIBEKO (Appendix 6). The management issue was, area context, planning, input, process, outputs, and outcomes. The assessment was conducted by asking the chairman of JUHIBEKO, Forest District Officer, Wildlife District officer and leader of JUHIBU. The assessment score for each question was ranging from 0 = poor, 1 = good, 2 = very good to 3 = excellent. Cumulative management effectiveness ratings were grouped as (0-15% = ineffective, 16%–30% = less effective, 31%–45% = effective, 46%–60% = good and >60% = highly effective). A paired student's t-test was used to compare the cumulative METT scored between JUHIBU and JUHIBEKO at 5% significance level.

Local community perception towards governance practice was measured with a five point Likert scale (Appendix 1). Households were asked to state whether the practice of governance element is very low, low, somewhat low, high or very high. The governance elements were relationship, participation, accountability, transparency and corruption. In

analyzing much low and low was given the value of 1 which indicates low, while somewhat low/high was given 2 indicate medium, also high and very high was given the value of 3 which indicates high. Microsoft excels and SPSS version 16.0 software was used for data analysis to come up with descriptive statistical table, graph and chart. Cross tabulation was performed to determine whether local community differ in their perception reading to governance practice in CBOs, the test was performed at the 5% significance level.

3.5 Determination of Factors Influencing Effectiveness of Law Enforcement in Wildlife and Forest Resources Management

Semi-structured questionnaire was used to collect factors influencing effectiveness of law enforcement (Appendix 2). A three point likert scale was used to establish management effectiveness Level (High effective, Effective, Low effective) as the independent variable while explanatory variables were derived from both social-economic, working environment and governance factors. Hence explanatory variables were age, sex, education, Source of Income (SI), Working Relation (WR), Experience (EP), Transparency (TS) and Punishment (PS). The ordered logistic regression model was used to explore factors influencing effectiveness of law enforcement. The data were subjected to Stata version 11 program to run ordered logistic regression model, hence the model was.

$$\begin{aligned}
 Y_{2i} &= 0 \text{ if } y_{2i}^* \leq \theta_1 \dots\dots\dots 1 \\
 Y_{2i} &= 1 \text{ if } \theta_1 < Y_{2i}^* \leq \theta_2 \dots\dots\dots 2 \\
 Y_{2i} &= 2 \text{ if } \theta_2 < Y_{2i}^* \leq \theta_3 \dots\dots\dots 3 \\
 Y_i^* &= \int_{k=1}^k \beta_k X_{ki} + \varepsilon_i, \frac{\varepsilon}{X} \sim \text{logistic} \left(0, \frac{\pi^2}{3} \right) \dots\dots\dots 4
 \end{aligned}$$

Y_i =observable variable (the level of effectiveness of law enforcement I); Y_i^* represents the probability of that level of effectiveness of law enforcement, given explanatory variables (X_i); X_i represents the explanatory variables; β_K are parameters to be estimated; K represents the number of explanatory variables, $I = 1, 2, 3 \dots, k$, ε = random disturbances.

Ordered categorical variables, usually assumes that the relationship between each pair of outcome groups is the same. This means that there is only one set of coefficients and they do not vary between the categories called parallel-lines assumption (Helms *et al.*, 2015). This implies that when estimating an ordered logistic regression, I assume that the coefficients that describe the relationship between the lowest law enforcement versus all higher categories of the effectiveness of law enforcement that is medium effective versus high effectiveness of law enforcement are the same. The Brant test of parallel regression assumption provides further evidence of non or either violation of assumption. Stata version 11 software was used to verify this assumption by performing Brant test of proportional odds (*Commend: oparallel, brant asl mcci nodots*). Generally if brant test generate a significant test provides evidence that the parallel regression assumption has been violated (Helms *et al.*, 2015).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics

Socio-economic characteristics assessed were age, sex, education and economic activities. Those characteristics play a vital role in determining their influence on effectiveness of law enforcement in a protected area. The result showed that, majority of the households in JUHIBU and JUHIBEKO had attained primary school level of education compared to other levels of education (Table 4) probably this could be due to the low level of income and thus unable to continue to higher level of education. Investment in education in the community increased conservation consciousness and might be more inclined in wildlife and forest resources management and promotes long term conservation goals (Guthiga, 2008; Kideghesho *et al.*, 2013; Roberts and Jones, 2013).

Table 4: Socio-economic characteristics of households in JUHIBU and JUHIBEKO

Age categories	JUHIBU			JUHIBEKO		
	Kakoy (%)	Mwada (%)	Olasiti (%)	Bereko (%)	Bukulu (%)	Kolo (%)
18 – 35	24.00	32.00	52.00	28.00	16.00	20.00
36 – 60	68.00	56.00	40.00	52.00	72.00	68.00
Above 61	8.00	12.00	8.00	20.00	12.00	12.00
Level of education						
Primary	88.00	72.00	76.00	76.00	72.00	80.00
Secondary	8.00	16.00	8.00	20.00	24.00	16.00
College/						
University	4.00	12.00	16.00	4.00	4.00	4.00
Sex						
Male	56.00	68.00	60.00	44.00	60.00	64.00
Female	44.00	32.00	40.00	56.00	40.00	36.00

The result noted that, majority of the law enforcement staff were in the adult age group of 36-60 years old in JUHIBU and JUHIBEKO while few in JUHIBEKO were above 61 years old (Table 5). Law enforcement staff comprised of higher males than females probably because the nature of law enforcement incorporate much energy and physical activities which can be done by male than female (Table 5). The findings show that, majority of the law enforcement staff in JUHIBU and JUHIBEKO have attained primary education and few have higher levels of education (Table 4).

Table 5: Socio-economic characteristics of law enforcement staff in JUHIBU and JUHIBEKO

Age categories	JUHIBU		JUHIBEKO	
	Frequency	%	Frequency	%
18 - 35	9	34.61	6	23.07
36 – 60	17	65.38	19	73.07
Above 61	0	0	1	3.85
Level of education				
Primary	16	61.53	22	84.61
Secondary	7	26.92	1	3.84
College/ University	3	11.54	3	11.54
Sex				
Male	21	80.76	19	73.07
Female	5	19.23	7	26.92

4.2 Economic Activities of Households in JUHIBU and JUHIBEKO

The findings show that, the majority of the households in JUHIBU and JUHIBEKO were farmers (Table 6) thus likely to influence encroachment inside PAs. The heterogeneous group with different tribes in JUHIBU and JUHIBEKO stimulate various activities such as farming, livestock keeping tourism and small scale business. Most of rural economies in

African countries are becoming more diverse with a range of income sources such as crop farming, livestock keeping, settlement and small business (Kissui, 2008; DeGeorges and Reilly, 2009). The result found that, the presence of pastoralist in JUHIBU and JUHIBEKO increased livestock population around PAs (Table 6). Nevertheless, agriculture system, including crop farming and livestock keeping was a predominant livelihood activity around PAs (Wily and Mbaya, 2001; Schaafsma *et al.*, 2014). However, effective land use planning, including a land for farming, livestock grazing and settlement are crucial components in influencing the effectiveness of law enforcement and reducing illegal activities in protected areas. However, the socio-economic forces driving illegal exploitation of wildlife and forest resources should be addressed (Kühl *et al.*, 2009).

Table 6: Economic activities of households around JUHIBU and JUHIBEKO

Economic Activities	JUHIBU			JUHIBEKO		
	Kakoy (%)	Mwada (%)	Olasiti (%)	Bereko (%)	Bukulu (%)	Kolo (%)
Business	8.00	12.00	16.00	32.00	8.00	16.00
Farming	40.00	52.00	48.00	32.00	60.00	60.00
Livestock	48.00	28.00	28.00	36.00	32.00	20.00
Tourism	4.00	8.00	8.00	-	-	4.00

4.3 Overview of Patrol Efforts and Illegal activities in JUHIBU and JUHIBEKO

A total of 159 patrol trips were conducted from 2012 to 2014, where 72 and 87 patrol trips were conducted in JUHIBU and JUHIBEKO respectively. Patrol trips lasted for an average of 16 to 20 days per month in JUHIBEKO and JUHIBU respectively. In each patrol squad an average of 12 and 17 village scouts were involved in JUHIBU and JUHIBEKO respectively. The number of days used for patrols in JUHIBU and JUHIBEKO similar with days of patrol used in high categories of protected area include Game reserve which conduct patrol activities for 10 to 20 days per month (URT, 2013).

Most of the patrol in JUHIBU were conducted on foot and vehicle while in JUHIBEKO were conducted on foot only. An average of 150 and 300 patrol efforts per month were involved in patrol activities in JUHIBEKO and JUHIBU respectively. In all thirty six (36) months, three (3) joint patrols were conducted between game scouts and District game ranger from Babati District. The joint patrol was more likely to arrest more poachers and sight various illegal activities in JUHIBU. Probably this was due to the fact that game rangers from Babati District were armed with firearm. While the responses from game scouts and forest guards revealed that, they usually used local tool (sticks, club, machete and knives) for protection during patrol (Plate 1).



Plate 1: Game scouts carrying sticks and machete for protection during patrol

(Photo: Olasiti village, 25 November, 2014)

4.3.1 Patrol efforts in JUHIBU and JUHIBEKO

The findings in JUHIBU show that, patrol efforts in all three (3) years significantly varied ($\chi^2 = 16.439$, $p = 0.000$). However, patrol efforts did not differ significantly between 2012 and 2013 ($Z = -1.066$, $p = 0.286$) at 0.05 levels of significance. Besides, the patrol efforts invested in 2012 and 2014 ($Z = -2.961$, $p = 0.003$); 2013 and 2014 ($Z = -2.859$, $p = 0.004$)

were significantly different at 0.05. Invested patrol efforts in JUHIBEKO significantly varied across the three years ($\chi^2=15.363$, $p = 0.000$). However, comparison between years shows that, patrol efforts in 2012 and 2013, ($Z = -1.897$, $p= 0.058$): 2012 and 2014 ($Z=-1.870$, $p= 0.061$) did not significantly varied. Indeed, in 2013 and 2014 patrol efforts was significantly different at 0.05 ($Z= -2.561$, $p= 0.010$) level of significance.

Patrol efforts were significantly higher in JUHIBU (67%) than JUHIBEKO (32%) at 0.05 level of significant ($Z= -3.059$, $p = 0.002$). Probably due to direct and indirect external interventions from NGOs, as reported by management that patrol efforts were increased due to the funding received from private organization like Honey Guide Foundation. Stakeholder participation in conservation of wildlife and forest resources plays vital role in law enforcement (Lotter and Clark, 2014). However, investing only in patrol activities for better monitoring and detection of illegal activities will not improve the effectiveness of law enforcement if illegal items are not confiscated and prosecution is adequate or major violation go unpunished (Moore *et al.*, 2010).

4.3.2 Illegal activities in JUHIBU and JUHIBEKO

4.3.2.1 JUHIBU

Various illegal activities associated with anthropogenic activities in JUHIBU and JUHIBEKO were identified. In all three years, about 53% of illegal activities were reported in JUHIBU where in JUHIBEKO were 47% (appendix 7). Mean illegal activities detected was not significantly different between JUHIBU and JUHIBEKO ($Z=-0.746$, $p = 0.456$) (Appendix 7). However, JUHIBU was likely to detect many numbers of illegal activities due to larger investment of patrol efforts as compared to JUHIBEKO. Illegal activities detected in JUHIBU significantly varied across years (Table 7). Findings in JUHIBU indicated that, main illegal activities detected during patrol activities was tree

cutting and Livestock grazing (Table 7) and most of illegal activities were occurred mainly in January (11), December (12%) and mainly in February (13%) (Appendix 8). Illegal activities of wildlife and forest resources can be protected by prohibition of human activities in a protected area and backed up by on-site enforcement (Haule *et al.*, 2002).

Table 7: Illegal activities recorded in JUHIBU from 2012 to 2014

Illegal activities	2012	2013	2014	Total	%	Mean	St.d
Bushfire	2	-	-	2	0.24	0.67	-
Canoe	40	-	9	49	5.95	19.33	6.36
Charcoal kilns	11	15	13	39	4.73	22.33	1.41
Charcoal sack	3	34	8	45	5.46	29.00	18.38
Elephant carcasses	2	1	-	3	0.36	1.33	0.71
Farming encroachment	19	22	12	53	6.43	29.00	7.07
Footprints	20	26	19	65	7.89	36.67	4.95
Illegal firewood collection	17	13	12	42	5.10	22.33	0.71
Illegal fishing	19	16	9	44	5.34	23.00	4.95
Illegal hunting (flashlight vs. horn)	2	1	-	3	0.36	1.33	0.71
Livestock grazing	42	35	28	105	12.74	56.00	4.95
Fishing net	13	18	-	31	3.76	16.33	12.73
Other animal carcasses	57	12	8	77	9.34	32.33	2.83
Settlement encroachment	12	10	10	32	3.88	17.33	-
Poachers tools (axes, arrow, bicycles, motor cycles, mist net and machete)	36	7	3	46	5.58	18.67	2.83
Wire snares	14	18	14	46	5.58	26.00	2.83
Tree cutting	53	48	41	142	17.23	77.00	4.95

4.3.2.2 JUHIBEKO

Findings from JUHIBEKO indicate that, in all the 36 months the main illegal activities detected during patrol activities were livestock grazing, firewood collection and tree cutting (Table 8). Illegal detected in JUHIBEKO were significant, varied across the

year (Table 8). Most of illegal activities in JUHIBEKO occurred in November (12%), December (13%) and mainly in January (15%) (Appendix 9).

The result show that, most of illegal activities conducted in JUHIBU and JUHIBEKO were due to poverty, lack of employment and increased in human population around PAs. The findings are similar to Bitanyi *et al.* (2012) who pointed that, poverty is a major driver for illegal activities to people living around protected areas and the inability of local community to regulate behavior and activities of any individual within and outside the community. Also, the study by Juma (2012) pointed that major threat to wildlife and forest resources in previous years was due to fire since agriculture and animal grazing were limited due to low human population.

Moreover, the result noted that, illegal activities in JUHIBU and JUHIBEKO occurred in rainy and farming season. Game scouts and forest guards reported that, in rainy season most of patrol activities were not regular due to poor accessibility, others village scouts concentrate on farming activities and lack of patrol gear, thus increased the chance of livestock keepers and poachers to invade the area. The findings were similar to Ngure (2012) and URT (2013), wet season is the most difficult time of the year for game rangers to conduct patrol activities; hence poachers devastate wildlife and forest resources by taking advantage of the patrol teams infrequent visits and poor coverage of their operations within the protected areas.

Table 8: Illegal activities recorded in JUHIBEKO from 2012 to 2014

Illegal activities	2012	2013	2014	Total	%	Mean	S. D
Chain saw	-	-	2	2	0.27	0.67	1.15
Charcoal kilns	22	17	20	59	7.91	19.67	2.52
Charcoal sack	25	9	13	47	6.30	15.67	8.33
Farming	14	4	8	26	3.49	8.67	5.03
Firewood collection	65	31	38	134	17.96	44.67	17.95
Foot prints	21	14	18	53	7.10	17.67	3.51
Livestock grazing	85	44	65	194	26.00	64.67	20.50
Settlement	8	1	6	15	2.01	5.00	3.61
Stone collection	-	3	3	6	0.80	2.00	1.73
Timber harvesting	35	15	33	83	11.13	27.67	11.02
Tree cutting	60	21	46	127	17.02	42.33	19.76

4.3.3 Common illegal activities detected in JUHIBU and JUHIBEKO

4.3.2.1 Illegal hunting

Illegal harvest of wild animal in JUHIBU is likely to reduce the number of wild animals in the Massai Steppe Ecosystem. Besides, most of the illegal hunting in JUHIBU were done for subsistence and commercial purposes. The evidence from monthly reports in JUHIBU indicate that, 80 species of mammals (3 larger mammals, 45 small mammals and 32 birds) carcasses were observed in JUHIBU ecosystem (Table 6). Most of identified carcasses were due to illegal hunting, accidents and crop raiding/livestock conflicts. Reports show that, most of the carcasses were buffaloes, Pangolin, Dik dik, Wildebeest, Impala, Elephants and Hyenas. Majority of the carcasses were found in Vilima vitatu, Oridoi, Minjingu, Ngoley and Olasiti villages. Illegal hunting was conducted by using snares, arrow, wire snare, flashlight v's horn and firearm. In different studies Gandiwa *et al.* (2014) and Mariki (2015) observed that, poachers tend to use spears, bows, firearm, poisoning arrows and snare for poaching wild animals. A total of 46 wire snare were recovered in JUHIBU ecosystem, several incidences found giraffe with snare were detected and the

incidence was normally reported to the veterinary doctor in Tarangire National Park to rescue the animal. Becker *et al.* (2013) reported that poachers tend to use snare to capture wild animal because it is not detected easily by rangers. Three larger mammals (Elephant) were killed in 2012 (2) and 2013 (1), poachers were not arrested and managed to escape with trophies (tail, tusk). The game scouts revealed that, it is difficult to approach poachers without a firearm because the majority of poachers conducted illegal activities with firearm especially who hunt elephant. Indeed, when a game scouts detected poachers with a firearm they reported to Tarangire National park for assistance. The findings concur to Ngure (2012) who pointed that, poachers who used firearm for illegal activities posed a huge challenge to game rangers and make difficult to confiscate guns and rescue animal from poachers. However, the illegal activities will be better controlled not by guns and rangers, but by solutions that respect and make partners with local communities, landowners, through providing sound incentives and opportunities to value and conserve wildlife and forest resources (Topp-Jørgensen *et al.*, 2005; Msuha, 2009).

4.3.3.2 Encroachment

Encroachment was conducted by local communities for the purpose of increasing land for settlement, cultivation. In some places beacons, signs were removed and tree were cut. Game scouts in JUHIBU revealed that, encroachment activities occurred most in Manyara, Magara and Maweni villages while in JUHIBEKO were mainly conducted in Bereko, Itololo and Humai villages. The survey found that, the two Community Based Organization is surrounded by a community who depends on farming activities. In fact, encroachment result in new settlements and clearing of forests for agriculture and livestock grazing due to the increased of human needs, unawareness of conservation and its importance to community livelihood (Sanga *et al.*, 2013; Vedeld *et al.*, 2012). Continued encroachment into protected areas resulted in tremendous decline in wildlife and

forest such as extinction of some wild animal and indigenous tree species (Madoffe and Munishi, 2005; Madoffe *et al.*, 2006; Silayo *et al.*, 2006).

4.3.3.3 Firewood and charcoal

In both JUHIBU and JUHIBEKO regulations allow local communities to collect firewood from the forest for special events such as ceremonies or burial. The result show that, charcoal production and firewood collection were used as source of energy and commercial purpose in JUHIBU and JUHIBEKO. Indeed, households from Bukulu village revealed that, the presence of Kondoa, Babati to Arusha route trigger production of charcoal in JUHIBU and JUHIBEKO for commercial purpose. Observation from result revealed that, due to shortage of employment most young people engaged in charcoal production to generate income. Jeremiah *et al.* (2014) observed that, charcoal production is perceived as instrumental in forcing the youths to engage in charcoal production as an alternative employment opportunity. The finding from this study concur to Kajembe *et al.* (2012) and Kideghesho *et al.* (2013) that wood fuel is a major source of energy for both urban and rural areas. Respondents from Kakoy, Bereko and Bukulu villages in respectively claim that;

“Collection of firewood in PAs does not cause any impact on the environment because we have always collected dry wood in the ground without chopping green wood from trees”.

However, Kajembe *et al.* (2012) found that, firewood collection in Kondoa and Rungwe Districts was major challenge in mitigating climate change and implementation of the REDD+ program because majority of the households depend on forests for fuel wood. Moreover, change of community life style in JUHIBU and JUHIBEKO has increased demand of production of burnt bricks for construction of permanent house hence increasing demand of firewood.

4.3.3.4 Timber harvesting

Illegal timber harvesting was done for the purpose of getting building material for domestic and commercial use (Table 9). Forest guards revealed that, Mapinduzi, Itololo, Itundwi and Bereko were the leading villages for illegal timber harvesting and buyers were found especially in Itololo village which is not part of JFM. The responses of households and forest guards indicated that, the demand of timber from Salanka and Isabe forest increased due to the progress of construction of permanent house in various towns include Arusha, Babati and Kondoa District. The findings are similar to studies of Mosoffe *et al.* (2011) and Jeremiah *et al.* (2014) who reported that, forests are being destroyed by other forms of land use like construction activities as a result of rapid urbanization leading to desertification and degradation of the environment. Damnyaget *et al.* (2013) reported that, illegal harvest of trees does not only put tree species at risk of extinction but also jeopardized the numerous fauna that exist in the area.

4.3.3.5 Livestock grazing

The extent of illegal grazing in JUHIBU and JUHIBEKO were high, while management from JUHIBU and JUHIBEKO pointed that, shortage of grazing areas is experienced during rainy seasons when most of the areas nearby the settlements are cultivated while during dry seasons, nutrition is very low due to shortage of pastures and water thus animals were then driven to protected area. It was reported that increasing livestock grazing were connected with other illegal activities such as illegal hunting and timber harvesting. Responses from the game scouts and forest guards indicated that, it is possible for livestock keepers when they graze their livestock inside the park to communicate with poachers on animal location and distribution of tree inside the PAs. The observation is similar to Nutakor *et al.* (2011) who pointed that, local communities around PAs are increasingly collaborating with poachers and benefiting from the business.

However, pastoralist claim that, '*livestock grazing in protected areas does not cause any harm to wildlife/forest instead they add nutrients to the land*'. Nevertheless Madoffe *et al.* (2006) reported that overgrazing leads to habitat destruction and loss of biodiversity by removing soil cover, erosion, destruction of water source and result of deforestation.



Plate 2: Arrested poachers removing their sacks of charcoal from a car in JUHIBU.

(Photo: Mwada village, 10 December, 2014)

Game scouts and forest guards pointed that, some of illegal activities take place at night, for instance livestock were taken to the forest for grazing in midnight. On the other hand, most of poachers worked undercover through an intelligence network by monitoring movement of game scouts/forest guards. The response concurs with Eliason (2011) observation that, wildlife and forest resources crime carries a lower risk of detection and prosecution than other illegal trafficked items.

4.3.4 Relationship between patrol efforts and illegal activities

4.3.4.1 JUHIBU

Detected illegal activities per month have significantly decreased from 2012 to 2014 at 0.05 ($\chi^2 = 15.167$, $p = 0.001$). The large number of illegal activities were detected in 2012 (Fig.

3), Literature suggests that, detection of illegal activities in PAs tend to vary with law enforcement efforts (Wiafe and Amoah, 2012; Gindiwa *et al.*, 2013). However the decline of detecting illegal activities was associated with decrease in patrol efforts. Probably the time spent in the field and the area covered during patrol activities was low. On the other hand, in JUHIBU some of the game scouts did not participate fully in patrol activities.

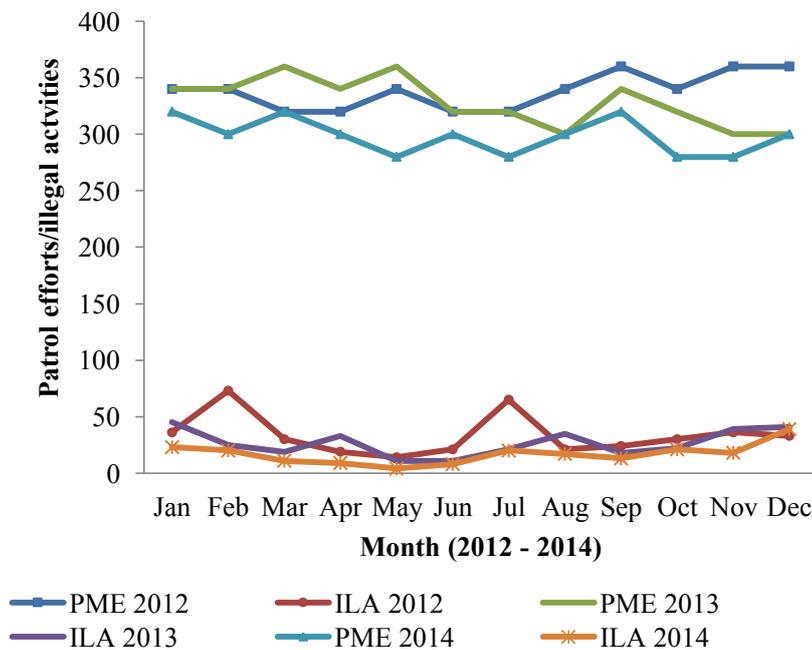


Figure 3: Relationship between patrol efforts and illegal activities in JUHIBU from 2012 to 2014

A Game scout pointed that *‘it is better to conduct patrol activities than stay at the gate/office, because at the gate/office there lots of work to dowhile on patrol we can have some hours to rest’*”.

Poor participation of some law enforcement staff in the patrol decreases effectiveness detection of illegal activities despite of conducting patrols. The mean illegal activities per month in 2012 and 2013 was not significantly different at 0.05 ($Z=-0.628, p= 0.530$).

Besides illegal activities detected in JUHIBU between 2012 and 2014 ($Z=-2.905, p=0.004$); 2013 and 2014 ($Z= -3.062, p= 0.002$) significantly varied at 0.05. In all the 36 months findings indicated that, mean patrol effort was negatively correlated with illegal activities, though correlations were not significant ($r=-0.212, p= 0.509$). While detecting illegal activities in 2013 and 2014 had negative correlation with patrol efforts ($r = -0.480, p=0.114$) and ($r=-0.002, p= 0.995$) respectively but were not significant. Hence, the findings imply that, the number of illegal activities detected decreased as number of patrol efforts and budget of law enforcement increased (Fig. 3). The findings do not concur with those of Gindiwa *et al.* (2013) who pointed that, improved law enforcement efforts in PA positively correlate with detected illegal activities.

The result found that, despite of increasing patrol budget in JUHIBU from TAS 48 489 000 (2012), and 61 343 000 (2013) to 63 003 000 (2014) the operation of law enforcement was ineffectively implemented (Fig. 3). The findings were different from observation to Tang (2010) and Gindiwa (2013) who reported that, increasing budget of law enforcement tend to increase patrol effort by spending ample time in the field is likely to detect large number of illegal activities. However, in 2012 number of patrol efforts positively correlated with detected illegal activities and was not significant ($r = 0.191, p=0.552$).

4.3.4.2 JUHIBEKO

Illegal activities were significantly different between 2012 and 2014 ($\chi^2= 11.128, df= 2, p= 0.004$). Comparison of illegal activities detected between years were significantly different in 2012 and 2013 ($Z=-2.666, p = 0.008$). While illegal activities detected in 2012 and 2014 ($Z= -0.970, p= 0.332$); 2013 and 2014 ($Z=-1.838, p= 0.066$) were not significantly different. In all the 36 months mean patrol efforts invested was positively correlated but did not significantly correlate with illegal activities ($r= 0.429, p= 0.164$). Besides, in 2012

patrol efforts positively correlated with illegal activities ($r = 0.899$, $p = 0.000$) though correlation was significant. However, in 2014 there as a negative association between patrol effort and illegal activities ($r = -0.300$, $p = 0.343$) although in 2013 the association positively correlated ($r = 0.572$, $p = 0.052$) but was not significance at 0.05 (Fig. 4).

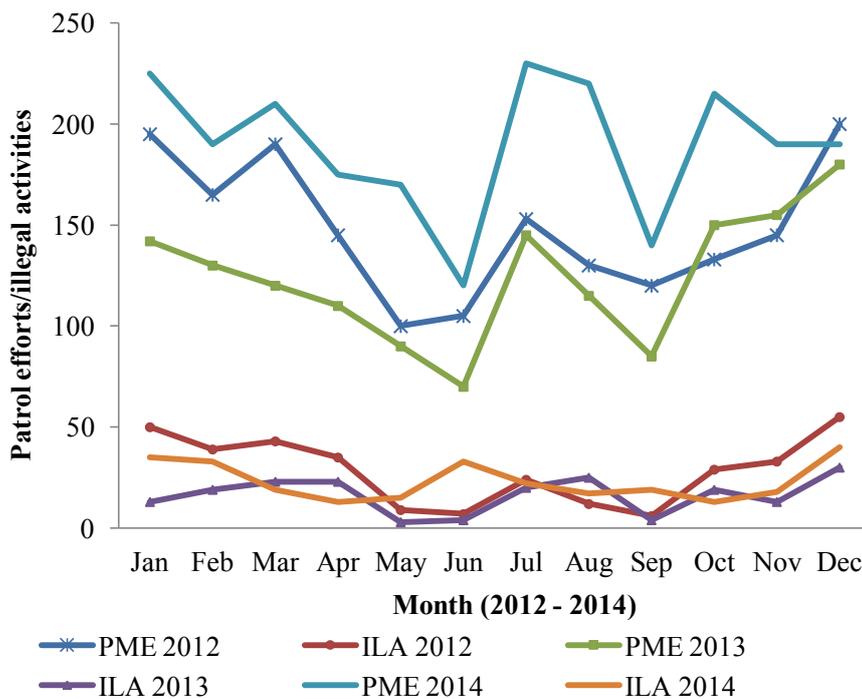


Figure 4: Relationship between patrol efforts and illegal activities in JUHIBEKO from 2012 to 2014

The result noted that, some of law enforcement staff tends to leak patrol strategies to poachers. It was reported in JUHIBEKO in 2013 forest guard commander from Bereko village was suspended from participating in law enforcement activities, because he was communicating and leaking information to illegal timber harvesters in JUHIBEKO. This was also reported by Nielsen and Treue (2011), where one patrol guard was found to communicate with hunters in Udzungwa Mountains. Leakage of patrol planning by a forest guards decreased detection of illegal activities, put patrol squads in high risk of being ambushed by poachers.

4.3.5 Trend of law enforcement in JUHIBU and JUHIBEKO

Detection and arrested poachers varies between 2012 and 2014 in JUHIBU and JUHIBEKO (Table 9). Probably morale of game scouts/forest guards decreased due to unfulfilled promises from JUHIBU and JUHIBEKO management like job contract, salary, and working tools were the main complaints from the game scouts and forest guards regarding to poor working environment. The detected various poaching signs such as foot print, charcoal kilns, timber pits strongly suggest the occurrence of poaching activities in JUHIBU and JUHIBEKO. Study by Agoramorthy (2009) suggested that, without timely detection and prosecution of wildlife and forest resources offense evidence is lost hence conviction becomes an incentive for further illegal activities.

Majority of the poachers were arrested for illegal livestock grazing in JUHIBU and JUHIBEKO (Table 9). The result show that arrested poachers were paid fines under CBOs or village regulation after accepting the offence or appearance before the courts, resulting in imprisonment and/or paying fines (Table 9). Other arrested poachers were sometimes given with warning and conservation education. Forest guards reported that economically powerful people with larger size of livestock herd in Bereko village illegal graze in the JFM. Nevertheless, guards arrested their livestock and got a fine of TAS 800 000 in 2014 however, they still graze their livestock in the forest. The findings are similar to a study of Moore *et al.* (2010) who pointed that, fine may be substantial for the local rural poor, but they are unlikely to deter potential offenders with greater resources because the short term benefit from illegal activities outweigh the fine paid. Also, even when found guilty, those who have profited from illicit wildlife and forest resources receive relatively low penalties which do reflect seriousness of the offence (Eliason, 2011).

The response from the lawyer in Babati district revealed, lack of formal government recognition of their authority in a form of a letter or identity card had undermined game scouts to stand as witness in court. It was also reported that, unwillingness of management to deal with prosecution of wildlife and forest crimes in court reduced effectiveness of law enforcement. Responses from game scouts and forest guards revealed that, no support in term of financial or effort invested by management in dealing with cases in court. Hence, several poachers were found innocent in court, for instance poachers from JUHIBEKO were released from court because they were proved to be innocent by court in 2014 (Table 9). However, forest guards revealed that, three offenders won the case due to financial ability and poor support from management to deal with cases in court (Table 9). It is pointed that managers in PAs are not willing to prosecute offences in courts (Kakira, 2010; Nutakor *et al.*, 2011). In addition, the level of illegal harvesting has been increasing until recently because most of conservation initiatives around protected areas emphasized conservation without significantly increasing law enforcement efforts against illegal harvesting of wildlife and forest resources (Silayo *et al.*, 2006; Bernard, 2011).

Table 9: Law enforcement statistics from 2012 to 2014 in JUHIBU and JUHIBEKO

CBOs	Year	Detected Poachers	Arrested poachers	Warned	Fined	Jailed	Proceed case	Released Case
JUHIBU	2012	38	17	7	6	-	-	-
	2013	72	44	12	23	-	-	-
	2014	61	40	9	19	2	3	-
	Total	171	101	28	48	2	3	
JUHIBEKO	2012	51	16	-	14	-	-	-
	2013	32	29	6	18	1	-	-
	2014	40	25	4	12	2	2	3
	Total	123	70	10	44	3	2	3

In both JUHIBU and JUHIBEKO the number of arrested poachers did not significantly vary across years ($\chi^2=1.267$, $p= 0.531$) and ($\chi^2= 0.207$, $p = 0.902$) respectively. Meanwhile, the number of arrested poachers was not significantly different between JUHIBU and JUHIBEKO ($Z = -1.384$, $p = 0.166$). The responses from the game officer and the forest officer showed that poor capacity, lack of lawyers and prosecutors reduced the effectiveness of law enforcement. The findings similar to Bernard (2011) observation, lack of collaboration between wildlife, forest sectors and regulatory bodies affect the success of the law enforcement chain. The low rate of conviction reduced the deterrence effect of the wildlife and forest resources laws and reduced the incentives for management to incur the extra cost of processing a “prosecution” case (Bernard, 2011).

4.3.6 Condition of wildlife and forest in JUHIBU and JUHIBEKO

Current conservationists place high emphasis on the need to integrate the views and needs of local communities in conservation processes. Understanding of community perceptions is of paramount importance in wildlife and forest resources management (Lazaro *et al.*, 2013). The findings show that, about 27% and 40% of the households in JUHIBU and JUHIBEKO respectively admitted that, the condition forest cover and animal population has improved due to law enforcement and increased local community awareness on the importance of conservation (Fig. 5). The improved condition of wildlife and forest resources was attributed to the number of arrested poachers thus some of the community members were scared of being arrested. However, respondents from Kolo village pointed that, few members of the community warned others when they conducted illegal activities and others community were able to provide information to forest guards regarding illegal activities. Moreover, due to conservation education provided by AWF through REDD+ project promote environmental conservation by establishing various groups dealing with improved stove, improved bricks, sustainable agriculture and tree

planting. The survey found that few groups were active, especially in Kolo village (Plate 3). In fact, increase in conservation education and awareness influence wise use of wildlife and forest resources (Guthiga, 2008).



Plate 3: Environmental protection group in JUHIBEKO

(Photo: Kolo Village, 30 December, 2014)

However, this situation was different in Bereko village, where one of respondent pointed that, *“I know some of the community members who conduct illegal activities and they usually sold firewood to me, however I cannot give information regarding illegal activities because I will go against local community and they will exclude me from community”*.

The argument concurs with Ariffin (2015) who reported that, some of community member are aware of the wildlife and forest resources crimes but they are scared to report them. Also the survey observed that, illegal hunting of wild animal has decreased since 2013 due Poaching Reduction Program (Tokomeza Ujangili Program).

Respondent from Olasti village reported that, *“In previous years, poachers sold bush meat to the villagers, but now days those poachers who conducted that business left the village. Since operation tokomeza carried out, I have not seen or heard anything regarding bush meat”*.

Respondents from JUHIBU and JUHIBEKO claim that, continued increase of charcoal price indicated the decrease to the access of trees in the forest for charcoal production. In JUHIBU 55% of the households admitted that, the price of one sack of charcoal was raised from (TAS) 8000 (2012); 12000 (2013) to 18000 (2014). While in JUHIBEKO (62.66%) of the respondents reported that, they bought one bag of charcoal for (TAS) 5000 (2012): 8000 (2013) and 12000 (2014). However, a study by Kimwery, (2009) pointed that like other developing countries of the Sub-sahara's region as the forest cover diminishes the price of wood fuel rises and more money is allocated to acquiring wood fuel and other sources of energy like gas and electricity.

About 44% of the households in Olasiti village pointed that, the use of other sources of energy (gas) especially in town's decreased demand for forest resources products (charcoal) hence illegal activities decreased and the condition of wildlife and forest resources improved. However, the observation could be true, but the extent of consumption of other source energy (gas) is not well known in this study. However, the study by Schaafsma *et al.* (2011) pointed that, since population growth and the demand of wood energy continue to increase, the argument is whether both the urban and rural populations will be able to switch to non-forest energy sources before most of the forests have been cut down beyond their threshold level.

Majority of the households 61% and 52% in JUHIBU and JUHIBEKO respectively, indicated that, the condition of wildlife and forest resources remained stable (Fig. 5).

Observation from households showed that, condition of the wildlife and forest was not decreasing or increasing due to poor law enforcement and low involvement of the community. It reported that law enforcement strategies tend to ignore local people support in conducting patrol activities (Lotter and Clark, 2014). The households admitted that law enforcement and participation of local communities could reduce illegal activities. The observation is supported by strong evidence from literature that when the state engages local communities as partners in law enforcement, the results have been positive (Alinon and Kalinganire, 2008).

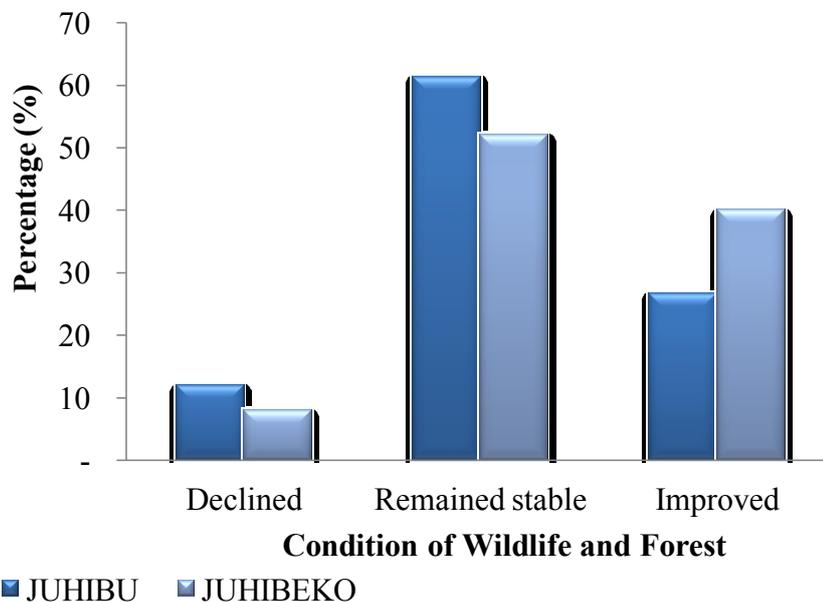


Figure 5: Condition of wildlife and forest resources from 2012 to 2014 in JUHIBU and JUHIBEKO

About 12% and 8% of the households in JUHIBU and JUHIBEKO indicated that, the condition of wildlife and forest resources was declining due to increase in population of both human and livestock, which puts pressure on available arable and grazing land as well as an increase in demand for fuel wood, poles and charcoal (Fig. 5). The findings are similar to a study by Damnyag *et al.* (2013) who reported that, an increase in human and livestock

population has intensified competition for resources and speed up the process of land degradation.

4.4 Management Effectiveness in JUHIBU and JUHIBEKO

The Management Effectiveness Tacking Tool showed that, cumulative score in JUHIBU ranged between 46 – 60% (48%) while in the JUHIBEKO it ranged between 30– 45% (34%) (Appendix 10). Regarding cumulative score from METT result, effectiveness of management in JUHIBU was average while JUHIBEKO was poor, hence it is likely to influence ineffectiveness of law enforcement in both study areas. Study by Amahowé *et al.* (2013) suggested that, management plays vital role in ensuring that organization objectives are achieved. However, management effectiveness in JUHIBU appeared to be better managed than JUHIBEKO and accumulated METT scores were significantly higher in JUHIBU compared to JUHIBEKO ($t = 3.078$, $p < 0.004$) at 0.01 (Table 10), perhaps due to direct and indirect external interventions from donors. Leader from JUHIBU pointed that, various organizations support patrol activities in WMA, for instance Honey Guide Foundation provides funding and a vehicle for law enforcement. Gavin *et al.* (2010) pointed that, management effectiveness varies on the basis of personnel training and patrol gears (vehicles, firearm), which in turn determine the patrol effort required. Various issues caused ineffectiveness of law enforcement in JUHIBU and JUHIBEKO including, inadequate staff, low involvement of the local community, lack of patrol gear, patrol budget, poor monitoring and evaluation (Table 10).

Table 10: Management issues for JUHIBU and JUHIBEKO towards effectiveness of law enforcement

Issue	JUHIBU		JUHIBEKO	
	Mean scores	%	Mean scores	%
WMA/JFM boundaries	2	2.02	2	2.02
Protected area rule regulation	2	2.02	2	2.02
Law enforcement	1	1.01	1	1.01
Management plan and implementation	2	2.02	1	1.01
Staff number and training	1	1.01	1	1.01
Patrol budget	2	2.02	-	-
Patrol equipments	2	2.02	-	-
Education and awareness	1	1.01	1	1.01
Fee and fine	1	1.01	3	3.03
Economic benefits	2	2.02	2	2.02
Monitoring and evaluation	1	1.01	1	1.01

4.4.1 Protected areas boundaries

Management in JUHIBU reported that the protected area boundaries are demarcated with beacons but due to the illegal activities, community dealing with farming activities removed beacons to increase their farm size. It has been pointed that many of the protected areas are present only on 'paper' lack effective management, sometimes even boundaries and demarcation on the ground, making them likely to fail as a conservation tool (Mariki, 2015). Management from JUHIBEKO pointed that, boundaries of forest was marked, however, is not well known to most of the community, hence other community conducting farming activities inside/close the forest. In both JUHIBU and JUHIBEKO, there was report of land conflict between management and local community regarding land boundaries. For instance, farmers from Bereko village pointed that, the JFM demarcated the area without the local people's involvement hence included portions of community's farmland into the JFM boundaries. Hence local communities can take advantage of this

and carryout various illegal activities such as farming and grazing due to unclear boundary. Muhumuza and Balkwill, 2013; Damnyag *et al.* (2013) pointed that lack of buffer zones hinders the protection of wildlife and forest resources. Poor demarcation of protected area boundary creates a favourable environment for conducting illegal activities and put more challenging for law enforcement (Mukul *et al.*, 2013; Flesher and Laufer, 2013).

4.4.2 Protected area rules and regulations

Local communities in JUHIBEKO allowed to collect firewood by paying 500 TAS per one head-load of firewood. The permission does not allow anyone to enter in PAs with axes or machete and should be escorted by game scouts/forest guards. Nevertheless, implementation of this strategy was not effective thus some of the communities were arrested after entering the PAs without permission. Rules and regulations are important in ensuring protection of natural resources in protected areas. Management in JUHIBU and JUHIBEKO enacted various rules and regulation for ensuring sustainable management of natural resources. Actually, rules and regulations are unlikely to be effective without corresponding improvements in the enforcement practices (Ariffin, 2015).

4.4.3 Law enforcement

Increase efforts in law enforcement play important role in reducing illegal harvest of resources. Response from management in JUHIBU and JUHIBEKO show that lack of staff, lack of funds, insufficient equipment, low support from the community and regulatory agencies hinder effectiveness of law enforcement. Damnyag *et al.* (2013) pointed that, inadequate support from law enforcement agencies and lack of funds for law enforcement increase chances of illegal activities. Enforcement efforts against illegal activities in developing countries have generally been unstructured, un-strategic and underfunded,

hence allowing increase of illegal activities (Kakira, 2010; Eliason, 2011). In fact poor governance reduces the motivation of staff and encourages illegal activities.

4.4.4 Management plans and implementation

Management planning in the protected areas is a vital tool for short and long term management of wildlife and forest resources. The study by Nielsen (2011) pointed that, Management rights and responsibilities are vested in management plans. Poor implementations of management planning hinders the effectiveness of law enforcement in PAs. Management plans of each CBOs is not well implemented especially in some villages which did not agree with management objectives towards establishment of JUHIBU and JUHIBEKO.

For instance, a village leader from Kakoy was complaining on the distribution of revenue from JUHIBU that, *“the village received the some contribution of revenue while they contributed small size of land compared to other villages which contributed larger land”*.

It was reported that, when there are inequalities in the distribution of economic benefits it may affect local community attitude towards conservation of wildlife and forest resources (Msuha, 2009; Suich, 2013). Management of JUHIBEKO pointed Itololo village which is close to the forest but the village did not sign the agreement of forming the association. Based on the findings, various illegal activities adjacent to Itololo villages were highly detected by forest guards.

4.4.5 Staff and training

Findings indicate that mean score for staff number and training in both JUHIBU and JUHIBEKO was low (Table 10). Findings from management in JUHIBU and JUHIBEKO indicate that, protection of flora and fauna was not achieved due to inadequate staff and

training. For instance, the leader from JUHIBU reported that, they have only 30 game scouts out of 15 were involved with tourism activities while 15 conducted patrol activities. About 8 out of 29 forest guards were sponsored by AWF for training at Pasiansi Wildlife Training Institute. Based on the few numbers of VGS ability to cover large areas, conducting effective law enforcement in PAs is likely to be poor. Management from JUHIBEKO showed that, the association was started with 52 forest guards in 2012 however; only 23 forest guards were active up to 2014 while the others quitted the job due poor working environment. Evidence from literature show that effectiveness of patrol activity increases with training, equipment and budget (Flesher and Laufer, 2013).

4.4.6 Patrol budget

The responses from JUHIBEKO management indicate that, income from fines and other fees goes to the law enforcement activities; however, the fine is low to cover all expenses of law enforcement and sometimes they conduct patrol without arresting poachers and end up with nothing. I argued that despite of JUHIBU having a budget for law enforcement compared to JUHIBEKO the performance of game scouts was not significantly different from a forest guard who depend much on fine/fees. Literature show that there is a fixed relationship between the amount spent on enforcement and the effectiveness of that enforcement (Robinson *et al.*, 2009). Inadequate funds restrict efforts to monitor illegal resource use. Gavin *et al.* (2010) reported that, in many developing countries the budgets for protecting key natural resources are negligible or even zero. In fact, depending on fines in conducting patrol activities in PAs reduces the effectiveness of law enforcement, especially when number of offender dropped (Chingonikay, 2010).

Thus, JUHIBEKO must find alternative sources of funding such as butterfly production, beekeeping or fish production to generate income for conducting management and law

enforcement activities. The survey shows that, WMA and JFM mainly depend on investors, private organizations such as AWF, Honey Guide Foundation and no plan of develop a new project or venture which can generate income. The study by Nielsen (2011) suggests that, well-funded anti-poaching units are more effective way to deter illegal activities in protected areas. However, the study of Topp-Jørgensen *et al.* (2005) indicated that effective management of wildlife and forest resources is highly dependent on good governance and leadership.

4.4.7 Education and awareness

The capacity building at village, district, and national levels is paramount to the success of community conservation area (Mfunda and Røskaft, 2011). Lack of communication and conservation awareness of the objectives and mission of PAs contribute to negative relationship between the PAs and adjacent communities. The survey noted that, in both CBOs there is no plan on education provision and awareness campaigns to surrounding community (Table 10). Lack of awareness and education, community *believed that management of JUHIBEKO sold Isabe and Salanka forest to AWF.* However, Management pointed that, AWF has played vital role in creating capacity building related to conservation in JUHIBU and JUHIBEKO. Key informant revealed that, most communities in especially in JUHIBEKO have no culture of growing tree rather than cutting trees. Hence, it is important to raise awareness of the local community regarding the importance of tree planting in their land. Management of JUHIBEKO pointed that, conservation education from AWF and HADO project had raised awareness of some of the local communities towards the importance of conservation and impacts of illegal activities on the environment. A study by Kissui (2008) and Mariki (2013) pointed that, public education increased public awareness, conservation efforts and influenced good working

relations with the community and contribute to the conservation of wildlife and forest resources.

4.4.8 Economic benefits

The leader from JUHIBU admitted that, through benefits sharing various social services, such as wards office and dispensary were constructed in Mwada village. However, few groups in the community realized such benefits from JUHIBU. In the case of JUHIBEKO management, distributed funds from REDD+ project to village members, the fund help in the development of social services for instance, in Bukulu village the funds was used to purchase cement bricks for construction of the dispensary. Local communities who receive benefits from wildlife and forest related activities are more positive towards wildlife/forest conservation than those who do not (Msuha, 2009). Implementation of benefit sharing initiatives in the wildlife and forest resource management faces a number of challenges such as corruption, lack of transparency and is not always equitably shared within communities (Mariki, 2013). Establishment of WMA and JFM expected to improve livelihood and poverty reduction by creating various ventures which generate economic benefits to the local community (Madoffe *et al.*, 2006).

About 44% and 37% of households from Mwada and Bukulu villages respectively admitted contribution of JUHIBU and JUHIBEKO in the construction of laboratory for secondary school and dispensary hence they were motivated to participate in the conservation of wildlife and forest resources. The result noted that, mismanagement and misuse of funds in JUHIBU adversely affected the benefits of local community and law enforcement activities. Game scouts argue that, the management conduct several meetings in a month and spends a larger amount of money through allowance which could be invested in patrol activities. The findings showed that, 68% and 64% of households in Olasit and Kakoy

village respectively in JUHIBU expressed discontent with the fact that, no benefits were generated from wildlife management, what they gain is crops raiding, livestock predation and no compensation made. Community in JUHIBU feel that WMA does not contribute to their livelihoods. Responses from household in Olasiti and Kakoy village argue that;

“How can we participate in patrol activities while you do not want to share the cost of crop raiding, livestock predation and human injury, even to compensate us with a hand shake or you want to tell us that, we should share the cost by killing an elephant, Lion or Baboon” tell me!!

Base on Wildlife Policy of 2007 the policy statement regarding to problem animal control state that, “the government does not intend to introduce a compensation scheme for damage cause by wildlife”. In section 71 (1) of Wildlife Conservation Act number. 5 of 2009 provide power to the Minister may, in the public interest and after consultation with the Minister responsible for finance, make regulations specifying the amount of money to be paid as a consolation to a person or groups of persons who have suffered loss of life, livestock, crops or injury caused by dangerous animals. According to Wildlife Conservation Act number 5 of 2009 Compensation are only provide to person who has a right in any land within an area declared to be game reserve shall be entitled to adequate compensation as per the provision of Land Acquisition Act and Land Act.

With regard to this argument, there is a need for a debate over compensation as a right versus compensation as consolation and why compensation provide only to a person who declare his/her land to be game reserve. Msoffe *et al.* (2011) suggested that, for wildlife to be conserved successfully outside the protected areas, should generate income for local communities who bear the cost of conserving wildlife. A study by Alexander *et al.* (2015) considers compensation as a conflict mitigation measure in ensuring effective management of wildlife and forest. In addition, Kolahi *et al.* (2014) noted that, without the availability

of legal activities that result in tangible monetary benefits for local people, illegal activities and overuse of wildlife and forest resources will continue and community conflicts adjacent to protected area will increase.

4.4.9 Monitoring and evaluation

In both CBOs JUHIBU and JUHIBEKO monitoring and evaluation systems were inadequate instead and they lacked strategy or regular improvement (Table 10). The findings indicate that management of the two CBOs prepared monthly report for each activity. However, evaluation of patrol information was low, the number of various illegal activities including boundary conflict, encroachment, and lack of patrol gear have been reported in various meetings and there was no measure that was taken to deal with those problems. Nevertheless, the finding discovered that no strategies for performance evaluation of patrol activities and management activities. This study suggests that better monitoring and evaluation of patrol activities could further increase the effectiveness of law enforcement activities. Meanwhile the study is similar to Amahowé *et al.* (2013) who noted that lack of routine monitoring and evaluation of management activities in the protected area leads to increased illegal harvest of wildlife and forest resources. Monitoring and evaluation help to identify problems and solution for better achievement of management objectives (Amahowé *et al.*, 2013). Monitoring is essential part of any project or protected area management as it allows an evaluation of the success of conservation activities and allows the protected area authorities to adapt their activities in the light of the results of the monitoring process (Gray and Kalpers, 2005). Also monitoring plays vital role in discovering management problems and provides solution.

4.5 Community Perception on Governance Practice in JUHIBU and JUHIBEKO

The result discovered that, the way of electing representative members for CBOs are not fair and free due to the influence of corruption during the campaign. The Author managed to observe representative election in JUHIBU during campaign households revealed that,

motor cyclesridersin Mwada were provided with petrol for their motor cycles from candidate. Economic institution failure results from poorly designed inefficient or simply non-functioning institutions (Moore *et al.*, 2010). Generally institutional weakness leads to resources being inefficiently allocated and can create perverse incentives for illegal activities (Magnus and Wang, 2013). The appropriateness of law enforcement decreases with the likelihood of human rights violations.

On the other hand, in Olasiti village the author was by one of candidate *“how many meetings are conducted in JUHIBU per month because I heard after the meeting they get allowance”*

From this question the candidate has full information on how to get allowance from JUHIBU. Hence this shows that most of the candidates or leaders who are elected as community representative have their own interest apart from conservation thus creating poor governance which creates a loophole of illegal harvest of wildlife and forest resources. Households reported that law enforcement activities in JUHIBU and JUHIBEKO were associated with corruption (Table 11). However the extent of corruption was higher in JUHIBU than JUHIBEKO probably because no rewards and low salary and presence of pastoralist around JUHIBU influence corruptionto game scouts (Table 11). Corruption by the law enforcement agencies is the most important underlying factor explaining law ineffective enforcement in a protected area(Nutakor *et al.*, 2011). On the other hand, households in Olasiti, Bukulu and Bereko villages complainedthat;

“When game scouts/forest guards they arrest the offenderwith livestock orcharcoal, they demand payment from the offender in order to release them and, they take the charcoal anddo not report to management”.

Actually, there was significant variation in local community perception per villagein JUHIBU with regard to corruption (Table 11). Gavin *et al.* (2010) pointed that, corruption

by enforcement agencies can result in deliberate underreporting of illegal activities resulting to ineffective enforcement. Corruption and misuse of power are the major reasons for deforestation in areas of the developing tropics (Mukul, 2014).

Accountability is a way of accepting responsibility and answer for action. Moore *et al.* (2010) noted that decision makers and implementers whether statutory, public servant or customary authority they should be accountable to the management of wildlife and forest resources. The survey found that, in both JUHIBU and JUHIBEKO levels of accountability were moderate (Table 11). However, households response was not significantly varied across village at 0.05 level of significance (Table 11). The reasons for community admitting that, game scouts and forest guards were responsible and willing to conduct law enforcement activities, however, due to poor working environment, reduced their effort from conducting patrol activities hence effectiveness of law enforcement decreased. The study by Moore *et al.* (2010) pointed that many villages in Tanzania would like to cooperate with the authority in enforcing wildlife and forest resources laws, but are prevented by a statutory system.

Table 11: Perception of local community in governance practice in JUHIBU and JUHIBEKO

CBOs	Elements	Low	Medium	High	χ^2	p – value
JUHIBU	Accountability	10 (13.33)	48 (64.00)	17 (22.66)	1.046	0.903
	Corruption	10 (13.33)	28 (37.33)	37 (49.33)	9.527	0.049*
	Participation	23 (30.67)	35 (46.67)	17 (22.66)	0.615	0.961
	Transparency	34 (45.33)	24 (32.00)	17 (22.66)	6.574	0.160
JUHIBEKO	Accountability	16 (21.33)	45 (60.00)	14 (18.66)	2.515	0.642
	Corruption	6 (8.00)	48 (64.00)	21 (28.00)	1.411	0.842
	Participation	15 (20.00)	27 (36.00)	33 (44.00)	7.539	0.713
	Transparency	22 (29.33)	32 (42.66)	21 (28.00)	10.172	0.038*

* significant at p <0.05

The findings show that, transparency in JUHIBU was much lower than JUHIBEKO (Table 11). Local community responses across village significantly varied in JUHIBU (Table 11).

Respondents pointed that, lack of transparency in JUHIBU and JUHIBEKO reduced participation in management of wildlife and forest resources. Also, a respondent from JUHIBU pointed that, *“after we elected leaders we do not get any feedback regarding revenue collection and expenditures”*. The study by Topp-jørgensen *et al.* (2005) revealed that, low transparency in the management of wildlife and forest resources in community conservation area reduces faith of local communities to participate in law enforcement activities.

The result consider JUHIBU and JUHIBEKO as a community institution for the management of wildlife and forest resources. However the chain of reporting and practice of wildlife and forest resource management activities is not well known to some of the village leaders. Village leaders in Bereko claim that, JUHIBEKO is supposed to conduct their activities and report their information to village government. In fact, there no clear chain of sending information about illegal activities and management of wildlife and forest resources in JUHIBEKO. For instance, one village leader reported that;

“we do not know where we are supposed to report either to JUHIBEKO or District level. In fact I represent the government, but I do not receive plans regarding their activities and I do not know how JUHIBEKO is operating, because visitors come to the village and enter into the forest without reporting to village office hence it is likely JUHIBEKO remains as an independent institution which is not responsible to village government”.

Regarding this claim poor governance due to unrecognized communication chain between village government and JUHIBEKO leaders is likely to influence ineffectiveness of law enforcement in wildlife and forest resources management. The claim in line with the argument of Ariffi (2015) who pointed that, absence of any structured or common

platform to coordinate, cooperation results in lack of communication which can lead to loss of opportunity to maximize detection of illegal activities in PAs.

4.6 Local Community Participation in Law Enforcement Activities

Considering the issue of local community participation in JUHIBU and JUHIBEKO, one should expect that villagers are well involved in the process, since it is a Community Based Organization. However, based on the findings, participation of local communities in law enforcement was low (Table 11). Households in JUHIBU and JUHIBEKO indicated that, did not participate in management of wildlife and forest resources because they were not involved in any activity. However, it is reported that, participation of the local community is a vital component in the success of conservation, but often are neglected by most management teams (Van, 2010). The findings indicate that, the concept of community participation in conservation of wildlife and forest resources was not effectively implemented. Literature pointed that law enforcement staff cannot patrol all protected areas, however, participation of local community creates a potentially important role for detection of illegal activities in a protected area (Lindsey *et al.*, 2013). Households from Mwada village which is head quarter for JUHIBU revealed that;

“JUHIBU which belongs to us has remained as a private organization for specific people who after the election, they go there but forget about us and we see their life improves everyday”.

On the other hand, 40% of responses from households in JUHIBEKO pointed that, *“we are not participating in the conservation of forest because the forest has been sold to AWF”*. Hence, this study recognizes that, poor involvement and communication between communities and management of JUHIBU/JUHIBEKO create negative perception of community and reduced community participation in protection of wildlife and forest resources. The findings indicate that, the CBOs saw the only way of involving local

community in conservation was through benefit sharing which is not the main case. However law enforcement unit in JUHIBU and JUHIBEKO ignored local community and conducted law enforcement without involving local community network through intelligence unit. Tanzania Forest Act No.14 of 2002 and Wildlife Act No.9 of 2009 in section 99 and 117 respectively state the reward of informers who provide relevant information regarding illegal activities. However, Game scouts and forest guards point that, implementation and provision of rewards to informers is delayed or in other cases end up without any rewards thus reducing the effectiveness of law enforcement. Jeremiah *et al.* (2014) pointed that, in recent years community exclusion from decision making has resulted into the persistence and even worsens of the deforestation and forest degradation problem in many countries.

Wildlife Conservation Act No. 09 of 2009 and Forest Act No. 14 of 2002 restricted the illegal use of wildlife and forest resources but this has resulted in resources use conflicts. The study by Masozera *et al.* (2006) and Van (2010) pointed that, wildlife and forest resources use conflicts are common in PAs, the main complication emanated from the decision of denying local people a free access and control over the use of the wildlife and forest resources. About 49% and 42% of local communities in JUHIBU and JUHIBEKO revealed that, the relationship between local community and management of JUHIBU and JUHIBEKO respectively were poor. However, respondents admitted that, poor relations were influenced by poor governance and restriction from the utilization of wildlife and forest products resulting in resources used conflict. This is supported by observation of Msoffe *et al.* (2011) that, resources use conflict have been inevitable due to the fact that human activities such as cultivation, settlement, illegal hunting, tree cutting and grazing are highly prohibited inside the PAs. According to Kajembe *et al.* (2012) majority of the

communities bordering protected areas were not satisfied with the rules as they threaten their livelihoods.

4.7 The Challenges Facing Law Enforcement Units in JUHIBU and JUHIBEKO

The evidence from this study suggests that, law enforcement unit in JUHIBU and JUHIBEKO face a number of fundamental challenges in implementing law enforcement and conservation of wildlife and forest resources. About 15% and 19% of game scouts and forest guards respectively pointed that, politician undermines the effort of law enforcement (Fig. 6). Forest guards pointed that, politician in JUHIBEKO used their time during the campaign by promising local community to use the conservation land and promised to remove all “green people” (Forest guards) in their villages. Villages affected by politics were Bukulu, Minjingu, Kakoy and Villima vitatu . Game scouts/forest guards pointed out that, when they arrest an offender they do not get full support from the village leaders in respective village such as Minjingu, Bukulu, and Vilima vitatu. The study by Nutakor *et al.* (2011) reported that, government agencies and politicians do not have political will to manage and protect the remaining wildlife and forest despite the benefit derived from these resources. Eliason (2011) pointed that, increase of political conflicts in conservation, increased illegal activities and collapse of wildlife and forest resources management systems. In addition, study by Andersson *et al.* (2006) and Mukul *et al.* (2013) noted that, environmental law enforcement and compliance in the protected area is weak in general due to lack of political will in protection of natural resources. However, Andersson *et al.* (2006) revealed that, local politicians will invest their time and resources in protection of natural resource if they reap political and/or financial rewards from doing so.

Effective patrolling by properly motivated guards appears essential for reducing illegal activities in a protected area (Nielsen, 2011). Village scouts in the two study areas claim that, despite of investing larger efforts in patrol activities they have not seen the benefits of

their effort. About 24% and 32% of game scout and forest guards respectively, complained of poor job condition such as low/lack of salary, health insurance and lack of job contracts (Fig. 6). On the other hand, majority of village scouts worked between 4–6 years in JUHIBU 46% and 61% in JUHIBEKO without job contract and significantly varied at 0.05 (Appendix 7). The survey noted that, about 54% and 50% of the game scouts and forest guards respectively were not satisfied with law enforcement activities due to poor job condition.

Chief Commander in JUHIBEKO revealed that, due to poor job condition 29 forest guards quitted the job and were employed by a Chinese Road Construction Company and school as watchman. Low income potential from law enforcement activities reduced the incentive to participate fully in law enforcement activities. A study by Eliason (2011) pointed that, low salary in protection of wildlife and forest resources reduces the morale of law enforcement staff where some game wardens left the work and go to another organization where the pay is higher. Probably the opportunity cost of conducting other economic activities probably outweighs the benefits of conducting law enforcement. Based on the findings, about 85% and 92% of game scouts and forest guards respectively conduct other sources of income activities (farming) while other game scouts sold banana and mangoes around the JUHIBU office.

Game scouts and forest guards are liable for protection of wildlife and forest resources against illegally activities. Despite of having vital role they have no power to influence management to fulfill their needs and improve their job condition. Majority 58% of the game scout in JUHIBU admitted that, working relation between management and game scouts was poor (Fig.6). The findings from game scouts indicate that, management does not consider their problems and they are not creating good relationships.

In order to achieve sustainable management of wildlife and forest resources sufficient and well trained staff are highly required (Rutagarama and Martin, 2006). Conservation education and training of the village scouts adjacent to the CBOs is an important tool for wildlife and forest resources management and conservation.

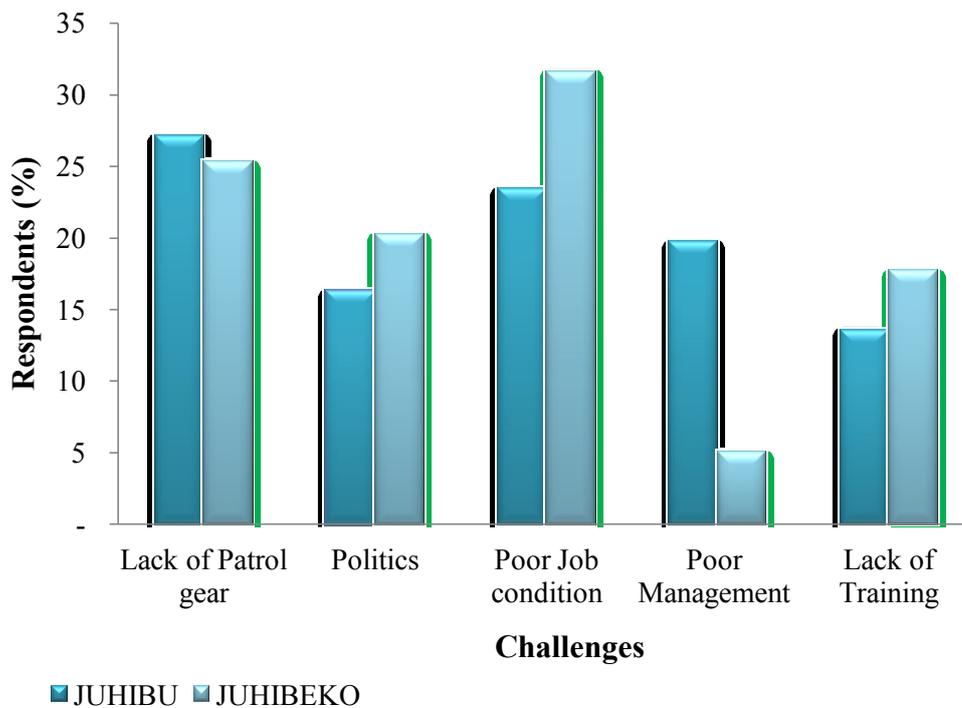


Figure 6: Challenges facing game scouts/forest guards in JUHIBU and JUHIBEKO

The findings show that, both JUHIBU and JUHIBEKO had no any plan to train the village scouts. However, forest guards in JUHIBEKO were trained by AWF, but they did not have equipment and gears for patrol. About 12% and 17% of game scouts and forest guards respectively revealed that, lack of training and awareness toward conservation undermine the effectiveness of law enforcement especially in the court section (Fig. 6). Responses from key informers pointed that, most of the recruited village scouts have low level of education which limited the chance of undertaking higher education level. However, Juma (2012) suggested that, short term training could be arranged and implemented on regular basis so as to enhance the capacity of village scouts for effective management of wildlife and forest resources.

Effective achievement of management objectives requires adequate resources, including human resources and physical resources. About 29% and 25% of the game scouts and forest guards respectively complained on lack of patrol gears (Fig. 6). Hence, they performed patrol activities with high risk due to lack of patrol gears such as firearms, binoculars, first aid kit, raincoat, tent and transport. Reports from JUHIBU and JUHIBEKO show that, game scouts and forest guards were attacked by the local community. *It was reported in 2014 that, game scouts were attacked by the community when they arrested an offender in Kakoy village. The attack was dangerous and four game scouts were injured.* On the other hand, in end of 2012, forest guards in JUHIBEKO were attacked by member of the community from Mapinduzi village who were equipped with arrows, club, and a stick. A number of forest guard managed to escape, two forest guards were injured and one forest guard (woman) captured by villagers though report showed that no harm has been done to her. Meanwhile the two incidences reduced the effort of game scouts/forest guards and exposed law enforcement staff to dangerous environment, especially to those live in the same village with poachers (Robinson *et al.*, 2009). Game scouts in JUHIBU admitted that “*without patrol gears like firearm and good job condition, we cannot fight the illegal harvest of wildlife and forest resources effectively*”. Based on the reported incidences the study concurs with the observation by Eliason (2011) who reported that, the job of game warden is a dangerous occupation that can be deadly as evidenced by the numerous wardens who have been killed, get injury by aggressive animals and beaten by village officials after being arrested in the line of duty.

Despite of having some of equipment and facilities such as car, motorbike, ranger post and visitor information center in JUHIBU, the condition of the equipment and facilities were not on good condition probably due to irregular maintenance. For instance, responses from game scouts show that, the motor cycle that supposed to be used for patrol in

JUHIBU was not in use because of technical problem. Insufficient patrol gears in JUHIBU and JUHIBEKO reduced the ability of game scouts and forest guards to cover large areas of the WMA and JFM, in return illegal activities increased especially during rainy season.

4.8 Factors Influencing Effectiveness of Law Enforcement in Management of Wildlife and Forest Resources

The effectiveness and success of protection of natural resources in any part of the world normally depend on many factors such as economic, social and political nature. The results from ordered logistic regression indicate that the overall model is significant ($p < 0.0000$) (Table 12).

Table 12: Order logistic regression model of factors influencing effectiveness of law enforcement in JUHIBU and JUHIBEKO

Variables	B	Std. Error.	Z	P-value
Sex	1.3183	0.9836	1.34	0.180
Age	-0.3586	0.0983	-3.65	0.000**
Education	-0.1551	0.1257	-1.23	0.217
Experience	0.8887	0.2325	3.82	0.000**
Sources of Income	-0.8380	0.5457	-1.54	0.125
Transparency	6.8861	2.5839	2.66	0.008**
Working relation	-4.7027	2.0806	-2.26	0.024*
Punishment	3.9443	1.1558	3.41	0.001**

Log likelihood = -38.4978, LR χ^2 (8) = 36.53, Prob > χ^2 = 0.0000, Pseudo R² = 0.3218, *and** significant at 0.05 and 0.01 respectively

Experience is knowledge or skill obtained from doing or practice a certain task. The results from ordered logistic regression model shows that, experience is positively significantly influencing effectiveness of law enforcement in wildlife and forest

management (Table 12). Meanwhile increasing one unit of experience results to relatively increase of the effectiveness of law enforcement from the lower level of law enforcement to higher categories (effective and highly effective) of the effectiveness of law enforcement. Indeed village scouts with higher experience were able to deal with law enforcement effectively. Despite of higher age influence law enforcement is negative but based on experience is likely to influence the effectiveness of law enforcement. Experience created important skill and knowledge towards law enforcement. It was reported that lack of experience in wildlife and forest resources issues is challenge in handling of crime evidence and presentation of arguments in court section (Ariffin, 2015). The study by Amahowé *et al.* (2013) recognized that, PAs manager lack skills and experience in negotiation, conflict resolution and communication with the surrounding neighbours hence tend to ignore the community.

Transparency is recognized as being core issues in decentralization processes over wildlife and forest resources management (Topp-Jørgensen *et al.*, 2005; Harttera and Ryanba, 2010). This study also found that transparency influences effectiveness of law enforcement in wildlife and forest sector. The model indicates positive coefficient and significant at ($p < 0.01$) (Table 12). Hence, an increase in one unit of transparency in all activities related to wildlife and forest management, increases the effectiveness of law enforcement from lowest category to higher categories of law enforcement. The findings are similar to Harttera and Ryanba (2010) who pointed that, protected area managers are likely to experience greater community support and trust when they provide information to the community about what they are doing and what they are achieving when management is seen to be open and accountable. In addition Topp-Jørgensen *et al.* (2005) suggested that, higher levels of cooperation are necessary for Community Based Conservation however the monitoring system can only be achieved and sustained in transparent system.

Effectiveness of the PAs to conserve wildlife and forest significantly correlated with the level of punishments of illegal activities in the park (Muhumuza and Balkwill, 2013). Ordered logistic regression model showed that, punishment was positively significantly influencing the effectiveness of law enforcement to a higher level of effectiveness at 0.01 level of significance (Table 12). The results imply that increase in unit of punishment increased the level of law enforcement from lower level to a higher level of law enforcement. Indeed, provision of higher punishment to offenders deters other community members from committing offences. About 45% and 41% of the respondents in JUHIBU and JUHIBEKO respectively revealed that, fine and punishment given to offenders do not deter others from committing offences. For instance respondents pointed that;

“we saw poachers arrested with evidence of the livestock/charcoal sack, however, after two or three days the same person were released and repeated the some illegal activities. Even the fine they paid is low compared to the expected benefits from illegal activities and the chance of being arrested is low”.

The purpose of anti-poaching patrols is to deter poaching activities and to make offenders (poachers) bear responsibility for their actions (Ngure, 2012). Lotter and Clark (2014) pointed that, the fear of conviction and heavy sentences is a greater deterrent, than the act of being arrested. Nielsen and Treue (2011) suggested that, fines should be high enough to discourage illegal harvesting of wildlife and forest resources in protected areas. However, setting high punishment will have no effect if the problems of gathering evidence, investigating cases, having experienced prosecutors and offenders to the court is not also addressed (Ariffin, 2015).

The model revealed that, increasing in working relationship had negative and significantly influence on the effectiveness of law enforcement (Table 12). The results implies that as increased in unit of family association such as brother, sisters or

relatives in law enforcement activities decrease the level of law enforcement from higher effectiveness to a lower category of effectiveness of law enforcement in wildlife and forest management. The survey noted that, game scouts and forest guards indirectly participate in illegal activities. The findings show that local community living adjacent to protected area has direct/indirectfamily/working relationship with game scout/forest guard hence reduce the effectiveness of law enforcement. This is shown by one of the research questions which asked that, *'what happens when you catch your relative during patrol'* the game scouts and forest guards pointed that:

'We take the offender/relative with his/her livestock/charcoal to village or JUHIBU/JUHIBEKO office; and next day I usually give him money to pay the fine''.

In this study, the age of law enforcement staff was negatively significant influencing the effectiveness of law enforcement in JUHIBU and JUHIBEKO at $p < 0.01$ level (Table 12). As the age of game scout/forest guard increased the effectiveness of law enforcement tend to decrease from higher levels of law enforcement to a lower level of effectiveness. The results indicate negative coefficient, which shows inverse relationship, hence as increased age decreased the ability of law enforcement staff to detect illegal activities. In fact increased in age tend to reduce the performance of law enforcement staff on law enforcement activities because law enforcement activities such as patrol activities depend much on walking long distances.

Brant test results indicated that, the proportional odds assumption has not been violated ($\chi^2 = 11.94$, $df = 8$, $p = 0.154$) at 0.05 level of significance. Hence, the coefficients that describe the relationship between, the lowest effectiveness of law enforcement versus all higher (high effective and medium effective) categories of the response variable are the same as those that describe the relationship between the medium category and higher or least categories.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The experience from this study reveals that, achievements of effective law enforcement in CBOs are uncertain due various factors which are associated with management, community, governance, regulatory bodies and working environment. Increase in human population and economic development has increased anthropogenic activities in JUHIBU and JUHIBEKO. Human population demands large land for cultivation, livestock grazing and settlement. However, the supply of wildlife and forest is limited while resources user group is too large to hold and result to encroachment, livestock grazing, firewood collection, timber harvesting inside protected area. The study noted that, occurrence of illegal activities around JUHIBU and JUHIBEKO was due to poverty, unemployment and lack of other sources of substitute to supplement their income.

Experiences from this study conclude that, investment in anti-poaching unit and participation of local community through improved their livelihood remains the central tool in increasing the probability of detecting illegal activities. Thus, the study notes that dealing with incidences of cutting or killing of animals while the incidence has occurred does not pay the benefits of conservation. Hence, inclusion of intelligence network is more effective to stop the occurrence of illegal activities. Meanwhile, management effectiveness was significantly higher in JUHIBU than JUHIBEKO. Lack of budget, land boundaries conflicts, poor motivation, low penalties, low political willing, low conservation education, limited the management effectiveness of law enforcement and increase illegal activities increase in PAs. Nevertheless, low transparency, accountability, participation, presence of corruption resulted to poor governance in JUHIBU and JUHIBEKO. The study

concludes that increase in age and working relation were significant and negatively influencing the effectiveness of law enforcement while the increase in experience, transparency and punishment to offenders were significantly and positively influencing the effectiveness of law enforcement in wildlife and forest sectors.

Therefore, local people are willing to support conservation efforts and report illegal activities if conservationists incorporate equitable benefits sharing, conservation education and compensation of wildlife damage. Breakdown the chain of law enforcement and poor involvement of local community result to illegal activities in two study areas. Despite of occurrence of illegal activities in JUHIBU and JUHIBEKO does not mean that, management gets rid of law enforcement rather than improving effectiveness of law enforcement by consider the following recommendations.

5.2 Recommendations

Based on findings and discussion of this study, the following recommendations are proposed as strategies for mitigating the problems facing law enforcement in CBOs.

- i. It is hereby recommended that there is the need of diversifying sources of income through PES to create sustainable livelihood opportunities to local communities.
- ii. Intelligence network and specialized law enforcement units for patrol activities inside and outside protected area be established.
- iii. Prosecution unit be established and lawyers to present cases for wildlife and forest sectors be employed.
- iv. It is hereby recommended that, competent staff on wildlife and forest be employed in CBOs.

- v. Working environment for game scouts and forest guards should be improved through provision of patrol gears, salary, rewards, health insurance and job contract.
- vi. Selected game scouts and forest guards should not perform their law enforcement activities in respective village instead they should work in other CBOs out of their regular CBOs due to family relationship with surrounding community.
- vii. Government and NGOs should support community participation and law enforcement in CBOs.

This study recommended that further research be conducted to assess the influence of burnt bricks and its impacts on management of wildlife and forest resources. Also discover other sources of energy as alternative energy to what extent reduce the demand on forest produce. However, little is known on the extent of gas consumption and its impact to forest resources. Thus, this study recommended that further research be conducted to assess the impacts of discovering gas and impact in conservation of forest in Tanzania.

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APPENDICES

Appendix 1: Households questionnaire

- i. District nameii. Name of Ward..... iii. Name of Village.....
- iv. Community Base Organization (CBOs) = JUHIBU (): JUHIBEKO ()
- v. Name of Respondent (optional)..... VI. Sex of respondent: Male () Female ()
- vii. Relation to household..... viii. Date..... ix. Sheet no.....

1. Marital status of household

1. Single () 2. Divorced () 3. Separate () 4. Married () 5. Widowed ()

2. Age of respondent

1. 18 – 35 () 2. 36 - 60 () 3. Above 61 ()

3. Level of education

1. Primary education () 2. Secondary education () 3. College/University ()
4. Others (specify).....

4. Ethnicity

1. Born in the place () 2. Come in recently (within 10 years) ()
3. Come in a long time ago (more than 10 years) ()

5. What is your source of income?

1. Business () 2. Farming () 3. Livestock keeping ()
4. Tourism activities () 5. Others (specify).....

Section B: Perception of local community

i. Illegal activities and Patrol efforts

- 1.0 What types of activities allowed to access inside the WMA/JFM?

2.0 Do you grazing your animal or collect natural resources product in the WMA/JFM?

1. Yes () 2. No ()

3.0 If by permission/fee did you get any problems when you request.....?

4.0 How you perceive the effort patrol in reducing illegal activities in WMA/FJM.

1. Very high () 2. High () 3. Moderate 4. Low () 4. Very low ()

4.1 Please provide a reason to support your choice.....

5.0 What is the trend of accessing the resources (poles & timber, charcoal, honey collection, grazing land, grasses, fishing) from WMA/JFM? *(Select only one)*

1. Very high () 2. High () 3. Moderate 4. Low () 4. Very low ()

5.1 Please support your choice with reasons.....

6.0 What do you think are the sources of illegal activities.....?

7.0 In your opinion, how do you see the trend of illegal activities in WMA/JFM for the past three years?

1. Much increase () 2. Increase () 3. Moderate 4. Decrease () 5. Much decrease ()

7.1 Please provide a reason to support your choice.....

8.0 In your opinion, how do you see the condition of wildlife and forest in WMA/JFM for the past three years?

1. Much improved () 2. Improved () 3. Remain stable 4. Decline () 5. Much decline ()

8.1 Please provide a reason to support your choice.....

9.0 Have you ever experience or heard anyone arrested by the game scout/forest guards in the WMA/JFM? 1. Yes () 2. No ()

9.1 If yes, can you explain what happen to offender.....

10.0 Do you think the punishment provided to offender deters others from committing offence?

1. 1. Yes () 2. No ()

10.1 Please provide reasons for your choice.....

ii. Management effectiveness and law enforcement Governance

1.0 Do you agree that management WML/JFM is responsible for the protection of wildlife and forest resources?

1. Strongly agree () 2. Agree () 3. Moderate 4. Disagree () 5. Strongly disagree ()

1.1 Please provide reason to support your choice.....

2.0 Do you agree that, management of WMA/JFM has ensured comfortable working environment for protection of wildlife and forest resources ?

1. Strongly agree () 2. Agree () 3. Moderate 4. Disagree () 5. Strongly disagree ()

2.1 Please provide reason to support your choice.....

3.0 Do you agree that, management of WMA/JFM treats offender fairly?

1. Strongly agree () 2. Agree () 3. Moderate 4. Disagree () 5. Strongly disagree ()

3.1 Please provide reason to support your choice.....

4.0 Do you think the management of WMA/JFM is effectively in implementation of law enforcement? 1. Yes () 2. No ()

4.1 Briefly provides reason to support your response.....

5.0 Do you agree that, law enforcement in WMA/JFM is practiced under consideration of the following element (*Circle only one*)

Element	Level of Agree/Disagree					Comment
	1	2	3	4	5	
Accountability	1	2	3	4	5	
Transparency	1	2	3	4	5	
Freedom of speech	1	2	3	4	5	
Without corruption	1	2	3	4	5	

1. Strongly agree () 2. Agree () 3. Moderate 4. Disagree ()

5. Strongly disagree ()

6.0 Can you rank the effectiveness of law enforcement governance in term of participation, accountability and transparency?

1. Very high () 2. High () 3. Moderate () 4. Poor () 5. Very poor ()

6.1 Briefly gives reason to support your choice.....

7.0 Have you ever experienced or heard of village leaders, village scout demand a payment from people for the permission of using products from WMA/JFM illegal?

1. Yes () 2. No ()

7.1 Briefly gives reason to support your choice.....

8.0 Have ever experience or heard of rich/elite/famous peoples, leaders, politician conducts illegal activities or arrested inside WMA/JFM?

1. Yes () 2. No ()

8.1 If yes, what measures taken by management to deal with those people.....

9.0 What is your opinion about management effectiveness of WMA/JFM?

1. Very high 2. High () 3. Satisfactory () 3. Low () 4. Very low ()

9.1 Briefly give reason to support your choice.....

iii. Law enforcement units

1.0 In your opinion, do you think there is need of law enforcement in the WMA/JFM?

1. Yes () 2. No ()

1.1 If yes/no can you explain why.....?

2.0 In general, how do you perceive the service /technique used by leaders/game scout to enforce rules and regulation of wildlife/forest?

1. Very fearful 2. Somewhat fearful 3. Moderate 4. Not very fearful 5. Not at all fearful

2.1 Briefly gives reasons to support your choice.....

3.0 Are you satisfied with performance of game scout/forest guards with respect to law enforcement? *(Select only one)*

1. Very high satisfied
2. High satisfied
3. Moderate satisfied
4. Poor satisfied
5. Very poor satisfied

3.1 Briefly give reason to support your choice.....

4.0 In what ways do you participate in law enforcement activities in WMA/JFM?

1. Provision of information on illegal activities
2. Conducting patrol
3. Stand as witness in the court
4. Others (specify).....

5.0 Have you ever provide information to game scout/forest guards about illegal activities in the WMA/JFM? 1. Yes () 2. No ()

5.1 If yes, what types of action taken.....

5.2 If no, would you give information in case you discovered someone doing or intending to conduct illegal activities in WMA/JFM? 1. Yes () 2. No ()

5.3 If no can you comment why.....

6.0 Do you satisfy with existing relationship between law enforcement unit and local community?

1. Very high satisfied
2. Highly satisfied
3. Moderately satisfied
4. Poor satisfied
5. Very poor satisfied

6.1 Briefly give reason to support your choice.....

7.0 What can you comment on the future of law enforcement unit in reduces the illegal activities in WMA/JFM.....

8.0 What do you think are the best way for you to participate in law enforcement activities.....

iv. Factors influencing the effectiveness of Law Enforcement

1.0 How can you rank the level of effectiveness of law enforcement in WMA/JFM?

1. High effective () 2. Moderate () 3. Poor ()

1.1 Please can you explain the factors which influence such level.....?

2.0 Do you think law enforcement reduce illegal activities in WMA/JFM?

1. Yes () 2. No ()

2.1 Briefly gives reason to support your choice.....

3.0 Do you think devolution of power to local community in management of wildlife and forest resources has increased the effectiveness of law enforcement?

1. Yes () 2. No ()

3.1 Briefly give reason to support your choice.....

4.0 What initiatives to be taken for effectively implementation of law enforcement activities in the WMA/JFM.....

5.0 What is your general view regarding law enforcement in wildlife and forest conservation.....?

Thank you for your Cooperation

Appendix 2: Questionnaire for law enforcement staff

Section A: Background Information

i. District name... ii. Ward name.....iii. Village name.....iv. Sheet no.....

v. Community Base Organization = 1. JUHIBU () 2. JUHIBEKO () v. Date.....

vi. Name of Respondent (optional).....vii. Sex of respondent: 1. Male () 2. Female ()

1.0 Age of respondent 1. 18 – 35() 2. 36 - 60 () 3. Above 61 ()

2.0. Marital status of game scout/forest guard

1. Single () 2. Divorced () 3. Separate () 4. Married () 5. Widowed ()

3.0 Education levels

1. Primary education () 2. Secondary education () 3. College/University ()

4.0. Total number of dependents 1. 1 - 2 () 2. 3 - 5 () 3. Above 6 ()

5.0. How long have you been working as game scout/forest guard in WMA/JFM?

1. 1 - 3 years () 2. 4-6 years () 3. 7-9 years () 4. Above 10

6.0. What are the benefits do you get from law enforcement (*salary, or other non-monetary*.....?)

8.0. Do you have other sources of income apart from law enforcement activities?

1. Yes () 2. No ()

8.1. If yes can you list them.....?

Section B: The illegal activities and patrol effort of ant-poaching unit

1.0 What are the illegal activities conducted inside WMA/JFM (*Rank them from highest to lowest*) 1..... 2..... 3..... 4.....

2.0 What are the techniques used in patrol.....

3.0. Comment on frequency and days of patrol per month.....

4.0. How many scouts going to patrol per squad.....?

5.0. Comment on the area covered during patrol.....

6.0 When an offender is arrested with any items what are steps taken?

- 1. Compounding () 2. Confiscate all items ()
- 3. Take offender to court () 4. Release the offender () 5. Other.....

6.1 Please provide reasons to support your choice.....

6.2 If taken to the court what are the probability of him/her get into conviction

- 1. Very high () 2. High () 3.Moderate () 4.Low () 4.Very low 0.0()

6.2.1 Please provide reasons to support your choice.....

7.0 How do you see the trends of the following illegal activities in the WMA/JFM? (*Circle only one*) 1=Increasing 2= Decreasing

Illegal activities	Status		Comments
	1	2	
Pole cutting	1	2	
Timber harvesting	1	2	
Firewood collection	1	2	
Honey collection	1	2	
Charcoal production	1	2	
Animal poaching	1	2	
Illegal fishing	1	2	
Others.....	1	2	

8.0 What are the extents of illegal activities in WMA/JFM since 2012 to 2014?

- 1. Very high 2. High 3. Moderate 4. Low 5. Very low

8.1 Please provide reasons to support your choice.....

9.0 Is there any improvement in law enforcement activities from 2012 to 2014?

- 1. Yes () 2. No ()

9.1 If yes, mention what has been improved.....

9.2 If no, what are the weakness.....

10.0 What level of patrol effort have reduced illegal activities from 2012 to 2014?

1. Very high 2. High 3. Moderate 4. Low 5. Very low

10.1 Please provide reasons to support your choice.....

11.0 Comment on effort you put in patrol in reducing illegal activities.....

Section C: Management effectiveness of WMA and JFM

1. 0 What types of activities local community permeated inside the WMA/JFM?

1. 2..... 3.....4.....

1.1. How do you ensure sustainability of those activities.....

2.0 Management of WMA/JFM seeks your opinions for decision making regarding to law enforcement activities? 1. Yes () 2.No ()

3.0 Comment the participation of police, lawyers and judge in enforcing wildlife/forest legislation.....

4.0 Do you consult the management regarding information of law enforcement?

1. Yes () 2. No ()

4.1 If no, can you explain why.....

4.0 Are the management and village scout in WMA/JFM encouraged teamwork in law enforcement? 1. Yes () 2. No ()

5.0 Can you rank the effectiveness of law enforcement unit in term of participation?

2. Very high 2. High 3. Moderate 4. Poor 5. Very poor

5.1 Please can provide reasons for your choice.....

6.0 How can you rank your work relationship with your leaders?

1. Very good 2. Good 3. Somehow good 4. Bad 5. Very bad

6.1 Please give explanation of your choice.....

7.0 What is the challenge facing law enforcement units in the WMA/JFM?

1. Corruption 2. Patrol equipment 3. Lack of motivation 4. Lack of trained staff 5.

Others (specify).....

7.1 If corruption what is the extent and cause of corruption in WMA/JFM.....

8.0 How effective in conducting law enforcement activities in term of responsibility, accountability and transparency?

1. Very high 2. High 3. Moderate 4. Poor 5. Very poor

9.0 Have you experienced village leaders or law enforcement staffs demand payment from the community to allow them to collect products from WMA/JFM?

1. Yes () 2. No ()

9.1 Briefly gives reason to support your choice.....

Section D: Factors Influencing Effectiveness of Law Enforcement

1.0 When you perform your responsibility effectively do you receive rewards/allowance/bonus from management?

1. Yes () 2. No ()

1.1 If yes, can you mention them.....

1.2 If no, what can you comment.....

2.0 What can you comment on job security regarding to your job.....

3.0 Have you ever attended any training regarding wildlife or forest management?

1. Yes () 2. No ()

4.1 If no, what kind of assistance you received from management when you got accident at work.....

5.0 What are the factors do you think may contribute to the effectiveness of law enforcement.....

6.0. Do you think the involvement of local community in wildlife and forest resource conservation is the only solution for reduce illegal activities? 1. Yes () 2. No ()

- 6.1. Please provide reasons to support your choice.....
- 7.0. How local community support you in law enforcement activities?
1. Provide information on illegal activities 2. Conducting patrol 3. Stand as witness in the court 4. Others (specify).....
- 8.0. In your opinion, how does a local community perceive you in the village.....?
- 9.0. Do you think your working environment is adequate to accomplish law enforcement activities? 1. Yes () 2. No ()
- 10.1. If no, what is missing or need to be improved.....
- 11.0. Are you provided with basic working tools for patrol? 1. Yes () 2. No ()
- 11.1 If yes can you mention them.....
- 11.2 If no how it affects your performance.....
- 12.0 How can you rank your satisfaction with the law enforcement job? *(Select only one)*
1. Very good () 2. Good () 3. Moderate () 4 Bad () 5 Very bad ()
- 12.1 Briefly can you provide reasons to support your response.....
- 13.0 Have you arrest the same poacher more than once 1.Yes () 2. No ()
- 14.0 Have ever arrest your relative (brother, friends, sister or parents) conducting illegal activities? 1. Yes () 2. No ()
- 14.1 If yes, what action did you take.....
- 15.0 What are the reactions of your relative or friends in the village when you arrest them.....?
- 16.0How can you rank the achievement of law enforcement in JUHIBU/JUHIBEKO?
1. Low achieved 2. Moderated achieved 3. High achieved
- 17.0 At what level can you rank the effectiveness of law enforcement in WMA/JFM?
1. Low effective 2. Effective 3. Highly effective
- 18.0 Please can you propose strategies for improving law enforcement.....
- 19.0 Please indicate any suggestion/comment/.....
- 20.0 Please can you ask any Questions.....

Thank you for your Cooperation!

Appendix 3: Checklist for key informant

A: Head of CBOs, Wildlife District Officer and Forest District Officer

1. What are the illegal activities and their causes over the past three years?
2. Comment on patrol efforts for the past three years in reducing illegal activities?
(Consider the problems facing law enforcement unit)
3. Do you have enough man power and facilities to control illegal activities (if not) how do you control and what are the requirement?
4. Ability of Game scout/forest guard in the implementation of their responsibility?
5. Often people are working hard when motivated, explain how do motivate your staff?
6. How do evaluate the performance of game scout/forest guard basing on their responsibility.
7. Comment on the working environment of game scout/forest guards
8. What is happening when poachers are arrested more than two?
9. Measures for dealing with elite, politician who break rules and regulations
10. Comment on fine, punishment that provided to offender
11. Comment on participation of local community toward law enforcement
12. What are contribution of regulatory bodies agency in wildlife and forest
13. Comment on recording and reporting systems of law enforcement activities?
14. Implementation of law enforcement in term, accountability, corruption and transparency
15. What is the factors influence the effectiveness of law enforcement in wildlife and forest sectors?

Appendix 4: Checklist for regulatory bodies (police, lawyers)

1. Comment on trend of wildlife/forest offence from WMA/JFM
2. What are the problems do you get when you proceed with wildlife/forest offences
3. Comment on support of management in the process of wildlife/forest trials?
4. What are the weaknesses of wildlife/forest law in convicting the offender?
5. Comment chance of offender regarding to law enforcement of being convicted
6. Comment on fine, punishment that provided to offender
7. Comment on law enforcement in term of accountability and transparency
8. Participation of law enforcement staff in court session and prosecution?
9. Participation of local community in reporting illegal off-take of wildlife and forest resources
10. Strategies for improving effectiveness of law enforcement?

Appendix 5: Participation observation guides

1. Patrol gear
2. Reporting of law enforcement
3. Communication/transparency
4. Responsibility and accountability
5. Patrol activities, (Technique used, number of staff, area covered)
6. Condition/quality of wildlife and forest resources
7. Relationship and team work

**Appendix 6: Management Effectiveness Tracking Tool (METT) for JUHIBU and
JUHIBEKO, Tanzania**

			A	B
S/No	Issue	Total Scores	Mean scores	Mean scores
I: Context				
1	Legal status -Does the protected area have legal status?	3	3	2
2	WMA/JFM boundary - Is the boundary known and demarcated	3	2	2
3	Protected area regulations -Are inappropriate land uses and activities (poaching, illegal timber harvesting, fishing, encroachment, livestock grazing, and farming) controlled?	3	2	2
4	Resource inventory - Do you have enough information to manage the PAs	3	2	1
5	Law enforcement - Are game scout/forest guard and other staff enough to enforce WMA/JFM rules?	3	1	1
	Addition point: Is there strategies of dealing with land conflict include boundary conflict between management and Local community	3	1	1
II: Planning				
6	Protected area objectives - Are protected are objectives agreed	3	2	1
7	Management plan - Is there management plan and is it implemented	3	2	1
8	Regular working plan - Is there annual work plan?	3	1	1
	Addition point: Is there strategies of dealing with regular arrested poachers	3	1	1
III: Inputs				
9	Research -Is there a program of management orientated survey and research work?	3	2	2

10	Staff numbers -Is there enough staff to manage the protected area	3	1	1
11	Staff training -Is there train plan for staff?	3	1	1
12	Current budget -Is the current budget sufficient?	3	2	0
13	Security of budget -Is the budget secure	3	1	0
IV: Process				
14	Resource management -Is the illegal activities adequately controlled (e.g. for wildfire, farming, livestock, encroachment, poaching)?	3	1	1
15	Personnel management - Are the staff managed well enough?	3	2	1
16	Management of budget -Is the budget managed to meet law enforcement needs?	3	1	0
17	Equipment - Is the current equipment adequately?	3	2	0
18	Maintains of equipment -Is the equipment adequately maintained?	3	1	0
19	Education and awareness programmer -Is there a planned education programmer?	3	1	1
20	Local communities -Do local communities around WMA/JFM participating in law enforcement	3	1	1
21	Indigenous people - Do indigenous and traditional regular used using the PAs have impact to management decision	3	1	1
22	State and commercial neighbor -Are there co-operation with adjacent land users in protection	3	1	1
23	Private organization, commercial tourism and hunting - Do commercial tour operators and hunting companies contributes to protected managements	3	2	1
	Additional: Is there working plain for law enforcement activities per month (number of patrol)	3	1	1

V:Outputs				
24	Visitor facilities - Are visitors facilities good enough	3	2	0
25	Fees and fine - Are fees and fine helping in protected area management?	3	1	3
Outcomes				
26	Law enforcement - Is law enforcement are being managed consistently to PA objectives?	3	2	1
27	Stability -Are their conflict between management and surrounding community	3	1	1
28	Access assessment - Are the available management mechanism working to control access or use of resources	3	1	1
29	Economic benefit assessment - Is the PA provide economic benefit to communities?	3	2	2
30	Monitoring and evaluation -Is their system of monitoring and evaluating management activities?	3	1	1
Total scores		99	48	34

Accumulative METT

A. $JUHIBU = 48/99 \times 100 = 48.48\%$

B. $JUHIBEKO = 34/99 \times 100 = 34.34\%$

Key Score 0 = Poor, 1 fair, 2 = good, and 3 = excellent

Appendix 7: Illegal activities recorded in JUHIBU and JUHIBEKO from 2012 to 2014

Illegal activities	JUHIBU					JUHIBEKO				
	2012	2013	2014	Total	%	2012	2013	2014	Total	%
Bushfire	2	-	0	2	0.24	-	-	-	-	-
Canoe	40	0	9	49	5.95	-	-	-	-	-
Chain saw	-	-	-	-	-	0	0	2	2	0.27
Charcoal Kilns	11	15	13	39	4.73	22	17	20	59	7.91
Charcoal sack	3	34	8	45	5.46	25	9	13	47	6.30
Elephant carcasses	2	1	0	3	0.36	-	-	-	-	-
Farming encroachment	19	22	12	53	6.43	14	4	8	26	3.49
Foot prints	20	26	19	65	7.89	21	14	18	53	7.10
Illegal firewood collection	17	13	12	42	5.10	65	31	38	134	17.96
Illegal fishing	19	16	9	44	5.34	-	-	-	-	-
Illegal hunting (flash light vs horn)	2	1	0	3	0.36	-	-	-	-	-
Livestock grazing	42	35	28	105	12.74	85	44	65	194	26.00
Fishing net	13	18	-	31	3.76	-	-	-	-	-
Other animal carcasses	57	12	8	77	9.34	0	0	0	0	0
Settlement encroachment	12	10	10	32	3.88	8	1	6	15	2.01
Stone collection	-	-	-	-	-	-	3	3	6	0.80
Poachers tools (axes, arrow, bicycles, motor cycles, mist net)	36	7	3	46	5.58	-	-	-	-	-
Wire snares	14	18	14	46	5.58	-	-	-	-	-
Timber harvesting	-	-	-	-	-	35	15	33	83	11.13
Tree cutting	53	48	41	142	17.23	60	21	46	127	17.02

JUHIBU 53% and JUHIBEKO 47%, $Z = -0.746$, $p = 0.456$

Appendix 8: Illegal activities recorded per month from 2012 to 2014 in JUHIBU

Month	2012	2013	2014	Total	%	Mean	St.d
January	36	45	23	104	11.25	34.67	11.06
February	73	25	20	118	13.06	39.33	29.26
March	30	19	11	60	6.49	20.00	9.54
April	19	33	9	61	6.59	20.33	12.06
May	14	11	4	29	3.15	9.67	5.13
June	21	11	8	40	4.32	13.33	6.81
July	65	21	20	106	11.46	35.33	25.70
August	21	35	17	73	7.89	24.33	9.45
September	24	18	13	55	5.95	18.33	5.51
October	30	22	21	73	7.89	24.33	4.93
November	36	39	18	93	10.03	31.00	11.36
December	33	41	39	113	12.22	37.67	4.16

$\chi^2 = 15.167$ d.f = 2 p = 0.001, significant at 0.01

Appendix 9: Illegal activities recorded per month from 2012 to 2014 in JUHIBEKO

Month	2012	2013	2014	Total	%	Mean	S D
January	50	37	37	124	15.18	41.33	7.51
February	32	0	33	65	7.96	21.67	18.77
March	38	33	12	83	10.16	27.67	13.80
April	38	12	20	70	8.57	23.33	13.32
May	-	-	20	20	2.45	6.67	11.55
June	-	-	-	-	-	-	-
July	31	13	13	57	6.98	19.00	10.39
August	24	22	24	70	8.57	23.33	1.15
September	-	-	25	25	3.06	8.33	14.43
October	39	25	26	90	11.02	30.00	7.81
November	48	19	32	99	12.12	33.00	14.53
December	52	27	35	114	13.95	38.00	12.77

$\chi^2 = 11.128$ d.f = 2 p = 0.004, significant at 0.01

**Appendix 10: Working duration of village game scouts/forest guards in JUHIBU
and JUHIBEKO**

Years	JUHIBU		JUHIBEKO	
	Frequency	%	Frequency	%
1 – 3	6	11.54	12	46.15
4 – 6	10	46.15	13	50.00
7 – 9	7	34.62	1	3.84
Above 10	3	7.69	0	0