Determining compliance of transboundary cooperation for biodiversity management in the Serengeti- Mara Ecosystem, East Africa

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ABSTRACT

Biodiversity management is under threat due to habitat loss and or modifications resulting from deforestation, increased farming, overgrazing and human settlement. There is need for an organized process as well as community participation in transboundary conservation. The entire Serengeti-Masai Mara Ecosystem the world famous Serengeti Game Park and Maasai Mara National Reserve and includes the Maswa Game Reserve (2,200km^2) in the south, Grumeti and Ikorongo Game Reserves in the east, Maasai Mara National Reserve in Kenya (1,672km^2) to the north, and Loliondo Game Controlled Area in the west. The paper reviews the level of policy compliance and strategy integration of international cooperation in transboundary ecosystem of environment in Kenya and Tanzania in order to determine the extent to which the states have complied with international protocols. An assessment of documentary evidence on the level of effectiveness in the integration of transboundary cooperation in policies and legal frameworks and field data were collected from 35 residents around the SME using questionnaires. The sample was convenient sampling in which only adults who gad interacted with conservation areas were interviewed. Additionally a cross tabulation using check list on policies related to biodiversity in the East African Community region, and policy prescriptions was made. The achievement of the cooperation obligations is not a benchmark to demonstrate cooperation but rather the number of prescriptions per legal framework on cooperation reflect more authority on domestication and application of the legal frameworks in transboundary matters.

Key words: Serengeti Game Reserve, Maasai Mara, transboundary biodiversity management, policies, policies, target

1. Introduction

Human population has its greatest footprint on global landscape today. However history shows that humans in the past adjusted themselves reasonably well and cohabitated with other members of the ecosystem including wildlife (Parkipuny, 1997). Recent decades have shown that humans, because of numbers and their consumption habits, are less tolerant and will not allow wildlife survival without heavy cost (Okello, 2005). The problem has not only become local or regional but has impacted both national and international in nature affecting all forms of habitats across many continents (Distefano, n.d). Wildlife operates within ecosystems whose boundaries do not to coincide with administrative nor national borders (Harris, et al, 2001; Nyhus, 2016). In this review, we examine the decision making process through policy mainstreaming and strategic integration for a transboundary management regime for the savanna ecosystem.

Transboundary Natural Resources Management (TBNRM) is defined (Van Der Linde *et al* 2001) as *any* process of collaboration across boundaries that increases the effectiveness of attaining natural resource management or biodiversity conservation goal(s). Key ecological systems and components which occur in two or more nations are subject to a range of often different and sometimes opposing management and land-use practices. Whenever a resource use is unsustainable on one side of a border of the same ecosystem, the resource use in the neighbouring state(s) may adversely be affected as well. A TBNRM area is an eco-region in which there is deliberate attempt to the manage natural resources across political or administrative boundaries (Griffin et al. 1999). The characteristics of TBNRM areas generally are associated with a strong private sector presence, promote empowerment of communities and the strengthening of community based natural resources management (CBNRM) and foster the creation of a multitude of public-private-community partnerships and enterprises (Shah, 2016).

There has been several attempts to conserve critical habitats such as grasslands, rivers and forests within the SME (Lamprey and Reid, 2004). The present study examines the management of the Serengeti-Mara ecosystem (SME) that lies within the Republic of Kenya and the Republic of Tanzania. Both countries are members of the East African Community (EAC) besides Burundi, Rwanda and Uganda. The EAC has adopted transboundary natural resources management protocol as one its priority areas of intervention. In this review analyses of the East African Community policies and frameworks and their long term outcomes with specific reference to SME will be examined.

2. Status of the ecosystem

The Serengeti-Mara ecosystem (SME) has an area of 31,500 km^2 and includes the Maasai Mara National Reserve (MMNR) comprising 25%, Serengeti National Park with an area of 14,750 km² and Ngorongoro Conservation Area 8,292 km². in Tanzania. The ecosystem lying at an altitude of 1600 m above mean sea level covers approximately 6,500 km², the remaining 75% is unprotected land occupied by both the Maasai and other agro-pastoral communities (Walpole *et. al*., 2003). The main water source for the ecosystem is the transboundary Mara River Basin (13,750 km^2) which is drains in to Lake Victoria and therefore the headwaters of the River Nile.

MMNR started as a wildlife sanctuary under the Mara Conservancy in 1948 with 520 km² being declared as protected land. In the same year it was established as the Maasai Mara Game Reserve and was later put under the Narok County Council (NCC) in 1961. The Reserve was increased from 520 km² to a total of 1,800 km². However in 1984 through a formal agreement, 301 km² was excised to provide access to the watering points for livestock. The MMNR now stands at the size of 1,530 km² (WPU, 1983; NCC & TMCC, 2009; Ogutu *et. al.,* 2011). In 1995 the MMNR was gazetted to be under the joint control and management of Narok County

and Trans Mara District. The NCC manages the Reserve east of the Mara River while the Trans Mara office manages the Reserve west of the river. The western side is known as the Mara Triangle. MMNR lies between 34°45' and 35°25' East and 1°13' and 1°45' South. The MMNR is in the Rift Valley, in Narok County. It is bisected by River Mara which forms the border between Narok County.The MMNR includes many group ranches like Koiyaki, Lamek, Ol Derkesi and Ol Kinyei.

The Serengeti National Park (SNP) was established as game reserve in 1929 covering 25,000 km^2 to preserve lions. The game reserve was expanded in 1949 in to a bigger area and declared a National Park in 1951. Further expansion of the park was done in 1959 and the park placed under the Tanzania National Parks Authority (TANAPA). A buffer zone around the park was created to reduce human-wildlife conflicts. The buffer areas included Ngorongoro Conservation Area, the Mara-Maswa-Grumeti-Kijesreshi and Ikorongo Game Reserves and four different wildlife management areas (Ikona and Loliondo Game Controlled Area). The relative expansion of the park area was a demonstration of the growing importance of the conservation area and also reflected the growing challenges the park was beginning to face as a biodiverse ecosystem. As international recognition increased, the SNP was declared a World Heritage Site in 1981 and in the same year it was declared as a Biosphere Reserve under UNESCO's Man and Biosphere Programme.

The wildlife population in the SME has been declining (Ogutu & Owen-Smith, 2003; Owen-Smith & Mills, 2006; Stoner *et. al*., 2006; 2007; Ogutu *et. al*., 2009; Western, Russell and Cuthill, 2009) due to expansion of agricultural land(Serneels *et. al*., 2001; Thompson & Homewood, 2002; Ogutu *et. al*., 2009), increase of human settlements (Lamprey & Reid, 2004; Norton-Griffiths *et. al*., 2009), hunting and bush meat (Loibooki *et. al*., 2002) and livestock incursions into protected areas (Ogutu *et. al*., 2009). The most serious threat according to Lado (1996) is habitat destruction and alteration. The overall root cause of wildlife decline is increase in human population (Johan, 1995).

Besides the wildlife, the Serengeti-Mara ecosystem (SME) is inhabited by the Maasai community whose culture has respect for and protect the wildlife ((Ole Tunya, 1992; Ole Dapash, 1997; Rotken, 1997; or for ceremonial purposes (Waithaka, 2004). Their system of managing resources include controlled grazing areas and fires (Homewood and Rogers, 1991). GoK, 1998; Cheeseman, 2002). Most of the Maa people have nomadic to sedentary lifestyles (Reid *et. al*., 2003; Waithaka, 2004).The cooperation amongst stakeholders is key to transboundary management of the SME especially where the traditional people are dependent on the same ecosystem for their livelihoods.

3. Methodology

3.1. Approach

The paper reviews the level of policy compliance and strategy integration of international cooperation in transboundary ecosystem of environment in Kenya and Tanzania in order to determine the extent to which the states have complied with international protocols. The secondary information of all articles relating to cooperation in East African Community (EAC policies and legal frameworks on SME based on CBD including the East African Community (EAC) Climate Change Policy (2011), the Protocol on Environment and Natural Resource Management (1999) and the East African Community Transboundary Ecosystems Management Bill (2010) were reviewed. The criteria used for selecting the articles was the extent to which the articles addressed transboundary natural resources management in the East African region.

3.2 Measures of complaince

3.2.1 Obligations in relation to policy

The term "compliance" designates the number of obligations featured in a policy intended to increase the level of cooperation and prevent disagreements including those that likely reduce habitat degradation. Policies are established by member states to help in developing institutions, legislations, strategies, and regulations on management. The level of compliance to policy was measured using the Obligation Compliance Susceptibility Index (OCSI). shown by the formula as follows (Shah, 2016...):

$$OCSI = \frac{\textit{Number of obligations policy featured in}}{\textit{Total number of obligations}} \times 100 \qquad (1)$$

The decision criteria will be based on OCSI ranging between 100-90% indicating excellent performance, 89-70% which was very good, 69-50% which meant good, 49-40% which reflected poor representation of the MEA in the relevant policy and less than 39% which indicated very poor performance of the policy or the legal framework.

3.2.2 Prescriptions in relation to obligations

Another level of integration was tested through the Policy Prescription Integration Susceptibility Index (PPISI) by checking the policy prescriptions in relation to the cooperation obligations. The total relevant prescriptions per obligation of each policy were converted into percentages. For example, if the Climate Change Policy had a total of five policy prescriptions relevant to cooperation, then these five policy prescriptions were cross checked against each cooperation obligation so as see which prescriptions were relevant in relation to the international obligations. The percentage of these prescriptions per obligation was calculated as shown in Equation 2.

$$PPISI = \frac{\textit{Total prescriptions per obligation}}{\textit{Total policy prescription per policy}} \times 100 \qquad (2)$$

An assessment of documentary evidence on the level of effectiveness in the integration of transboundary cooperation in policies and legal frameworks, and using non-probabilistic sampling data were collected from 35 respondents, 20 from the MMNR area and 15 from the Serengeti area using questionnaires. The sample was convenient sampling in which only adults who gad interacted with conservation areas were interviewed. Additionally a cross tabulation using check list on policies related to biodiversity in the East African Community region, and policy prescriptions was made.

4. Results and discussions.

Table 1 shows the three framework laws that were identified and examined. The Articles that spell out requirements for the transboundary management of the ecosystem are Articles 1, 5, 6(a), 7, 8(a), 8(h), 8(j), 10, 12,13, 14 and 17 of the biodiversity management (Table 1). The total number of obligations were 12.

Table1: Framework laws of the East African Community on biodiversity management

The Protocol on Environment and Natural Resource Management		East African Community Transboundary Ecosystems Management Bill		East African Community (EAC) Climate Change Policy	
Article	Content	Article	Content	Article	Content
3	The Protocol applies to the management of transboundary resources.	3	Establishment of an institutional framework for the management of trans-boundary ecosystems within and among Partner States	2.2	Promote capacity building efforts through inter alia education, training, research, technology development and transfer and information and knowledge management on climate change
4	The partner states follow the principle of co-operation in the management of environment and natural resources.	4	This Act shall apply to all existing and proposed activities in trans-boundary ecosystems within and among Partner States	3.1.3	The EAC shall aim at development of climate change adaptation plans, policies and strategies and mainstreaming climate change adaptation in national development planning

5	Foster closer cooperation for sustainable and coordinated management, conservation, protection and utilization of the environment and natural resources	5	The management of the East African Transboundary Ecosystems will be done by the East African Transboundary Ecosystems Management Commission	3.3.3	EAC Partner States shall strengthen climate change scientific research through monitoring, detection, attribution and prediction
6	Harmonize the policies, laws and strategies in the national jurisdictions.	7	the Commission shall coordinate, monitor and supervise the implementation of the East African Community policies relating to management of trans-boundary ecosystems and liaise with the private sector, on issues relating to management of trans-boundary ecosystems	3.4.1	Partner States shall undertake public awareness on the importance of ecosystems in climate change mitigation and the well-being of the region's environment
7	Protect critical ecosystems of flora and fauna	8	The national environment management authorities in the Partner States shall be the national transboundary ecosystems management focal points	3.4.3	Partner States shall develop a database for repository of research findings, and sectoral information sharing including knowledge management
8	Enforce that conservation and management of environment and natural resources are treated as an integral part of national and local development plans	9	Partner States shall take all measures necessary to prevent the introduction of alien species of fauna and flora into the shared trans-boundary ecosystems	4.2.3	The capacity building for climate change adaptation and mitigation shall focus on education, training and public awareness.
9	Jointly develop and adopt harmonized common policies and strategies.	10	Partner States sharing continuous ecosystems shall identify and designate such areas as trans-		

			boundary ecosystems		
10	Partner States shall develop, harmonise, adopt and implement common policies, laws, strategies, plans and programmes.	12	Partner States shall require any person intending to use the shared trans-boundary ecosystems within their territories for must obtain a permit.		
11	Partner states shall regulate and control introduction of alien species, plant pests and diseases, and develop early warning systems for all types of threats to trees.	13/14/ 15/16/ 17/18	Activities which are likely to have significant trans-boundary impacts shall not be carried out without an approved EIA.		
12	Partner States shall develop, harmonize adopt common policies, laws and strategies for the conservation and sustainable utilization of wildlife resources in and outside protected areas and integrate such management into national development plans.	17			
13	Protect and conserve the water resources and their ecosystems through protecting and improving the water quality; preventing the				

	introduction of alien species into; and protecting and conserving biological diversity in the water resources.			
22	The Partner States shall develop and harmonise common policies, laws and strategies for ensuring sustainable development of rangelands.			
23	The Partner States shall develop and adopt an integrated approach to address the physical, biological and socio-economic aspects of the process of drought.			
24	The Partner States shall develop and adopt an integrated approach to address the effects of climate change			
26	The Partner States shall ensure the competitiveness of the Community as an attractive investment destination and develop appropriate tourism-specific incentives to encourage the growth of private sector initiatives in the tourism sector.			

31	The Partner States shall harmonise and adopt common policies, laws and programmes requiring the conduct of environmental impact assessments for planned activities and projects which are likely to have significant adverse impacts			
34	Partner States shall ensure that officials and public authorities assist the public to gain access to information and facilitate their participation in environmental management			

Two legal institutions that have been given mandates to manage biodiversity conservation are Kenya Wildlife Service (KWS) in Kenya and TANAPA in Tanzania. NEMA and NEMC are the regulatory authorities regarding environmental management. The policy environment in the two sister states indicate that both have been keen on biodiversity conservation as may be noted by the series of policy and regulatory mechanism that have been presented. However there were differences in legislation and practice that have prioritized individual land acquisition, agricultural expansion and urban settlement. Table 2 shows the summary of policies in Kenya and Tanzania.

Table 2: Summary of policies on environment and natural resources management

Sector	Kenya	Tanzania	Comments
Constitution	Comprehensive treatment of Land and Environment and Natural Resources Management.	1977 Art. 27(1) Safeguard and protection of environment; 27(2)on abuse, misuse, wastage, etc	Kenya's constitution recently revised.

Water	National Water Policy, 1999; Draft Transboundary, 2008	Water Policy (NAWAPO) 2002, Issue of full cost recovery.	Tanzania has transboundary issues. Water must be planned with land use in mind.
Environment	National Environment Management Policy Draft. Well detailed. NEMA.	National Environment Policy 1997. NEMC	Sectoral policy may be conflicting in some cases.
Land	National Lands Policy, 2010; Draft Constitution 2010.	National Lands Policy 1961.	Major differences on lands issues. Land use very important in Mara River Basin context.
Wildlife	Wildlife Conservation and management Act 2013	Wildlife Conservation Act no.5, 2009; National Wildlife Policy 2007	
Wetlands	Draft National Wetland Policy – KWS, WRMA, NEMA	No wetlands policy. National Environment Policy, 1997	
Forestry	KFS Development Policy, 2005; National Policy draft discussed but never went to Cabinet.	National Forestry Policy, 1998;	
Irrigation	National Irrigation Bill, 2015; National Irrigation Policy, Draft 2008.	Irrigation Policy, 1997	
Agriculture	NAEP, 2001	National Agriculture policy, 1997; National Livestock Policy, 1997	Individualized land division and expansion of agriculture.
Fisheries	National Fisheries Policy, Draft 2009.	National Fishery Policy 1998	Tanzania is revising most of their natural resources legislations.

It may be noted that the policies were developed at different times and as a result the Lands, irrigation and fisheries policies in Tanzania have been undergoing reviews. Similarly, most of the Kenyan policies have recently been reviewed to streamlined the sectoral policies to the Constitution 2010. More efforts to conserve wildlife through community initiatives has been successful on the Tanzanian side compared to Kenya (Homewood and Rogers, 1991) partly because of communal management of natural resources. After Kenya's independence the government encouraged wheat growing in the northern part of the SME (Amuyunzu, 1997) allowing penetration of farms into wildlife zones. In 1975 the distance of the nearest farm to the Maasai Mara National Reserve (MMNR) boundary was 52 km; by 1990 it had reduced to 40 km and further to 17 km in 1995 (Sitati, 1997). Around the MMNR there are so many sporadic semi urban-market centres, human settlements, roads and other social amenities.

Examining the Protocol on Environment and Natural Resource Management (1999), all the 12 obligations of the CBD in terms of cooperation were reflected (100%). The East African Community Transboundary Ecosystems Management Bill (2010) scored 91.7% (11 obligations) while the East African Community (EAC) Climate Change Policy (2011) scored 75% (9 of the 12 obligations). The results of the analysis of the three frameworks are shown in Table 3.

Table 3: CBD obligations and their relevant EAC frameworks

CBD obligations	Transboundary Ecosystems Management Bill	The Protocol on Environment and Natural Resource Management	Climate Change Policy
Conservation, sustainable use and equitable sharing of biodiversity (Article 1)	√	√	√
Identifying threats and monitoring status of biodiversity and habitats (Article 7)	X	√	X
Cooperation amongst countries in biodiversity usage and conservation (Article 5)	√	√	√

|			
Developing National Strategies, plans and programmes for conservation (Article 6a)	√	√	√
In-situ conservation through protected areas (Article 8a)	√	√	X
Prevention of alien species (Article 8h)	√	√	X
Innovation, integration of indigenous knowledge and involvement of local communities (Article 8j)	√	√	√
Cooperation between government and private sector in the sustainable use of bioresources (Article 10)	√	√	√
Research and training for conservation and sustainable use of biodiversity (Article 12)	√	√	√
Public education and awareness, participation (Article 13)	√	√	√
Minimizing impacts on biodiversity with EIAs (Article 14)	√	√	√

Exchange of technology, scientific, socio-economic and indigenous research results (Article 17)	√	√	√
Total obligations achieved	11	12	9
% score achieved	**91.7**	**100**	**75**

From Table 3 it may be noted that the Protocol on Environment and Natural Resource Management, East African Community Transboundary Ecosystems Management Bill scores between 100-90% (excellent) while East African Community (EAC) Climate Change Policy score between 89-70% (very good). Although the Protocol on Environment and Natural Resource Management emerged the overall best as it addressed all the 12 obligations on cooperation, the prescriptions in relation to the twelve obligations of the CBD and the direct relevance to the SME are seventeen out of the fifty-one prescriptions (33 %).The East African Community Transboundary Ecosystems Management Protocol has fourteen prescriptions from a total of twenty-four which address the cooperation issues targeting the SME (58.3%). The East African Community (EAC) Climate Change Policy has six prescriptions addressing cooperation out of the total eighteen prescriptions (33.3%) illustrated in Figure 2.

Policy Prescriptions

Policy Prescription Integration Susceptibility Index (PPIS) is a measure of the number of prescriptions which address the cooperation issues targeting transboundary ecosystem managemnt such as the SME. The Protocol on Environment and Natural Resource Management had a total of 51 prescriptions from which only 17 were related to cooperation as indicated in Table 1 giving a Policy Prescription Integration Susceptibility Index (PPISI), 33%. The East African Community Transboundary Ecosystems Management has fourteen prescriptions from a total of twenty-four prescriptions has a PPISI of 58.3% while the East African Community (EAC) Climate Change Policy has six prescriptions addressing cooperation out of the total eighteen prescriptions and a PPISI of 33% (Figure 4). This indicates that although the OISI is a good indicator in helping to assess the level of obligation integration, the PPISI provides a realistic picture in terms of the policy prescription integration levels. In this analysis, the OISI indicated that the Protocol on Environment and Natural Resource Management reflected the best regarding to all the twelve obligations. On the other hand the PPISI indicated that the East African Community Transboundary Ecosystems Management Protocol have domesticated the cooperation obligations better in terms of prescriptions.

**Figure 5: Policy prescription integration level of EAC frameworks**
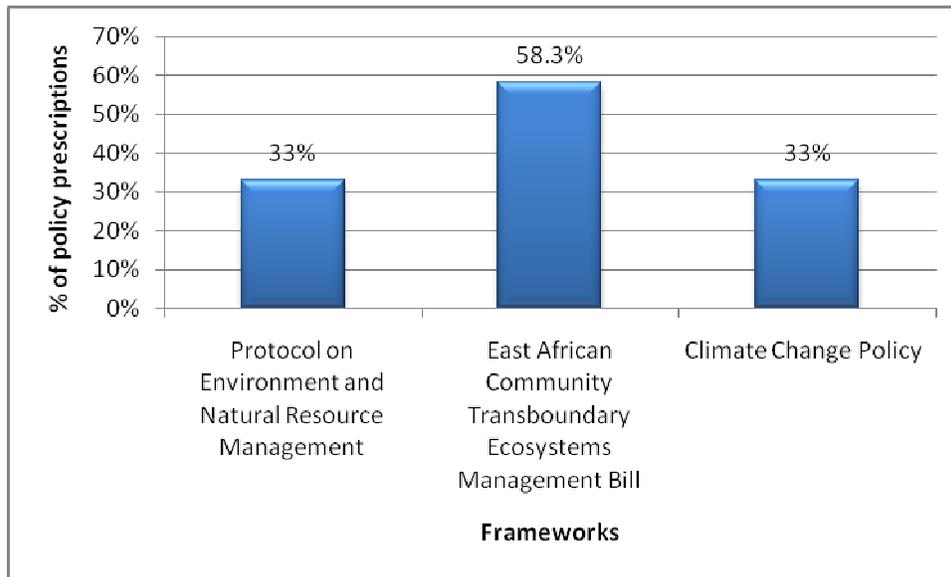
The achievement of the cooperation obligations itself is not a benchmark to show the domestication of cooperation but the number of prescriptions per legal framework on cooperation reflect more authority on domestication of the legal frameworks in transboundary matters. In most cases the policy prescriptions are very poorly reflected (Shah, 2016).

4.2 Community based responses from questionnaires

The effectiveness of the transboundary frameworks were also measured by the community awareness and participation in the frameworks. Out of 35 respondents, the number of males were 71.4% while the females were 28.6%. In order to capture the effectiveness of the EAC transboundary frameworks, the respondents were asked whether they perceived any conservation efforts being carried out by the Kenya Wildlife Service (KWS) and the TANAPA. Majority of the respondents (82.9%) stated that there was no effort from the authorities in terms of conservation.

The respondents' response was that there were no benefits (40%) while 60% stated that there were benefits from 17% positive responses for the previous question. The benefits included income (40.2%), improvement in education (32.7%) and poverty reduction (41.7%)as stated by the respondents shown in Figure 2.

Figure 4: Benefits to the communities in the SME
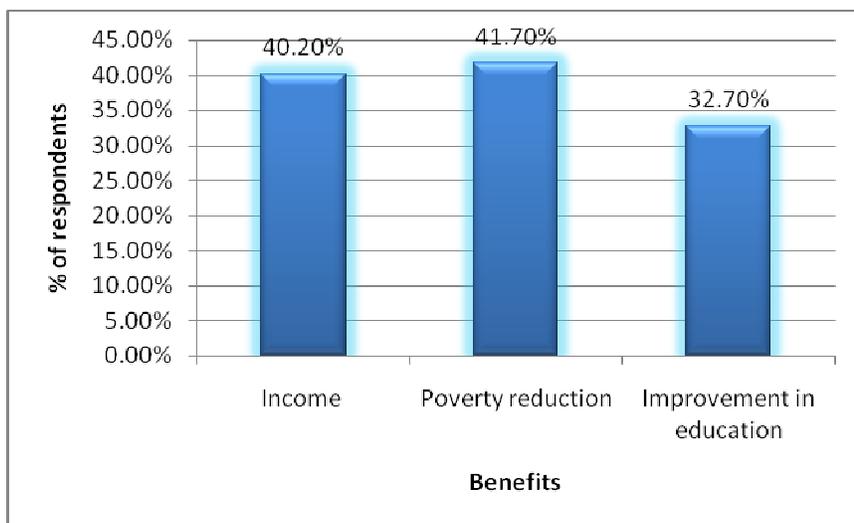
For threats to the SME and whether there were any initiatives taken to overcome such threats, the respondents noted deforestation and decrease in wildlife as the only challenges.

There were no initiatives (70%) taken from the authorities to reduce the threats. The majority of respondents (70.4%) were not involved in decision making and only 28.6% were involved in decision making. Most governments work on the command and control approach which does not involve the locals and hence fails to address environmental problems (Karkkainen, 2004) and at the same time different goals and mandates which hinder transboundary management and cooperation (Wondolleck & Yakee, 2000).

Awareness creation through frequent workshops were reported by 68.6% of the respondents. Lack of education and awarenss may impedes transboundary cooperation (Wikramanayake *et. al*., 2001, Basnet, 2003)or promotes it (Grant and Quinn in 2007); in which t. most people know very little about the transboundary wildlife ecosystems, hence low priority for conservation. In the US side, there is more awareness in the transboundary wildlife ecosystem as te latter generates significant community involvement.

4.3 Discussions and Conclusion

Biodiversity management is threatened by livestock grazing, population increase, human-wildlife conflicts, poaching, tourism and poverty Furthermore as population increases, illegal settlements and encroachment of forest land leading to degradation, deforestation and habitat fragmentation. There are a lot of initiatives taken by both Indian and Nepalese communities and the governments. These include the bottom-up cooperative activities including cross-border visits by managers, scientists, sharing data and continuous workshops on education and awareness.

The results of this study show that all the three legal frameworks namely the Protocol on Environment and Natural Resource Management, the East African Community Transboundary Ecosystems Management Bill and the Climate Change Policy integrated Articles 1, 5, 6a, 8j, 10, 12, 13, 14 and 17. Studies have shown that in most regional blocs like South and Central America (CISDL & WFC, 2011) and SADC (Swiderska, 2002) Article 1 on conservation, sustainable use and equitable sharing of biodiversity is well catered for. This is because biodiversity is the backbone of these countries in terms of food security and foreign exchange and thus, is incorporated in all biodiversity policies. Likewise Article 8j is also well catered for in many regional

blocs. For example in SADC, community involvement in wildlife management through the Communal Area Management Programme is doing well especially where transboundary resources are shared. For example the Kruger National Park in South Africa is shared with Gonarezhou National Park in Zimbabwe (IUCN, 2005). Around these parks, communities have benefited from habitat protection through economic development in terms of tourism, firewood collection, medicinal plants and cutting of thatch grass. It has also helped in reducing poverty (*ibid*).

The findings showed that the CBD Article 7, on cooperation for identifying threats and monitoring status of biodiversity and habitats was very poorly reflected in the legal frameworks. Only the Protocol on Environment and Natural Resource Management took Article 7 into account which explains why the transboundary resources continue to suffer from deforestation. Transboundary management of ecosystems needs to transcend administrative boundaries because the latter never defines natural ecosystems as wildlife is migratory (Young, 1997). The Maa community must be encouraged to use wildlife for economic benefits through tourism. Threats like habitat degradation and loss are very common. This research has also shown deforestation to be a cause of habitat destruction.

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