

# THE CLIMATE CHANGE IMPACT ON LIVE STOCK SECTOR IN ETHIOPIA

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## ABSTRACT

*In 21st century, Climate Change is a serious global environmental concern and its impacts are more severely felt by poor people in Ethiopia who depend heavily on the natural resource base for their livelihoods. Rural poor communities rely greatly for their survival on agriculture and livestock keeping and it is most climate-sensitive economic sectors. Ethiopia has the largest livestock herd in sub-Saharan Africa and directly contributes to the livelihoods of more than 70% of Ethiopians. Historically the country has been prone to extreme weather variability. Mean annual temperature increased by 1.3°C between 1960 and 2006, an average rate of 0.28°C per decade. Since the early 1980s, the country has suffered seven major droughts; five of which have led to famines; in addition to dozens of local droughts. Livestock production depends on natural resources, primarily means pasture and water. Climate change therefore affects livestock production in numerous ways, both directly through impacts on livestock performance, and indirectly through impacts on the environment, society and economy. Thus, study was based upon primary and secondary data sources which intend to identify and map the vulnerable areas of Ethiopia towards the climatic variations and at the same time it will also estimate the population and livestock sector affected from the same. For rural communities losing livestock assets might lead to the collapse into chronic poverty with long-term effects on their livelihoods.*

**Keywords:** *Climate Change, Livestock, Drought, Livelihood etc.*

**“Climate change is a terrible problem, and it absolutely needs to be solved. It deserves to be a huge priority.” - Bill Gates**

## I. INTRODUCTION

Evidence from the Intergovernmental Panel on Climate Change (IPCC, 2007) is now overwhelmingly convincing that climate change is real and poor people are worst affected. The International Fund for Agricultural Development (IFAD) acknowledges climate change as one of the factors affecting rural poverty and as one of the challenges it needs to address (*The IFAD Strategic Framework 2007-2010*).

Livestock is a significant contributor to economic and social development in Ethiopia at the household and national level. On a national level, livestock contributes a significant amount to export earnings in the formal market. Livestock accounts for 15-17% of total GDP and 35-49% of agricultural GDP. Livestock directly contributes to the livelihoods of more than 70% of Ethiopians. Ethiopia has the largest livestock herd in sub-

Saharan Africa, with an estimated cattle population of 49m, sheep population of 25m, and goat population of nearly 22m. Thus, Livestock play an important role in Ethiopian economy and the adverse impact of climate change directly and indirectly affected the local people.

## II. OBJECTIVES AND METHODOLOGY

There are some aims and objectives of my paper such as: *First and foremost*, the study will try to assess climate change phenomena and its impact on the livestock sector in Ethiopia. *Secondly*, understand the perceptions of "climate change" in different pastoral communities in arid and semi-arid areas of Ethiopia. *Last but not the least*, the study will review the response of administrative machinery towards the grim future of several areas of Ethiopia and also it will make an effort to suggest appropriate measures for the looming climate change scenario.

The study will be based upon primary and secondary data sources. Primary data include field visit, survey and personal interview or observation and Secondary data contain published and unpublished reports, documents from various international organization, government, semi government, newspaper, private sources etc.

## III. CLIMATE CHANGE IN ETHIOPIA

Ethiopia lies within the tropics but the wide range of altitude produces significant variation in temperature and rainfall conditions. Ethiopia's climate is typically tropical in the south-eastern part and north-eastern lowland regions, but much cooler in the large central highland regions of the country. Mean annual temperature lies between 15-20°C in these high altitude regions, at the same time as 25-30°C in the lowland regions.

Historically the country has been prone to extreme weather variability. Mean annual temperature increased by 1.3°C between 1960 and 2006, an average rate of 0.28°C per decade. The increase in temperature has been most rapid for the period of July-September, at a rate of 0.32°C per decade. Mean annual temperature is projected to increase by 1.1 to 3.1°C by the 2060s, and 1.5 to 5.1°C by the 2090s. Rainfall is highly erratic, most rain falls with high intensity, and there is a high degree of variability in both time and space. Major floods also occurred in different parts of the country in 1988, 1993, 1994, 1995, 1996, and 2006. Since the early 1980s, the country has suffered seven major droughts; five of which have led to famines; in addition to dozens of local droughts. Droughts the greatest and most recurring climate hazard in Ethiopia, particularly for pastoral and agro-pastoral communities that inhabit drought-prone areas. So its geographical location and topography in combination with low adaptive capacity entail a high vulnerability to the impacts of climate change.

## IV. CLIMATE CHANGE IMPACT ON LIVESTOCK SECTOR

Climate change is expected to have adverse ecological, social and economic impacts. Quantitative climate change impact assessments made so far on various socio-economic sectors are limited in the country. However, effort was made to compile information on climate change impacts from various sources such as the Initial National Communications of Ethiopia to the United Nation Framework Convention on Climate Change (UNFCCC), the IPCC reports and other sources. Impact and vulnerability assessments in priority sectors were

undertaken as part of the process of developing the Initial National Communications of Ethiopia to the UNFCCC.

As the global population grows and demand for animal products increases, the United Nations Food and Agricultural Organization (FAO) projects that the global meat and milk market will double by 2050. A number of developing countries are seeking to expand their livestock sectors to compete in the global agricultural economy. Ethiopia, home to Africa's largest livestock population and the continent's top livestock exporter (tenth largest livestock producer globally) is poised to join the race.

Livestock production depends on natural resources, which in much of Ethiopia, primarily means pasture and water. Climate change therefore affects livestock production in myriad ways, both directly through impacts on livestock performance, and indirectly through impacts on the environment, society and economy. Impacts will be experienced on forage yield, livestock productivity, ecological processes and farm-level profitability, possibly leading to modification of regional and national food production and incomes. The impact of climate change on livestock production in Africa is also greatly influenced by the vulnerability of Ethiopian livestock keepers. Therefore, understanding lower order impacts is crucial to anticipate and predict higher order effects. In pastoral and agro pastoral systems; livestock is a key asset for poor people, fulfilling multiple economic, social and risk management functions. The impact of climate change is expected to heighten the vulnerability of livestock systems and reinforce existing factors that are affecting livestock production systems, such as rapid population and economic growth, rising demand for food (including livestock) and products, conflict over scarce resources (land tenure, water, biofuels, etc.). For rural communities, losing livestock assets could trigger a collapse into chronic poverty and have a lasting effect on livelihoods.

The direct effects of climate change will include, for example, higher temperatures and changing rainfall patterns, which could translate into the increased spread of existing vector-borne diseases and macro parasites, accompanied by the emergence and circulation of new diseases. In some areas, climate change could also generate new transmission models. A quarter-century after a debilitating famine shocked the world and claimed the lives of a million people, providing enough food for its entire people remains a huge challenge for Ethiopia. And the spectre of famine has not been consigned to history. In 2008, Ethiopia faced the prospect of another famine, after seasonal rains failed two years in a row (a phenomenon attributed to climate change). Thousands of livestock died in the ensuing drought; widespread deaths among the human population were staved off by an influx of emergency food aid.

Small-scale pastoral farmers migrate through the drought prone arid and semi-arid regions of eastern, western and southern Ethiopia, tending cattle, sheep, goats and camels. Farmers in the lush highland areas tend 75 % of the country's livestock in crop-livestock systems, using the animals for draught power, transportation, sources of milk, nutrition in times of drought, and manure for fertilizer and fuel.

### **Heat Stress and Livestock**

Livestock is a much better shield than crops against extreme weather events such as heat and drought, but it is not certain that elevated mean temperatures and increased frequency of extreme heat stress of the coming decades are within the range that can be tolerated by existing genotypes of livestock in Africa as well as Ethiopia. High temperatures reduce feed intake and thus milk production and in the tropics lead to energy deficits and decreased cow fertility, fitness and longevity.

## **Climate Change and Animal Disease**

Climate warming has already occurred in recent decades. If diseases, including animal diseases, are sensitive to such warming, then we should already have witnessed dramatic changes to certain infections. The standard for linking disease change to climate change has been set: there must be change in both at the same time, in the same place, and in the 'right' direction (Rogers and Randolph, 2003). To date, evidence of this nature is remarkably scarce, but it is beginning to appear. However, due to a number of diseases affecting domestic animals, this resource is not reaching its full potential. Typical diseases in this respect are foot-and-mouth disease (FMD), African horse sickness (AHS), lumpy skin disease (LSD) and camel pox.

## **Climate Change and Livestock Production**

Livestock and climate change have a close relationship. The spatial distribution and availability of pasture as well as water are vastly reliant on the pattern and availability of precipitation. Changes in the patterns of precipitation and ranges of temperature affect feed availability, grazing ranges, feed quality, weed, pest and disease incidence. Thus, changes in different climatic factors like temperature, precipitation and the frequency and severity of extreme events like droughts, flood directly affected livestock yields. Livestock can be affected in two ways by climate change: the quality and amount of forage from grasslands may be affected and there may be direct effects on livestock due to higher temperatures.

The harsh effect of climate change is expected to have maximum impact on vulnerable pastoral groups engaged in extensive livestock production systems in dry-areas in Ethiopia. Climate change and their variability in Ethiopia pose particular risks to poor farmers and pastoralists who have an immediate daily dependence on climate sensitive livelihoods and natural resources. In addition to the physiological effects of higher temperatures on individual animals, loss of animals as a result of droughts and floods, or disease epidemics related to climate change may consequently increase.

Indirect effects may be fingered through ecosystem changes that alter the distribution of animal diseases or the supply of feed. All pastoral regions in Ethiopia are highly prone to the adverse impacts of climate change, while the problem is more prevalent in the North Eastern lowlands of the country. The afar region is home to pastoral and agro-pastoral people who largely depend on livestock production for their livelihood but due to climate variability the people exposing to the risks of several climate related disasters. The four major effects of climate change on livestock production in Borana pastoralists include feed shortage, water shortage, reduced productivity, and decreased mature weight and/or longer time to reach mature weight. Climate change will have far-reaching consequences for dairy and meat production, especially in vulnerable parts of the world where it is vital for nutrition and livelihoods (UNFCCC, 2011).

Additional study ((UNECA, 2011) indicated that the decline in the number of livestock species namely cattle, goats, sheep and donkey kept by pastoralists of Moyale and Dillo areas was remarkable in which most of the animals were reported to have died during severe droughts, which occurred in 2005 and 2008. Livestock productivity is affected most severely under the Ethiopia dry scenario, in which the ratio between future and baseline productivity falls to a low value of approximately 0.70 in the moisture reliable humid lowland zone, or a 30 percent decline in productivity. Under each scenario, there is a downward trend in productivity over the 2001 to 2050 period.

The repercussions of climate change on the livestock sector will be manifest in changes in the quality and quantity of vegetation, availability of fodder and water and an increase in climate-related diseases (impacts are summarized in Table elaborated on in the following section).

**Table: Effects of climate change on Livestock (Calvosa et al. 2010)**

Water	✓ Change in quantity and timing of precipitation
Feed	✓ Land use and systems changes ✓ Changes in the primary productivity of crops, forage and rangeland ✓ Changes in species composition ✓ Quality of plant material
Biodiversity (genetics and breeding)	✓ Loss of genetic and cultural diversity – (both livestock and crops) ✓ Change in ecosystem function and resilience
Livestock (and human) health	✓ Change in pattern and range of vector-borne disease and helminth infections ✓ Loss of disease resistant livestock breeds ✓ Change in pattern of human disease, including malaria, Schistosomiasis, and filariasis ✓ Increase in heat-related mortality and morbidity

*Source: [data.iucn.org/dbtw-wpd/edocs/2010-103](http://data.iucn.org/dbtw-wpd/edocs/2010-103)*

## V. CONCLUSION AND WAY FORWARD

Thus climate change is major concern in Ethiopia and their livestock sector. Climatic Variability directly or indirectly affects livestock as well as livelihood of Ethiopian people and economy. Adaptive measures and policies can only provide a successful response if they are adopted in suitable situations. A variety of challenges need to be considered including a common framework on climate change and a set of Sustainable Development Goals in a single year was truly a monumental achievement. Hence, adaptive measures are taken in well-timed; both as farmer's level as well as policy maker's level is important for achieving the sustainable future goal.

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