

Impacts of Drought on the Livelihood of Pastoral Nomadic Tribes

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Abstract

Pastoral livelihoods are supported by livestock grazing on drylands, but it is subject to a variety of variations, including shocks like acute droughts. Drought events are cited by herders as a justification for abandoning their transhumance practises. The aim of this study is to determine the importance of drought as a driving force for livelihood security losses that lead to a specific systemic change, such as a household leaving transhumant pastoralism. There is a connection between severe drought and other global change processes like societal change and land use changes that affect pastoral systems' ability to sustain a stable livelihood. Furthermore, research examine how the relevance of shocks as a driving force of systemic changes in linked human-nature-systems might be effectively studied based on these findings. According to the findings, extreme drought episodes are becoming more common and have a substantial impact on pastoral livelihoods. Households adopt a range of tactics to adjust to or cope with climate irregularities. Diversification of income sources; cattle movement to monitor feed and water availability; and expansion of herd structure to profit from the diverse drought and disease tolerance are among the long-term adaptation tactics adopted.

Keywords: *pastoralism, drought, Impacts of drought, Nomadic Pastoralism in India, Climate change Pastoralism.*

1. Introduction

Shepherds herd animals across vast swaths of land according to the seasons and the fluctuating availability of water and pasture in a pastoral lifestyle. It's the name of an artistic, literary, and musical genre that depicts such living in a romanticised way, mainly for urban audiences. This paper argues that pastoralist violence is linked to competition for resources, which is rising temperatures, as well as other factors like interstate and intercommunal tensions and political instability. The long-term viability of pastoralism is being debated at both the national and international levels. The scientific community is paying attention to the issues to create information, share experiences, and best practises that could lead to solutions for pastoralism's survival and that of the millions of people who rely on it for a living.

Households in pastoral communities have been categorised into four categories based on their wealth: wealthy, middle-class, poor, and destitute. According to important informants in the Dhasi community, 13 percent of homes are wealthy, 50 percent are middle-class, 27 percent are poor, and ten percent are penniless. The poverty level in the pastoral area is difficult to overestimate. In certain localities, poor households account for as much as 60% of the population. Minority and majority notions, which derive authority from access to resources, have little effect on wealth class differentiations. However, the Watta, a minority group, is typically impoverished and reliant on hunting for survival. They are also helped by contributions made in response to certain events. Watta is a small group that, due to its size, feels subordinate to the rest of Borana society. The Dawe people, a minority inside the Bale pastoral area, are similarly separated from the rest of civilization and have few social ties with them. Another minority tribe that makes a career as blacksmiths is the Tumtuu, who use traditional tools to build implements for use in the community. They are a little yet significant contributor to the local economy. This community has a very small number of individuals, and they are typically impoverished. Female-headed families rely on the support of their husband's clan or the boy kid to maintain their survival from a gender standpoint. Women frequently engage in handcrafting for their own personal enjoyment. While the agro pastoral community of Haralo has a wide range of wealth classes, the proportion of households in the medium wealth category, which comprises the majority of the pastoral community's households, is rather high, accounting for the majority of the pastoral community's households. When it comes to agro pastoral settlements, the poor make up most of their population. This clearly shows that people who work in agriculture are far poorer than those who are simply pastoralists.

The household's wealth status is revealed by its sources of revenue and essential jobs, which affect the household's manner of life. The most valuable source of income is livestock production. The number of cattle (or camels), goats (or sheep), or sheep can be used to determine a community's wealth status (or goats and sheep). Furthermore, the nature of a job, such as commerce, and the money earned from it are both markers of a person's social status. Even if they have a disproportionately large quantity of capital to engage in the business of buying and selling animals for profit, the wealthy devote just a modest amount of time to trading. On the other hand, the poor and needy have a limited quantity of capital with which to manage a business. As a result, rather than trading directly, they prefer to broker. In the study community, paid labour participation is a predictor of poverty. In the Gololcha society, wealth classes are reflected by wealth indicators. In comparison to other areas, in pastoral areas, the percentage of female-headed families is unusually high. For example, in the Gololcha village, the proportion of female-headed households reaches almost 30% of the total. In response There was a backlash to the claim that

female-headed homes aren't a requirement for wealth ranking because their status would be the same as their husbands' if they had a child. Many female-headed homes, on the other hand, are underprivileged or disadvantaged in some way.

For tribal nations, water has a strong cultural value and is frequently employed in ceremonies. A scarcity of water has an impact on the survival of flora and animals, which have added cultural and medicinal value to tribal nations. During a drought, for example, wild rice becomes more difficult to harvest and there are fewer berries accessible. Warmer weather can aid the spread of invasive species (emerald ash borers, for example, are decimating ash trees, which are essential for basket manufacturing).

Farming is a common activity for tribal cultures, and they frequently lease their property to non-tribal farmers. Drought lowers the production of these lands, resulting in major financial losses for tribal groups. Drought lowers the availability of plants and animals for hunting and gathering, weakening indigenous communities' economic resiliency.

Drought is sometimes accompanied by extreme heat, which puts a strain on tribal inhabitants, particularly elders, children, and those without access to air conditioning. During drought, existing economic difficulties can worsen tribal community members' emotional and physical stress.

2. Major Challenges to the Pastoral Livelihood

- i. **Increase in Population** As opposed to ten years ago, there has been an increase in the number of people in pastoral areas. Population growth in the Borana region has been attributed to the Gari-Somali and Borana border dispute. A major portion of their rangeland and traditional water wells were confiscated by the Geri-Somali, according to the Borana. As a result, some pastoral families relocated to nearby Oromo villages, producing congestion in those areas. Oddly, Ollas have increased in numbers from 10 to 58, which indicates that there is an increase in population.
- ii. **Cross Border Trade Restriction** Unofficial cross-border trading is also outlawed, which has a significant financial impact on pastoral communities. The pastoral community's income is impacted by the low price of animals on the domestic market because there are few possibilities for job other than livestock husbandry.
- iii. **Decline in Mutual Support** Another negative tendency in Borana is the decline in buusas gonofa, or clan members assisting one another. Community support networks are divided into two categories. The first can be triggered by just being aware of a person's or a family member's concerns and helping. The wealthy may donate one or more animals to the poor in this case. The authority to use milk from a lactating animal without having to release the cow. When a member of the community requests social aid from his clan group, the second type of support happens. Clan elders traditionally assess the applicant's situation before deciding. When a person's livestock is lost due to circumstances beyond his control, the clan chiefs may choose to give cattle from one of the clan members' herds. Due to an increase in the number of disadvantaged people seeking aid, this practise is disappearing. There's a chance the clan members won't be able to keep up with the growing demand. As a result, community members place a greater emphasis on the first type of social encouragement. However, some clan members have begun to reject clan chiefs' directives and appeal to Kebele social tribunals in recent years, resulting in a reduction in such beneficial practises. Clan elders' judgments were overturned by the kebele social tribunals, damaging the mutual support system.
- iv. **Decline in Range Productivity** The most notable negative change, according to community members, is a decline in rangeland output. Pasture yield has decreased over time because of increased bush encroachment, termite infestation, lower rainfall, and farmland development. As a result, the Fora was able to continue. Rangeland productivity is clearly impacted by cattle productivity. It has a direct impact on household food security. Since women and girls control milk or other animal products, reduced rangeland production has an impact on gender-based empowerment.
- v. **Decline in Livestock Productivity** Livestock productivity, on the other hand, has declined in pastoral areas during the last decade due to frequent drought. Milk and meat output and productivity have dropped because of the loss of rangeland productivity. Unwanted bushes encroached on pastureland, causing rangeland output to decline. The drought in 1999/2000 had a significant impact on pastoralists' livelihoods. A big number of animals died because of the accident. Some households, for example, lost tens of thousands of sheep because of the drought. According to the study discussion, some persons committed suicide because of the incident. Household income fell because of the cattle loss, and they experienced food insecurity. As a result, the poorest families began cutting down trees as a means of income, causing environmental damage.
- vi. **Decline in Food Security** Various communities and social groups reacted differently to changes in food security and household income. According to the Dire woreda research, 79% of respondents said their revenue has declined in the previous ten years. Income diversification, which is believed as a positive development, is also a reaction to the income decline. There is, however, variability among community members as well as

across communities. The Haralo community asserts that as the price of animals and cattle products increased, so did the nominal income of the households. Over the previous ten years, rangeland productivity has dropped, and therefore, milk yield has decreased. In the Dhasi village, for example, daily milk yield per cow has plummeted from roughly four litres to 0.75 litres per cow. Many pastoral communities live without milk during the dry seasons, and some cows don't even provide enough milk for calves, indicating a significant decline in milk production. A rise in the incidence of mastitis is also contributing to lower milk supply. Pastoral communities have also been forced to change their feeding habits because of this. The communities now rely on grain consumption and black tea consumption, as opposed to ten years ago. Due to a drop in animal productivity and agricultural yield, the community's food security has deteriorated. Living prices, on the other hand, have climbed considerably in the last ten years. In ten years, it is expected that Birr 500 will be worth Birr 5,000. This implies that wasting two cattle before 10 years would now entail the investment of six cattle. The community today views itself to be less food secure than it was 10 years ago because of growing living costs, increased population, and reduced income.

- vii. **Decline of Pure Borana Breed** There is also a connection between eating and physiological development in communities. So, the ribs of animals that eat well stretch outwards and form a wider bow, while poor-fed animals have straight ribs that do not bend nearly as much. The conversation reveals that the earlier shape is 10 years older than the current incident, while the latter is about the current occurrence. Pastoralists are also aware that livestock are physically smaller today than they were previously. After the Boran breeds were affected by drought, pastoralists introduced smaller, more tolerant breeds from neighbouring tribes, resulting in shifts in genetic resources. On the other side, it could be the result of declining rangeland productivity, which reduces the land's carrying capacity.
- viii. **Decline in Crop Productivity** Agricultural productivity has fallen during the last ten years, despite an increase in the area under farming. Corn output, for example, Due to unpredictable and insufficient rainfall, the amount of water per ha has decreased from roughly 20 qt to 7 qt in the last 10 years. This has resulted in a reduction in revenue from livestock and grain production during the last decade. This led to increased food insecurity at home.
- ix. **Increased Consumption of Items Having Addictive Nature** Changes in the intake of less nutritious, more costly, and addictive foods have also occurred. In the community, the number of male and female who ingest khat and smoke or use tobacco has risen significantly. It appears to be a common social practise. Furthermore, both in the village and in the city, pastoral groups are increasingly consuming beverages. The rising use of these addictive substances is considered as a negative trend, notwithstanding reduced household income and higher food poverty.
- x. **Other Negative Changes** The following issues have not improved, even though the situation is not getting any worse. The fact that women's workloads remain high is welcomed by pastoral communities. Women in all the communities studied must either go a long distance to purchase a flourmill or grind by hand. This deprives women of time that could be spent on more important things. In addition, women have had little control over resources and perks. Traditional customs that influence women's rights are not shifting as quickly as one might want. As a result, women are more susceptible to HIV/AIDS than men. Furthermore, most pastoral communities are unaware of the various applications for cattle wealth. Alternative business-based uses of such wealth could help the pastoral community diversify its livelihood portfolio, establish risk management mechanisms, & match livestock numbers to rangeland and water resource carrying capacity. In the pastoral villages' surrounds, there has been a paucity of livestock and public health services for the past ten years. There are no cattle treatments or therapies available in general. Negatives include a lack of adequate agriculture, livestock, and natural resource management technology, pastoral community development professionals, as well as a lack of sufficient training.

3. Nomadic community

Pastoral nomads, like many pastoral communities around the world, have faced significant socio-political and environmental upheaval in recent decades. On the one hand, they have been subjected to a wide range of socioeconomic & political pressures, involving population growth, government policies and interventions, land use changes, and development efforts. On the other hand, they were exposed to climate change and its consequences for their climate, habitat, and way of life. However, no comprehensive research of the effect of climate change and its interactions with socio-political and economic changes on pastoral nomads has yet been done. Richard Tappers' research in 1965, for example, was the most recent comprehensive study of the Shahsevan's socioeconomic and political conditions, when climate change and many current socioeconomic elements did not pose a severe threat to their migratory economy and way of life. How they are coping with and managing the effects of current political, economic, and natural-environmental changes by utilising their capacities and resources. Traditional health professionals are working in more than a million villages across India. Among them are village bone setters, herbal medicine specialists in jaundice, paralysis, children's illnesses, eye

issues, poison healing, and midwives. Zoo therapy is the use of therapies obtained or ultimately derived from animals in the treatment of human illnesses.

Nomadic groups are ecologically connected with one another. To thrive, many species depend on a diverse range of natural resources, and to do so, they build out intricate ecological niches for themselves. Changes in the environment and ecology have a substantial impact on their ability to earn a living and provide for their families. - Domesticated animals contribute significantly to the economy of these countries. A wide variety of animals including horses, camels, donkeys, bucking broncos, sheep, cows, monkeys, dogs, & bears are reared, trained, and utilised by nomads. They also trap, hunt, sell, and use a variety of wild wildlife, including foxes, deer, boars, lizards, snakes, mongooses, and hares, among other animals. Also, they have a deep link with the surrounding flora. A wide range of vegetal products are obtained, processed, and sold by this company. They don't have a permanent address because they are constantly on the move. Even though many of them have recently begun to settle down, they have always been in possession of no land rights or house titles. Because of this, individuals are denied access not only to social programmes but also to the rights and benefits that come with citizenship.

The cultural and social mosaic of nomadic tribes is equally interesting as that of scheduled tribes, even though they have not been examined as thoroughly as scheduled tribes. This isn't to argue that there hasn't been any research done in this area. Although some groups, such as the Dhanagars and the Banjaras, have received more anthropological study than others, the mainstream of anthropology has mostly disregarded them. Even in cases when research has been conducted, it has been done predominantly from the standpoint of social and cultural anthropology. There is a wealth of information about indigenous communities held by the British officers who prepared the gazetteers, but it needs to be updated and corrected. There is a compelling need to heal the damage done by colonial anthropology to go forward. When it came to DNTs, colonial administrators made the common mistake of conflating castes and jobs, laying the groundwork for repressive legislation. Economic anthropology is the anthropological sub-discipline that is relevant in this scenario. This was due to the tribes' positive ties to village life, notwithstanding their itinerancy. They weren't affiliated with the 'jajmani' or 'balutedari' systems, but they provided services & goods that the artisans couldn't. Among the most bizarre goods on show were beads, trinkets, fragrances, perfumes, swords, and medications. These intergenerational trading interactions are worth investigating further. Another issue that warrants scientific inquiry is the loss of these jobs and their replacement with other Nomads have taken up jobs that are comparable to or identical to regular jobs, but they've also ventured into uncharted area. This is a promising subject for students of economic anthropology, both philosophically and methodologically. The value of anthropology is self-evident, but the value of archaeology should not be overlooked. Ethno-archaeology has become increasingly popular in recent years. Its conclusions may not be directly useful to planners, practitioners, and activists since they are buried in technicalities, yet certain insights could be quite useful. Beads, stones, and trinkets discovered in neolithic sites across the Deccan, for example, could have originated in northern India (Dhavalikar 1985). Similar types of beads are still traded across the Deccan today by nomadic communities like the Vaidus. Further research into these types of connections would be valuable from both an academic & a practical standpoint. The genomic mapping of nomadic communities is another interesting field of research. To discover physical affinities among different tribes, physical anthropologists used to take detailed physical measurements and analyse blood samples. No nomadic people have been included in these programmes, except for a few famous groups such as the Dhanagars. Physical anthropology techniques from the past may be outdated now, but these civilizations must be considered as part of the Human Genome Project or other comparable endeavours. They would undoubtedly fill up some of India's anthropological deficiencies.

As a result, most nomadic groups had to rely on begging as a secondary source of income. Their eating habits were almost completely unrestricted. For the same reason, they committed petty thefts and thefts. Most of the thefts, however, were limited to a few ears of corn, fruit, harvested grain, and other comparable items. The nomadic women were very skilled and quick at removing little trinkets and items from residences (details can be found in Atre 1989 and Kennedy 1908). Communities such as Uchale, Ghantichor, and Makadwale taught their children how to steal and pickpocket, as well as how to resist tremendous physical challenges and police brutality Gaikwad (1987). To gain access to and supply natural resources, nomads had to compete with sedentary populations, and they were always at a disadvantage. They did, however, carve out sophisticated ecological niches and pursue a methodical economic and ecological organisation, as Gadgil and Guha point out. Even though nomadic people engaged in a variety of economic activities, their livelihoods are now gravely threatened by modern development processes. Development has been characterised by urbanisation, mechanisation, commercialisation, large-scale infrastructure building, growth in transport and communications, increasing social and spatial mobility, and a shift from an agrarian to an industrial economy. As a result, most nomadic groups have begun to lose their livelihoods and have been forced to seek alternative employment. Pastoralists and hunter-gatherers' livelihoods are most impacted since grazing grounds and woods are no longer free access regimes. The causes for the influence on their livelihoods are as follows:

- a) total depletion of natural resources, both qualitatively and quantitatively
- b) the establishment of competing use patterns between different consumers and sectors.

- c) Privatization and commercialization of resources are on the rise.
- d) Access and management over natural resources are restricted.

The usual reaction of these communities to the changing circumstances has been to seek employment in a related field or to rely on wage labour. Pastoral communities like the Dangers and Banjaras have settled down to farming since they are numerically stronger. However, as Malhotra and Gadgil point out, traditionally nomadic pastoralists have not secured rights over property, and as a result, most of them are now forced to farm small plots of marginal land, resulting in a significant reduction in the quality of life. The same thing is happening with the Berads and Ramos, both of whom come from a farming family. Only individuals with large and high-quality land holdings can make a decent living. Gopals, Dangats, Nandiwallas, and Garudis are among the pastoralists who have switched to dairy farming. The Kanjarbhats have chosen to keep distilling booze and have started obtaining licences to sell country liquor. Petty civil contractors have emerged among the Vaddar, Beldar, and Patharwat groups' industrious members. In central Maharashtra, the Vaidus have started making tin boxes and other things.

Gender discrimination is one of the most intriguing and complex aspects of challenges impacting nomadic tribes. The patriarchal nature of nomadic tribes enforces old patriarchal structures and organisations. Nomadic women, like other disadvantaged portions of society, work productively. Because the house does not exist, they are not bound by its four walls. They are not only concerned in the processing and manufacture of goods, but also in the selling and marketing of those goods. They are bold, fearless, and expressive since they must interact with the outside world daily. The patriarchal structures, on the other hand, continue to brutally oppress nomadic women. Nomadic women are Sabalas (powerful) on the outside but Abalas (weak) in front of their spouses, according to activists. Patriarchy is stricter among nomads than in sedentary, farming cultures. Though the external manifestations vary per community, the fundamental element is that women are viewed as a piece of property. Child marriage is a typical occurrence. Women are sold, exchanged, mortgaged, and even leased out in some nomadic societies, such as the Pardhis or Vaidus. Dej (dowry) is paid to the bride in most cultures, and as a result, parents typically try to extract as much money as possible. There are also strict standards for women's conduct and behaviour. The penalty imposed on women when these norms are broken is the most distressing component. Exogamous marriage, infidelity, and pregnancy before marriage are all considered major offences.

4. Drought

Nomads have stricter patriarchy than sedentary farming societies. The underlying factor is that females are considered as a piece of assets, while the external manifestations vary per group. A common occurrence is the marriage of a child. In some nomadic civilizations, such as the Pardhis & Vaidus, females are sold, swapped, mortgaged, and even leased out. In most cultures, the bride receives dej (dowry), and as a result, parents want to take as much money as possible. Women's conduct and behaviour are also held to high standards. The most disturbing feature is the penalty put on women who violate these restrictions. Exogamous marriage, infidelity, and pregnancy prior to marriage are all seen as serious offences. The essential need is for governments, NGOs, and international donors to be educated on the realities of development in a semi-arid, highly changeable environment. Although the notion that pastoralists' systematic abuse of the land contributed to drought & large-scale habitat destruction in the Sahel has been discredited in scientific literature (e.g., Mace, 1995; Leach & Fairhead, 1996a, b), it persists as a popular myth, and is even taught in US undergraduate geography courses. The scientific community increasingly regards apparent dryness in the Sahel as a transient response to reduced rainfall (Tucker et al., 1991, 1994). Numerous studies have demonstrated that this ground surface "degradation" is reversible, with vegetation systems returning once rain returns. Naturally, due to the naturally dynamic conditions of the area in this semiarid region, "drought" in the form of wind depositional, as well as dunes encroaching on communities, endures in some regions.

Droughts and floods devastate farm yields and the national harvest, reducing household & national food supply as well as farming money generated from crop sales. Depending on how dependent a family or country is on agribusiness for food and revenue, poor harvests put food security and livelihoods at risk at all levels, from the single to the nation. The direct effects of droughts and floods are less severe in households and economies that have varied income sources that are not particularly dependent on farming (i.e., vulnerability is reduced to the extent that complementary food & income sources are non-covariate). According to the literature review, there have been various studies on the socioeconomic and political effects of floods on households in a variety of countries. Few studies have been done, however, affecting internally displaced peoples' livelihoods and food security, using appropriate empirical models, the current study examines the impact of floods on IDP households' food security and livelihood, as well as other socio-economic variables.

5. Literature review

Climate change has several effects on countries' economies and food security. Rising temperatures and shifting rainfall patterns have an impact on agricultural production, both for rain-fed and irrigated crops. Uncontrolled sea level rise leads to the loss of landscape, land, and infrastructure. Floods are the most prevalent natural disaster in India. Floods exaggerated an average of 33 million people among 1953 and 2000. "Entitlement Approach" by Sen

is used by Devereux (2007a) to analyse the recent food crisis in Malawi, and the author proposes that policy measures can compensate for the flaws of production against labour versus trade versus transfers versus other types of entitlements. Droughts that occur more frequently may stymie hydropower production, whereas floods that occur more frequently may drastically boost public infrastructure investment requirements.

Most studies on nomadic people have taken place in areas where nomadic tribes make up a high enough percentage of the population to be easily identified, and where they have occupied extensive swaths of land. In Africa, the Middle East, and central Asia. Pakistan and India are the two countries in South Asia where they are concentrated. They are mostly found in Kashmir, Himachal Pradesh, and Uttar Pradesh in India. Planners and researchers have mostly ignored these migratory tribes (George, 1985). As previously stated, the state bears no responsibility for their development and regards them as "second citizens." As a result, they are excluded from government-sponsored development programmes. It is not unusual to discover that nomadic settlements are not counted in censuses, that no literacy or education programmes exist, and that there is no concept of a mobile school's system. These communities have likewise been underserved by the scholars. Other than the Gaddis in Himachal Pradesh, there has been little research on other nomadic pastoral groups.

Drought is among the most severe, but little understood climatic phenomena due to its slow start and compounding impacts over time. Drought is typically characterised as a prolonged period of several years with less precipitation than the annual average, leading to severe water scarcity. Definitions vary based on the situation (Wilhite et., al 2000; Manabe & Whetherald 2002). WMO (1975) classifies drought as meteorological (a prolonged lack of precipitation over a region), hydrological (an insufficient supply of surface & subsurface water resources) agricultural (declining soil moisture, agricultural failure owing to a shortage of surface water supplies) or socioeconomic (a protracted period of no economic activity) (failure of water resources systems to meet demands, which impact human activities both directly & indirectly). It is described as a scenario in which rainfall is less than 75% of the climate normal, according to the Kenya Meteorological Service (2010) (that is, a rainfall deficiency of at least 25 percent). However, because it does not provide any information on the temporal distribution of rainfall, it is very basic (Wilhite and Glantz 1985).

A better way to think about ideal rainfall would be to define it as enough rain in terms of both amount and distribution throughout time and place to meet the needs of specific livelihoods in each area. Drought has worsened in the Horn of Africa region over the last decade, with rainfall totals in certain places being at least 50–75 percent below average, insufficient to support economic and pasture development and consequently livelihood security in many people (Nicholson 2014). Natural calamities, such as protracted droughts, are one cause of the failure in the pastoral communities' resource use balance. In this situation, the number of animals is reduced either by selling them for food or by them dying because of the drought. Drought is the most harmful effect of climate change, decimating lives and impeding socioeconomic development in Kenya's rangelands. Droughts will become more frequent and intense because of climate change, according to several research. After years of prolonged dryness and high temperatures, pastures have completely dried up, resulting in water scarcity, and forcing pastoralists to evacuate their houses in search for water and food for their animals. There is a connection among climate change and conflict because of the scarcity and competition of natural resources.

This isn't a one-way street: climate change is one of multiple factors that contribute to natural resource scarcity, and natural resource scarcity is one of several factors that contribute to conflict in the first place. Climate change is a "threat multiplier," according to Campbell/Dalrymple/Craig (2009), meaning that it will enhance the effects of other factors that lead to war. Drought causes catastrophic events that impair people's adaptive capacity, causing them to suffer. Droughts will grow more common, more severe, and endure longer because of climate change. Thousands of ecological migrants are fleeing dryness, which is causing animals to go hungry and thirsty due to a lack of grass and water (IRIN 2009). As per the United Nations Development Programme, conflicts over water and pasture have escalated in drought-stricken pastoralist communities in northern Kenya. Approximately 150,000 people in parts of north-eastern Kenya already rely on food aid (Mung'ou 2009). Conflict has erupted between pastoralists from several tribes in Kenya's northern region, where the drought has been severe, over access to grazing land and water sources. Pastoral communities in Kenya have been victims of the worst drought in the country's history of pastoralism, according to Campbell, Dalrymple, and Craig (2009).

Wilhelmi and colleagues (2002) explain the agro-climatological factors that determine drought vulnerability in agriculture. The relationship between ET, water use efficiency, and crop output was used as a guide to estimate evapotranspiration (ET). Spatial interpolation was used to assign probability values, and geographic information systems were used to categorise them (GIS). In each scenario, the chance of seasonal crop moisture scarcity was classified as low, moderate, high, or extremely high. The findings of this study, which was conducted using Geographic Information Systems, were used to develop Nebraska's agricultural drought vulnerability assessment (GIS). Providing free and secure cattle movement, boosting security, expanding access to education and livestock markets, and creating transport and distribution facilities are the greatest ways to ensure pastoral viability. These actions should be reinforced by low-cost loans, increased extension services, encouraged diversification of

livelihoods and income sources, increased livestock variety, and promoted drought-tolerant species to be most effective.

6. Conclusion

External shocks are examined in depth in our work as a driving force for systemic changes in coupled social ecological systems. Most crucially, research proved that drought was only a danger to livelihood security under limited situations, leading to the abandonment of transhumance. This suggests that focusing on a single sort of shock (in this case, drought) may be overly simplistic in terms of gaining a thorough grasp of the mechanisms driving a systemic shift. This also demonstrates the importance of considering this shock on a systemic level, in conjunction with other relevant components for systemic change. A research of pastoral households' vulnerabilities revealed that there is no universal answer to the question whether livelihood security losses are endogenous or externally driven. There is a complicated interplay between endogenous and exogenous factors that might cause such losses, and the characteristics of the households decide which factor dominates.

The income demands and mobility strategy of a household were examined to see if it was already subject to resource-consumer interactions (endogenous driver) or merely in the event of rainfall variability or drought (exogenous drivers). For transhumant pastoralists, drought and the associated loss of livelihood security are clearly unexpected consequences. Our experience has shown us that there might be a variety of unintended consequences to pastoral vulnerability, such as changes in land use (with implications for e.g., movement patterns) or societal change (with implications for income demands). For this reason, it is necessary to analyse systemic changes from the standpoint of unanticipated side effects.

Drought affects pastoral communities in the form of cattle losses, which has a negative influence on a pastoral household's ability to provide income, subsistence, and other sociocultural products and services. Pastoral households are already taking steps to safeguard their livelihoods as droughts become more common. Most drought adaptation and coping techniques are reactive, focusing on intensifying resource exploitation, which may jeopardise the same livelihoods that they are supposed to support.

There appear to be several possibilities to adapt to long-term drought by means of socio-economic events, political shifts and deteriorating environmental situations. Limited market access, recent changes in property ownership from communal to private tenure following oil discoveries, and insufficient infrastructure are all contributing challenges to achieving a sustainable pastoral production system. Access to competent veterinary services, grazing pasture deterioration, and a lack of knowledge and extension services are all barriers to overcome. As droughts grow more common, this means that pastoral households will have shorter recovery times. If this trend continues, recovery periods for pastoral ecosystems and livelihoods may become shorter, further reducing their resilience. This necessitates the adoption of proactive measures aimed at safeguarding critical assets such as grasslands and animal resources. The best approaches to assure pastoral sustainability in the future are to provide free and secure cattle movement, improve security, expand access to education and livestock markets, and build transportation and communication facilities. These actions should be reinforced by low-cost loans, increased extension services, encouraged diversification of livelihoods and income sources, increased livestock variety, and promoted drought-tolerant species to be most effective.

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