

The devastating impact of floods on livestock farming systems and socio-economic characters of dairy farmers

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Abstract

Floods are among the most destructive natural disasters, severely affecting livestock farming systems and the socio-economic conditions of rural communities. This study examines the impact of floods, focusing on livestock loss, feed scarcity, milk production decline, and infrastructure damage. Flood events lead to significant livestock mortality due to drowning, disease, and lack of timely veterinary care, ultimately reducing herd strength and farmer income. Submergence of fodder cultivation land results in acute feed shortages, further affecting animal health and productivity. Dairy farmers experience a marked decline in milk yield due to stress, malnutrition, and loss of animals. Additionally, floods disrupt human livelihoods, causing displacement, economic losses, and damage to houses and essential infrastructure. The study also highlights social dimensions, including gender vulnerability and community-level disparities in recovery. To mitigate these impacts, strategies such as early warning systems, flood-resilient infrastructure, emergency fodder banks, and improved veterinary services are essential. The findings emphasize the need for integrated disaster management approaches to enhance the resilience of livestock farming systems and safeguard rural livelihoods against future flood events.

Keywords: flood disaster; livestock mortality; fodder scarcity; milk production; socio-economic impact; disaster resilience.

Introduction

Flooding is considered one of the most damaging natural disasters affecting agricultural production systems across the world. It occurs when excess water from rivers, heavy rainfall, or other sources inundates normally dry land areas. In recent years, the occurrence and severity of flood events have increased due to climate variability, deforestation, and improper land-use practices. These disasters have serious consequences for agricultural sustainability, particularly in rural areas where communities rely heavily on livestock and crop production for their livelihoods.

Livestock farming is an essential component of rural economies as it provides food products such as milk, meat, and eggs, while also generating employment and supporting household income. However, livestock production systems are highly sensitive to environmental disturbances. Flood events can disrupt animal management practices, destroy grazing lands, contaminate water sources, and damage farm infrastructure. In addition, floods often lead to outbreaks of infectious diseases among animals due to poor sanitation and overcrowded shelter conditions.

Apart from the direct effects on livestock, floods also create wider socio-economic challenges. Human populations may face displacement, loss of property, and reduced access to food and clean drinking water. Smallholder farmers and economically disadvantaged communities are particularly vulnerable because they lack sufficient resources to recover quickly after disaster events. Therefore, evaluating the effects of floods on livestock production and community welfare is important for developing sustainable disaster management strategies.

Livestock Mortality and Reduction in Herd Size

One of the most immediate consequences of flooding is the loss of livestock. Animals may perish due to drowning,

injuries, starvation, or exposure to contaminated environments. Even animals that survive the initial flood event may later succumb to diseases or nutritional deficiencies resulting from disrupted management conditions.

According to Navarre (2006) [8], livestock affected by natural disasters frequently suffer from health complications when veterinary assistance is delayed. Floodwaters can isolate farms and limit access to veterinary services, medicines, and feed supplies, thereby increasing the vulnerability of animals. Furthermore, prolonged exposure to wet and unhygienic conditions can weaken the immune system of animals and increase the likelihood of infectious diseases.

Large-scale floods in several countries have demonstrated the severity of livestock losses during such disasters. For instance, severe flooding in the Chittagong region of Bangladesh in 2007 [10] resulted in the death of a substantial number of farm animals, causing serious economic losses for rural households (Rashmi, 2007) [10]. Likewise, the major floods that occurred in Pakistan in 2010 affected more than fourteen million livestock animals, many of which died due to fodder shortages, disease outbreaks, and lack of proper shelter (FAO, 2010).

The loss of animals significantly reduces herd size and disrupts the long-term productivity of livestock farms. Rebuilding livestock populations requires substantial financial investment and time, particularly for cattle and buffalo. As a result, farmers often experience prolonged economic hardship following major flood disasters.

Effects on Feed Resources and Fodder Production

Floods can severely affect the availability of feed resources required for maintaining healthy livestock. Agricultural

lands used for fodder cultivation may remain submerged for long periods, resulting in destruction of crops and reduced agricultural productivity. Floodwater deposition may also alter soil structure and fertility, affecting future crop growth. In many flood-prone regions, seasonal flooding causes widespread damage to crop fields. For example, in Bangladesh, agricultural lands are frequently inundated during monsoon seasons, which reduce fodder production and limit the availability of feed for livestock (Rashid and Paul, 1987) ^[11]. Farmers who depend on locally produced fodder crops often struggle to maintain adequate nutrition for their animals during these periods.

Similar findings have been reported in Ethiopia, where severe flooding caused major disruptions in agricultural activities. Haile *et al.* (2013) ^[7] observed that nearly 85% of households in the affected regions experienced significant losses in crop cultivation due to flood damage. This situation created severe shortages of feed resources for livestock, forcing farmers to sell animals prematurely or reduce herd size.

Another challenge associated with floods is the destruction of stored feed materials such as hay, silage, and concentrate feed. Floodwaters may contaminate these feed resources with mud, pathogens, and harmful microorganisms, making them unsafe for animal consumption. Consequently, livestock may suffer from nutritional deficiencies that negatively affect growth, reproduction, and productivity.

Impact on Milk Production

Flood disasters can also negatively influence dairy production. Dairy animals require balanced nutrition, comfortable housing conditions, and proper health care in order to maintain optimal milk yield. However, these conditions are often disrupted during flood events. Flood-related stress, inadequate feeding, and poor sanitation can significantly reduce milk production in dairy animals. Stress alters hormonal balance and metabolic processes, which may impair lactation performance. Furthermore, displacement of animals and overcrowding in temporary shelters can increase the spread of diseases that further reduce milk yield.

The devastating floods that occurred in Kerala, India in 2018 had a significant impact on the dairy sector. Many dairy farmers lost their animals, while others experienced shortages of fodder and feed resources. As a result, the state witnessed a considerable decline in milk procurement during the disaster period (Vedanthadesikan, 2019) ^[14].

In addition to reduced milk quantity, milk quality may also deteriorate during flood situations. Contaminated water supplies and poor hygienic conditions increase the risk of diseases such as mastitis in dairy cattle. Such health problems can further reduce milk production and create public health concerns for consumers.

Human Consequences of Flood Disasters

Flood events do not only affect agricultural systems but also pose serious threats to human lives and well-being. Large-scale floods can cause fatalities, injuries, displacement of populations, and psychological distress among affected communities.

For example, flash floods in the Chittagong district of Bangladesh resulted in the death of about one hundred individuals and caused injuries to several others (Rashmi, 2007) ^[10]. Similarly, the severe floods that occurred in

Kerala in 2018 resulted in more than three hundred fatalities and displaced hundreds of thousands of residents from their homes (Babu and Gireesh, 2018) ^[11].

Displacement caused by flooding often forces people to stay in temporary relief camps where access to clean water, sanitation, and healthcare services may be limited. Such conditions increase the risk of water-borne diseases such as cholera, typhoid, and dysentery. Moreover, the emotional stress associated with loss of property, livestock, and livelihoods can have long-lasting psychological effects on affected individuals.

Economic Consequences

Flood disasters impose significant economic burdens on households, communities, and national economies. Damage to agricultural lands, livestock resources, and rural infrastructure can severely disrupt economic activities in flood-affected areas. Livestock is often considered a major financial asset for rural families. Therefore, the loss of animals during floods directly reduces household income and food security. According to Borrows and De Bruin (2006) ^[2], floods accounted for approximately 31% of global economic losses associated with natural disasters between 1986 and 1995.

In countries such as Bangladesh, repeated flooding has contributed to increased inequality in income and asset distribution. Roy *et al.* (2006) reported that severe flood events often push vulnerable households deeper into poverty, making recovery extremely difficult without external support.

The economic effects of floods may also extend beyond rural communities. Damage to agricultural production can disrupt food supply chains, increase market prices, and negatively affect regional economic development.

Damage to Infrastructure

Floodwaters frequently cause extensive destruction of physical infrastructure, including houses, roads, bridges, irrigation systems, and livestock shelters. Damage to these structures can significantly delay recovery efforts and restrict access to essential services. During the 2018 Kerala flood disaster, several hundred houses were partially damaged while many others were completely destroyed (CMD, 2018). Such destruction leaves many families without shelter and increases dependence on government relief programs.

Similarly, research conducted in Ethiopia indicated that a large proportion of households experienced complete destruction of their homes during flood events (Haile *et al.*, 2013) ^[7]. In addition to residential buildings, farm structures such as barns, livestock sheds, and feed storage facilities may also be severely damaged.

Destruction of transportation infrastructure further complicates relief operations because it restricts the movement of emergency supplies, veterinary assistance, and food resources to affected areas.

Gender-Related Vulnerabilities

Flood disasters often affect different social groups in varying ways. Women are frequently more vulnerable to disaster risks due to social, cultural, and economic constraints. Limited access to financial resources, education, and decision-making power can make it more difficult for women to cope with disaster situations.

Das and Dey (2011)^[4] observed that flood-affected regions of the Barak Valley exhibited a gender ratio of 898 females per 1000 males, indicating significant demographic and social disparities in these communities. Women often carry additional responsibilities during disasters, including caring for children, elderly family members, and livestock.

Therefore, disaster management programs should incorporate gender-sensitive policies that ensure equal access to relief services, financial assistance, and recovery programs for both men and women.

Community-Level Impacts

The impact of floods can vary considerably among different communities depending on factors such as socio-economic status, geographical location, and access to resources. Marginalized populations often face greater difficulties in recovering from disasters due to limited financial support and reduced access to government assistance.

During the Kerala floods of 2018, people belonging to various social groups were affected, with a large proportion of the affected population belonging to other backward classes (Prajisha, 2019)^[9]. These observations highlight the need for inclusive disaster management strategies that address the needs of all community members.

Community participation in disaster preparedness and recovery planning can improve resilience. Local knowledge and cooperative efforts among community members can play an important role in developing effective flood response strategies.

Mitigation and Management Strategies

Reducing the negative impacts of floods on livestock farming requires a combination of preventive measures, preparedness strategies, and effective disaster response systems. Establishing early warning systems can help farmers prepare for flood events and move livestock to safer areas before floodwaters rise. Accurate weather forecasting and communication systems are essential for minimizing losses.

Construction of elevated livestock shelters and secure feed storage facilities can protect animals and feed resources from flood damage. These structures provide safe refuge for animals during disaster situations. Adoption of climate-resilient agricultural practices, including crop diversification and improved drainage systems, can also help farmers reduce vulnerability to floods. Development of flood-tolerant crop varieties may further support agricultural sustainability in flood-prone regions. Another important strategy is the establishment of emergency feed and fodder banks. These reserves can provide critical nutritional support for livestock during disaster periods.

Finally, timely veterinary services are essential for preventing disease outbreaks among livestock after floods. Mobile veterinary clinics, vaccination programs, and disease monitoring systems can help protect animal health during recovery periods.

Conclusion

Flood disasters pose serious threats to livestock production systems and rural livelihoods. They can result in livestock mortality, destruction of feed resources, reduction in milk production, and extensive damage to infrastructure. In addition, floods have far-reaching socio-economic consequences, including loss of human life, displacement of

communities, and increased poverty among vulnerable populations.

Developing resilient livestock farming systems requires improved disaster preparedness, early warning systems, climate-resilient agricultural practices, and accessible veterinary services. Community participation and inclusive disaster management policies are also essential for effective recovery. By implementing these strategies, governments and rural communities can reduce the vulnerability of livestock production systems and enhance resilience against future flood disasters

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