**REVIEW ARTICLE**

**The Impact of Natural Disasters on Livestock Sector: A Review**

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**ABSTRACT**

The Livestock sector plays a central role in nature resource based livelihood of the vast majority of population and often considered as the poor people's ATM. They are kept as a unit of production and provide an important source of revenue, employment and wealth. However, this sector is facing a number of problems like bad health, shortage of feed and fodder, increase incidence of emerging and reemerging diseases etc and the most drastic amongst them being the Natural disasters like earthquake, floods, volcanoes etc. This paper gives a brief idea about the ill effects of natural disasters on the health of livestock, thereby affecting their production and productivity along with the various strategies to be kept in mind while dealing with disaster like event.

**INTRODUCTION**

Disaster refers to any event that causes immense damage and loss not only to the people but also to the infrastructure and environment as well [1]. Food and agricultural organization FAO, 2008 has defined disaster as a serious event in which a particular community is not able to function properly due to losses in terms of resources, economy, environment etc, thereby making it difficult for the community to cope up with the resources left. Generally, an event to be called as disaster, following aspects should be kept in mind (i) The total number of people killed should be more than ten. (ii) People affected should be more than hundred (iii) The state should call for an emergency declaration and international assistance [2]. Disasters leave a long lasting impact on the countries which are not developed, the reason being non availability of resources, lack of knowledge regarding various technologies and other managemental aspects. On the other hand, the intensity and frequency of disasters particularly natural disaster is less in the Industrialized or developed countries unlike India. This is because these countries are capable of coping up via various programmes like insurance, government assistance, access to various credits and by activation of business reserves [3].

The literature available and relevant to this paper is divided into following sub headings.

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Risks associated with livestock rearing during a disaster

The disasters have not only posed a threat to mankind but have also taken livestock into consideration. Livestock is the key asset of a country, and it has important say in raising countries economy. Though this sector is already facing some problems in terms of feed resources, poor health conditions, inadequate infrastructure for marketing, processing and value addition, disasters both natural and manmade, have further aggravated their problem and worsen the economy by leaving negative effects on the people as well on the livestock itself [4].

Whenever any region, country or a place is struck by any natural calamity be it flood, earthquake, volcanoes etc. the livestock is first to be affected, the reason being the government’s relief and rehabilitation measures are focused primarily on the people and therefore the sector gets meager importance and hence they are left as such [5]. According to the report of [6] livestock is the second most affected subsector after crops and has accounted for USD 11 billion or 36 percent of all the damages and losses reported due to various natural disasters, out of which 44 percent production losses are caused by drought and 39 percent losses are caused by floods. Because of the growing global population, the demand for livestock production is expanding in the agriculture sector. Climate change, on the other hand, has an impact on livestock output and biological changes in animals, such as fertilisation and breeding. Extreme weather events such as heat waves, floods, and drought cause livestock productivity losses as well as mortality. Climate change has some direct and indirect effects on cattle productivity. Heat stress, humidity, wind, drought, frost, and floods are all direct consequences, resulting in lower milk production, meat output, reproduction, animal health, and performance [7].

One of the major cause of disaster that occur in developing countries is epizootics. The production efficiency of a large number of animals is decreased due to various epizootic diseases that follow immediately after disaster, thereby killing large populations of animals. Poor nutrition and sub clinical diseases are the other two important causes due to which animal’s health is further deteriorated. These two factors cause mineral and energy imbalances, loss of body weight which increases susceptibility to diseases and decreases reproduction efficiency [8]. The after effects of disaster on animals also include abandonment of various animals and birds by their respective owners, animals death due to starvation, attack by predators, contracting diseases and infections ranging from parasitosis (internal and external) to other bacterial and vector borne diseases, amongst which the most important being Hemorrhagic septicemia, Anthrax, Black Quarter etc., Therefore the production of eggs, milk etc from these animals come to a hault [9]. Due to the violent impact of disaster, alteration in the behavioural change of livestock is noticed e.g, one can notice disorientation in their behavior, animals become very choosy in their eating and drinking if they found that the feed and water donot taste familiar. Moreover the nervousness becomes greater during and after disaster [10]. Since livestock is vulnerable to all sort of disasters but the most vulnerable is flood [11]. Animals contract infections of hooves and skin when they stand in the contaminated water for a long period of time. Deep cuts in their skin make them susceptible to tetanus and other toxins present in the flood water. In addition to this animals become prone to hepatitis, dysentery, food poisoning etc. [12]. The after effects of floods also include the agony of survivors, physical and mental stress, non availability of drinking water, essential commodities, medicine, environmental damage and loss of the dwellings that make it, the most feared among the natural disasters. A major volcanic eruption that took place in 1991 in Southern Chile led to the deposition of volcanic ash on pastures where approximately 2.5 million sheep grazed as a result thousands of these sheep died due to starvation since the ash prevented access to forage and wore down their teeth [13]. Similarly in other disasters like drought and famine like conditions, chances of poisoning and toxicity among animals are higher some plants accumulate toxins only during certain growth stages or when they are growing under stress. The chance for livestock poisoning may be increased when hot, dry weather conditions persist [14].

Livestock disaster scenario in India

India is one of the most disaster prone countries in the world which is mainly due to its high geo-climatic conditions as well as its higher degree of social vulnerability. According to National Disaster Management Authority [15] nearly 58.6 percent of country’s land area is prone to earthquakes of moderate to very high intensity, over 40 million hectares (12 percent of land) is prone to floods and river erosion. About 2 percent of its land area is landslide prone and 68 percent of its cultivable area is affected by droughts. Close to 5700 km of its 7516 km coastline is cyclone prone and exposed to events like tsunami and storm surge [16]. At least one major tropical cyclone strikes India each year with powerful tidal surge that affects hundreds and thousands of lives [17]. The regions in India have been categorized into five sub divisions based on the disaster affinity which are as follows: i) Northern Mountain Region: This region is mostly prone to snow storms, leading to landslides, cold waves along with heavy rainfall and soil degradation. ii) Indo Gangetic Plains: This region is mostly prone to floods. iii) The Deccan Plateau: It is the most drought prone area; earthquakes of varying intensities have been reported from the area. iv) The western desert: (Thar Desert) having scanty and unreliable rainfall. v) The coastal areas: The region mostly being prone to cyclones, sea erosions and tidal waves [18]. Amongst the Natural Disaster, the earthquake that struck Garhwal Himalayas in Northern India Oct 20, 1991 caused strong ground shaking in the district of Uttarkashi,
Livestock in particular have remained highly vulnerable to almost all sorts of natural disasters but the most frequent and vulnerable of all types is the occurrence of flood [26]. The principle reason for flood lies in natural ecological system which includes monsoons, highly silted river systems and steep and highly erodible mountains particularly seen in northern regions [27]. The other attributed reasons of flood include increase in population, rapid urbanization, enormous pressure on rural land, increasing developmental activities in flood plains and global warming [28]. Floods and drought account for 83 percent of total crop and livestock production losses, showing the severe impact of climate related disasters on agriculture sector. Production losses in Asia amounted to roughly USD 48 billion corresponding to 60 percent of total losses in all developing regions. The most significant losses in Asia were expressed after flood which when considered at country level showed that India was most affected by crop and livestock production losses after repeated floods between 2004 – 2013 [29].

Importance of risk communication for disaster preparedness

Risk communication in disasters aims to prevent and mitigate harm from disasters, prepare a population before a disaster, disseminate information when any disaster like situation arises and aid subsequent recovery. In developing country like India, where the preparedness, response and rehabilitation mechanisms are primarily focused on human beings and inadequate attention is given to livestock, management in such a situation leads to their heavy losses. The losses due to these disasters in context to livestock could be reduced with better preparedness, timely response and well-designed rehabilitation efforts [30]. The livestock population gets mostly affected because the government’s prime target of rescue, relief and rehabilitation is mainly concerned to people of affected areas. The livestock gets no or meager help from the authorities resulting in massive spread of epidemic diseases besides other losses to livestock farmers [31]. The vulnerability and impact of disaster are high on the weaker sections of the community which largely depends on animals for their livelihood and even though animals are the main source of livelihood to the poorest of the poor, disaster management of animals in most cases do not figure anywhere in preparedness, mitigation or rehabilitation strategy Ramakumar [32] thereby indicating that the various socio personal variables like education, farming condition, communication, mass media exposure, social participation and cosmopolitanness are found to have positive correlation with level of preparedness of livestock farmers [33]. The Hurricane Katrina that struck the gulf coast of United States on 29 August 2005 resulted in displacement of approximately 770,000 people, 1800 human deaths, loss of property etc and left a significant impact on pets and non
Livestock Management during disasters

The various steps to be taken prior, during and after disaster in relation to livestock management includes:

Prevention: a) construction of shelter for animals in cyclone and flood prone areas and in case of shifting animals to safer places preference should be given to bullocks, in milk cows, breeding bulls as their loss can cause immense damage to economy. b) Untethering the animals when milk cows, breeding bulls as their loss can cause immense damage to economy. c) Proper care should be taken to protect the animals against prey, poisonous snakes and reptiles. d) Reconstruction of veterinary and A.I centres that are damaged due to floods e) A permanent feed security system should be set up in flood prone areas. f) Proper training should be given to farmers for evacuating their animals.

Relief: a) Proper care should be taken to protect the animals against prey, poisonous snakes and reptiles b) Untethering the animals when milk cows, breeding bulls as their loss can cause immense damage to economy. c) Efforts should be made to collect feed, fodder, medicine etc and they should be kept at safer places d) Proper training should be given to farmers for evacuating their animals.

Rehabilitation: a) Livestock owners should be provided with compensation in case of livestock loss or diseased condition b) Proper arrangement for quick movement of veterinary personal to reach animals for treatment, vaccination and deworming.

For management of livestock during disasters many local people use indigenous knowledge for predicting rainfall and other weather conditions depends on bio indicators. The methods include movement of dragon flies, flapping of ears by goats, howling of foxes in the morning and evening, jumping of cattle, flocking of sheep and goat, poultry inserting their feathers in soil, continuous barking of dogs and chirping of birds, frogs croaking underneath stones and migration of parakeets in north south direction. Acharya, Pareek and Trivedi in their study on cultural values of dogs and chirping of birds, frogs croaking underneath stones and migration of parakeets in north south direction. Acharya, Pareek and Trivedi in their study on cultural values of disaster management of animals in these animals c) Reconstruction of veterinary and A.I centres that are damaged due to floods d) A permanent feed security system should be set up in flood prone areas. The scarcity of feed and fodder after any disaster poses a serious and indirect threat to the livestock. They suggested the use of urea treated straw as a feeding option that has the potential of meeting up the challenge to some extent. The straw feeding during the disasters can reduce the burden on the already scarce feed resources without compromising the production performance and also suggested use of Urea Molasses Mineral Block (UMMB) as a viable feeding option during disasters. Further, by products of sugarcane like bagasse, molasses, sugarcane tops etc., should be fed to animals during scarcity period. They also reported that urea when used for treatment of bagasse enhances its nutritional quality and steam treatment can also be used to increase its digestibility.

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Many developing countries including India are not well prepared to counter any disastrous event. The reason being the countries are lacking behind in well developed disaster management plan. In order to reduce the severe losses to human life, animal life and property, necessary measures have to be taken which mostly include disaster kits preparation, transportation facility for animal, providing safe shelter etc. Since animals are the main source of livelihood to the weaker sections of society, disaster management of animals figure nowhere in the relief, rehabilitation and rescue strategies. Also due to absence of livestock risk forecasting and risk communication, the situation is aggregated further. Need of the hour is better preparation, contigent plans for both flood and drought should be prepared beforehand. Various organizations working in this field should be allowed to work in cooperation in an optimal way. The level of coordination...
and cooperation across diverse institutions was extremely poor, implying that the many agencies involved in the rehabilitation process appeared to act in isolation from one another, as per the perception of farmers. So there should be better coordination and cooperation among organizations with a single mandate that has a visible impact. One should also strengthen the manpower, develop specially trained staff and generate epidemiological data, facilities for communication for better preventive actions. Government organizations should be mobilized and strengthened by boosting manpower, and they should provide first-hand assistance to livestock owners in terms of livestock risk service delivery and other livestock catastrophe management information. Moreover, concerned government agencies, state agriculture institutions, and meteorological departments should collaborate and coordinate better for better livestock management during catastrophes, using an effective and reliable forecasting mechanism. The preparedness, response and recovery mechanism should be given better attention both by the Government as well as NGOs and special type of animal houses should be built in the respective villages in order to minimize the economic, social and psychological loss to the livestock farmers during any natural disaster. Further strategies like registration of livestock farms, single window system, disposal of carcasses in scientific manner, segregation of ill animals during and post disaster, well designed rehabilitation efforts should also be taken into consideration.

POLICY INITIATIVES NEEDED TO BE TAKEN

In order to reach a level of preparedness, to be able to respond timely and effectively in case of disaster like event, identification of organizational resources, determining the role and responsibilities, better policy formulation, initiative of better procedures and planning activities should be taken into consideration. One can also create awareness of risk in a community by giving advice on certain boiling issues, by guiding the community in implementing workable disaster prevention interventions such as building codes, road systems and placement of animals and by disseminating timely messages in a format that is understood by local community.

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