BIBLIOGRAPHIC INFORMATION SYSTEM

Journal Full Title: Journal of Biomedical Research & Environmental Sciences

Journal NLM Abbreviation: J Biomed Res Environ Sci

Journal Website Link: https://www.jelsciences.com

Journal ISSN: 2766-2276

Category: Multidisciplinary

Subject Areas: Medicine Group, Biology Group, General, Environmental Sciences

Topics Summation: 128

Issue Regularity: Monthly

Review Process type: Double Blind

Time to Publication: 7-14 Days

Indexing catalog: Visit here

Publication fee catalog: Visit here

DOI: 10.37871 (CrossRef)

Plagiarism detection software: iThenticate

Managing entity: USA

Language: English

Research work collecting capability: Worldwide

Organized by: SciRes Literature LLC

Manuscript should be submitted in Word Document (.doc or .docx) through **Online Submission** form or can be mailed to support@jelsciences.com

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Journal of Biomedical Research & Environmental Sciences main aim is to enhance the importance of science and technology to the scientific community and also to provide an equal opportunity to seek and share ideas to all our researchers and scientists without any barriers to develop their career and helping in their development of discovering the world.

JOURNAL OF BIOMEDICAL RESEARCH & ENVIRONMENTAL SCIENCES
ISSN: 2766-2276
SUBJECT AREA(S): ENVIRONMENTAL IMPACTS | NATURAL RESOURCE MANAGEMENT
DOI: 10.37871

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 effecting 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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DOI: 10.37871/jbres1295

Submitted: 24 June 2021

Accepted: 16 August 2021

Published: 17 August 2021

Keywords

- Natural disaster
- Livestock
- Health
- Production
- Productivity

ENVIRONMENTAL SCIENCES

ENVIRONMENTAL IMPACTS

NATURAL RESOURCE MANAGEMENT

VOLUME: 2 ISSUE: 8

How to cite this article: Rasool S, Hamdani SA, Ayman N, Fayaz A, Shubeena S, Thahaby N, Nabi B, Hai A, Akand AH. The Impact of Natural Disasters on Livestock Sector: A Review. J Biomed Res Environ Sci. 2021 Aug 17; 2(8): 669-674. doi: 10.37871/jbres1295, Article ID: JBRES1295, Available at: https://www.jelsciences.com/articles/jbres1295.pdf

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 striked Garhwal Himalayas in Northern India Oct 20, 1991 caused strong ground shaking in the district of Uttarkashi,

Tehri, and Chamoli (now Uttarakhand) in the state of Uttar Pradesh. Official information indicated that population of about 307,000 in 1,294 villages were affected; 768 persons died while 5,066 were injured. In addition the earthquake claimed 3,096 heads of livestock and as many as 42,400 houses were damaged completely [19]. The super cyclone that hit the Orissa state in 1999 caused huge loss to the economy of the state by killing thousands of livestock. An estimated loss of 19.04% cows, 2.78% bullocks, 4.07% calves, 4.08% buffaloes, 12.70% sheep, 8.65% Goat, 6.43% pigs and 24.37% poultry was reported in the said disaster [20] which was mainly due to collapsing of houses, falling of branches of trees, heavy rain and winds and the affected areas were the major producers of meat, milk, eggs etc. Similar cyclone storm that hit the coast of odissa in 2013 caused extensive damage to the life and property. The total livestock affected was 7.02 million which accounted for 16.7 percent of total livestock population. The total number of animals effected were 1425 large animals, 2906 small animals and 156000 poultry. As 68% of India's land is prone to droughts. In 2000-2001, droughts in India affected 8 states which left a huge impact on both human and livestock sector. It was estimated that 146.3 million human population and 69.3 million livestock population were severely affected by droughts in the above said period [21]. The Nilam cyclone that hit the southern state of Andhra Pradesh in 2012 resulted in large damage to agricultural and horticultural crops, milch and draught animals, poultry birds etc. About 1858 animals were reported dead which included 505 large animals and 1353 small animals and 98757 poultry. An estimated loss of 1286 cattle sheds were reported along with 128 veterinary community health centers that left a huge impact on livestock farmers. A prodigious event occurred in Jammu And Kashmir State on 6th September when devastating floods took a heavy death toll not only of humans but of livestock as well. It was reported that 65000 sheep died in the floods, about 7000 large animals were lost. Shortage of feed and fodder affected 5 lakh sheep badly [22] moreover the devastating floods left almost entire livestock of military farm dead at Srinagar's Tattoo ground. Out of 324 cattle, people could save only 12 calves and 317 were reported dead. As per the report provided by Sheep husbandry and Animal husbandry Kashmir, the average sheep/goat lost due to floods were 79,855 and approximately 446120 sheep and Goats were injured. The total milch animals lost were 4336, followed by 3591 draught animals and 17 calves that were lost during the floods of 2014. The total number of animal sheds damaged during the floods was about 360 [23]. In terms of livestock feeding, the scarcity of feed and fodder was severe in the case of concentrates (50.42 percent), followed by dry fodder, and the scarcity of fresh drinking water was so severe that animals were forced to drink flood water during that time. [24]. Reduced feed quantity and quality, changes in pest and disease prevalence, and direct production degradation owing to physiological stress all contribute to have a major impact on livestock systems [25]. According to State Economic Survey 2014-2015, the state had recorded an estimated 1.57 percent drop in GDP due to the floods of 2014 which otherwise had been constantly increasing since 2004. 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 cosmopolitness 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

human animals near about six lakh animals either died or were left without shelter. This was mainly due to lack of state and local rescue plans and moreover evacuation and rescue plans did not take into account pet and service animals thereby putting the life of pet owners into risk who were reluctant to evacuate without their animals [34].

The lack of an early warning system, followed by insufficient emergency medicine and ambulatory clinic facilities, has been identified as a major barrier to disaster risk communication [35]. In order to mitigate the impacts of natural disasters, preparedness plan dealing with such events should be organized beforehand and people should effectively participate in such plans Srivastava [36]. The establishments of early warning system and capacity building could help in coping with the disasters [37]. The disaster planning involves identifying organizational resources, determining roles and responsibilities, developing policies and procedure and planning activities in order to reach a level of preparedness to be able to respond timely and effectively. The planning process is preliminary in nature and is performed in a state of uncertainty until an actual emergency or disaster occurs. The early warning systems can save significant numbers of livestock and property from impeding disasters by i) Creating awareness of risks in a community by giving advice on basic health and hygienic requirements ii) By ensuring a constant state of preparedness iii) Guiding the community in implementing workable disaster prevention interventions such as building codes, road systems and placement of animals and iv) By disseminating timely messages in a format that is understood by local community.

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 shelter is not available 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.

Relief: a) Proper care should be taken to protect the animals against prey, poisonous snakes and reptiles b) proper arrangement for quick movement of veterinary personals to reach animals for treatment, vaccination and deworming.

Rehabilitation: a) Livestock owners should be provided with compensation in case of livestock loss or diseased condition b) Working bullocks and milch animals should be provided from other unaffected regions that are surplus 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.

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 and indigenous knowledge of climate change and disaster prediction in Rajasthan reported that the tribal's assessed the probability of extent of flood by observing colour of clouds, their location, intensity and frequency of rainfall as early warning. They further expressed that uncommon sounds and changes in water stream, shade of water, heading of wind and the surprising conduct of natural life like subterranean insects, birds, rodents and snakes additionally helps in the evaluation of climatic varieties.

STRATEGIES TO COUNTER DISASTER LIKE EVENTS

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 aggrevated 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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How to cite this article: Rasool S, Hamdani SA, Ayman N, Fayaz A, Shubeena S, Thahaby N, Nabi B, Hai A, Akand AH. The Impact of Natural Disasters on Livestock Sector: A Review. J Biomed Res Environ Sci. 2021 Aug 17; 2(8): 669-674. doi: 10.37871/jbres1295, Article ID: JBRES1295, Available at: https://www.jelsciences.com/articles/jbres1295.pdf