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Akkamaha Devi Naik

Assistant Professor, Department of Agricultural Extension, MS Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, India

Ashok Kumar B

Assistant Professor, Department of Agricultural Extension, MS Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, India

Status and preparedness for agriculture disaster management: An overview

Akkamaha Devi Naik and Ashok Kumar B

Abstract

Agriculture sector in India faces severe problem in the form of natural disasters like drought, flood, cyclones, earthquakes etc., resulting in crop damage and poor crop productivity. Depletion and degradation of natural resources, increases the vulnerability and expose farmers to natural threats, leading to more frequent and dangerous disasters. At the same situation, we have to feed the ever-growing human population to ensure food security. It is well known that many emerging countries are not always well ready to deal with disasters. This is mainly due to lack of proper developed disaster management plans resulting in a huge loss of human life, animal life and also a major effect on agriculture sector. But Now-a-days farmers are becoming more conscious of the importance of disaster management systems and preparedness is being made to decrease the adverse effect of disaster on agriculture.

Keywords: preparedness, disaster, disaster management, strategies and impact of disaster

Introduction

Disaster—the word used by the French, Greek, Italian and other ancestors is giving a meaning that, whenever the alignment of stars in bad position, a bad event will happen. From the societal point of view, a dangerous event within the earth's system that results in demise, injury to human being and loss of valuable goods is called as a 'Disaster. Now-a-days, our human community has started facing disasters commonly. Mainly because of our own interference with the nature improperly through the many developmental activities and implement haphazardly without consideration of such natural earth System Processes. Proper planning, during these disastrous natural events, our disaster management goals would be achieved rightly in-time and safe guard both our life and property.

Indian scenario (The Hindu business line)

- 68% of total sown area is susceptible to drought
- 40 Million hectares land mass is vulnerable to floods
- 58.6% of the landmass is prone to earthquakes
- 8% of the land is vulnerable to cyclones

Table 1: Major losses in India due to disasters

Year	Live lost human (In No.)	Cattle lost (In No.)	Houses damaged (In No.)	Cropped areas affected (In lakh Ha)
2001-02	834	21,269	3,46,878	18.72
2002-03	898	3,729	4,62,700	21.00
2003-04	1,992	25,393	6,82,209	31.98
2004-05	1,995	12,389	16,03,300	32.53
2005-06	2,698	1,10,997	21,02,012	35.52
2006-07	2,402	4,55,619	19,34,680	70.87
2007-08	3,764	1,19,218	35,27,041	85.13
2008-09	3,405	53,833	16,46,905	35.56
2009-10	1,677	1,28,452	13,59,726	47.13
2010-11	2,310	48,778	13,38,619	46.25
2011-12	1600	9126	8,76,168	18.87
2012-13	984	24,360	6,71,761	15.34
2013-14	5,677	1,02,998	12,10,227	63.74

Corresponding Author:**Akkamaha Devi Naik**

Assistant Professor, Department of Agricultural Extension, MS Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, India

Ministry of Home Affairs, 2014

Impact of disaster in different states of India

- Gujarat Earthquake-2001: 20,000 people killed, 167,000 wounded, 400,000 homes destroyed (NGDC)
- Uttarakhand Flood-2013: 5,700 people presumed dead (ndtv.com/India-news)
- Bihar Flood-2013: 201 people lost their lives (ibnlive.in.com/news)

- Drought in Maharashtra-2013: 9 million farmers impacted (News Centre, IBTL)
- Jammu & Kashmir Flood-2014: Nearly 277 people died (Hindustan Times)
- Most severely cyclone and flood affected areas in India: West Bengal, Odisha, Andhra Pradesh, Tamil Nadu, Kerala and Gujarat come under most severely cyclone and flood affected areas of India.

Table 2: Impact of disaster on agriculture

Direct impacts	Indirect impacts
Loss of crops, livestock, fisheries and other agri-businesses Loss of agri-development infrastructures Loss of fertile soil and its fertility Loss in production and productivity	Weakens the farming employment Lowers food saving leading food insecurity Lowers the farmers' income Weakens the multiplier effect to other sector and thus to economy

Frequently occurred agriculture disasters are droughts, floods, earthquake, cyclone and pest and diseases

- Drought on agriculture: A prolonged period of abnormally low rainfall, leading to a shortage of water.
- Karnataka is one of the most often drought affected state in India, it experienced one such drastic drought season in Kharif 2012. Ramanagra district was affected most. Cereals and Oilseed crops were affected most in agricultural crops; overall sowing area was reduced by half of the target.

Options for drought preparedness plan/strategy in Agriculture

For crops: Shift to less water-demanding crops and cropping systems, research of drought tolerant crops/species/genotypes, supplementary irrigation, soil mulching and crop shading, reducing crop density.

For livestock: Review available feed, livestock transfer where/when possible, locating potential sites of water for emergency/watering points, protective (natural) shelters and alternative feed (by-products, less and un-palatable shrub).

Flood in agriculture

An overflow of a large amount of water beyond its normal limits, especially over what is normally dry land.

Kerala flood on August 2018 (Times of India, 2018)

On August 2018, severe floods affected the South Indian state of Kerala, due to high rainfall during the monsoon season. According to the state administration, more than 60,000 people have been rehabilitated, although thousands are still stranded in isolated places and agriculture production badly

hit; losses may cross Rs. 1356 crore.

Kodagu flood, 2018 (Firstpost.com)

Heavy rain leading to landslides and flooding continued to Karnataka's Kodagu district. It's a largest coffee-growing region is striking at heavy losses

Coffee Board Chairman MS Boje Gowda told IANS. "We were expecting a good coffee output this year, but due to heavy rains and floods, about 60 per cent of the berries in the district were destroyed,"

Protecting crops from flood

- Keeping ploughed soil covered by mulch or cover crops
- Planting trees and hedges around fields to reduce run-off
- Building dikes and irrigation channels/pipes to control the flow of water onto crops
- Improving drainage through raised beds, ridges or mounds
- Planting early-maturing crops to avoid the flooding season
- Planting flood-tolerant crops
- Cyclone warning: 24 hours in advance of cyclone
- Warning language: District-wide warnings not to go fishing, and warnings about winds, tidal waves and storm surges

Nepal earthquakes

In 2015 earthquake in Nepal had a major impact on Agriculture, 72 per cent of households recording severe damage of rice seed, and more than half of respondents said their stocks were totally destroyed (Govt. of Nepal National Planning Commission 2015).

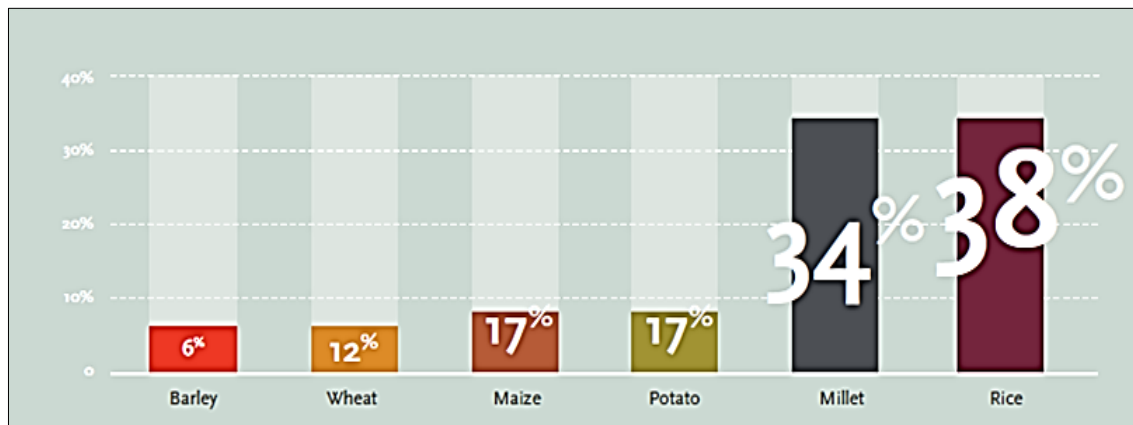


Fig 1: Seed loss (% of households reporting loss in Nepal)

Government of Nepal, 2015

Lessons learnt on preparedness for disaster restoration

- Disaster preparation in Nepal enabled an immediate response: trained field assessment teams in all districts were ready to conduct rapid assessments that helped identify the needs and target beneficiaries within days of the disaster.
- Landslide monitoring must be set up instantly after earthquakes, and anticipation measures applied immediately in zones already identified as at-risk for landslides, as well as those newly placed at risk by the earthquake.
- Responses to disaster should therefore include the provision of labour-saving technologies as well as access to inputs. Farmers must be given a choice of seed varieties that suit their needs and preferences

Weakness in disaster management efforts

(a) Inadequate early warning system

Though, the forecasting, monitoring and warning mechanisms are beautifully articulated on paper in practice, the warnings are not timely enough and they do not stretch all those likely to be affected.

(b) Lack of pre-disaster preparedness

With disasters striking India, there must be proper plan in place to tackle the disaster and minimize its impact. At the same point, people are found unaware time and again. There is not planned information system as to what supposed to be done when faced with a calamity. For example, during Tsunami in 2004 dead body laid floating in the water for several days due to the unavailability or lack of required tools to meet the need of the time.

(c) Inadequate and slow relief

Relief is a significant part of the disaster management to offer help to the affected people. The relief operations are frequently handled in ad hoc and haphazard manner. How efficiently to provide food, medicine, to reduce the affected people etc. are addressed and met improperly. Even days after the Bhuj earthquake, and Tsunami, 2004, many people were not providing with safe drinking water, temporary shelter, and medicines.

(d) Lack of co-ordination

Disaster management needs concerted efforts from Central Government, State Government, NGOs, International agencies and private sectors etc. Due to lack of co-ordination among team, relief material is not property distributed among the people. Even worst happens when they are misutilized and are not distributed uniformly.

(e) Slow rehabilitation and reconstruction

While immediately after a disaster strikes, there is hectic relief and rescue mission, mainly aimed at feeding people and stalling the outbreak of an epidemic, relief and rescue cannot go on endlessly and rehabilitation and reconstruction should be given proper attention. However, this is an area which is often ignored and progressed is sluggish once the initial attention fades away.

(f) Poor management of finances for post-disaster relief

Funds are mis-utilized and relief measures were tardy and inadequate, providing scope for pilferage of relief and rehabilitation remained unutilized and there is huge shortfall in distribution of emergency relief, shelter material cloths, house building assistance etc.

Disaster management strategies in agriculture

- Diversification: Need to concentrate on other allied activities other than agriculture
- Rain water harvesting: Construct farm pond, dug well and other water storage structure in field for future use
- Pest and disease management systems: mobile app ‘Plantix’ is automated disease diagnosis.
- Crop insurance: Pradhan Mantri Fasal Bhima Yojana (PMFBY): This kind of schemes will helpful for the farmers when natural calamity occur
- Awareness of natural hazards: Disseminate or forecast the information through mass media
- Indigenous knowledge of farmers: Sometime giving importance to indigenous technology also plays a vital role for disaster management.
- Reducing harvest/storage losses
- Remote sensing (RS) and Geographic information system (GIS)

Table 3: Disaster management cycle

	<ul style="list-style-type: none"> ▪ Mitigation - Minimizing the effects of disaster. Examples: Vulnerability analyses; public education. ▪ Preparedness - Planning how to respond. Examples: Preparedness plans; emergency exercises/training; warning systems. ▪ Response - Efforts to minimize the hazards created by a disaster. Examples: Search and rescue; emergency relief. ▪ Recovery - Returning the community to normal. Examples: Temporary relief; grants
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Indigenous knowledge of farmers

Table 4: Behaviour of different species as a sign of drought and rain. (Fummi Muyambo *et al.* 2017) ^[6]

Species	Behaviour	Description in relation to drought or rain
Snakes	If they see snakes moving in the same direction	It will signify drought
Bees	When bees fly in a certain direction	It will signify drought
Frogs	When frogs make much noise in the afternoon	It will signify drought
Horse	When a horse playfully jumps	It will signify rain

Seed preservation

- Elderly people check the maize while still in the field for good quality cobs. The big maize cobs are guarded strictly and reserved for seed kept for following growing season.
- Some farmers sprinkle some ash around the seed to keep ants away
- Spray crops with crushed neem solution
- Apply animal dung on plants
- Mix grains and seedlings with crushed teak leaves
- Mix grains with wood ash before storage
- Sprinkle wood ash on crops in the field

Table 5: ICT for agriculture disaster management

ICT	Interventions
Television	Warning quickly to broad population
Mobile	<ul style="list-style-type: none"> ▪ Good source for communication/planning/ warning/rescue operations ▪ SMS - a unique and fast way of broadcasting message to large group of people
GIS	Can provide critical information with respect to hazard zoning, incident mapping, natural resources and critical infrastructure at risk, available resources for response, real time satellite imagery etc.

Table 6: Hazard forecasting and warning networks in India

Hazard forecast & warning network	Purpose
<ul style="list-style-type: none"> ▪ Flood forecasting and Warning Network 	Forecast is disseminated using computer networks and satellite (Internet, e-mail).
<ul style="list-style-type: none"> ▪ VHF Radio Communication System for Fishermen Community in Tamil Nadu 	Fishermen carry VHF sets to establish voice calls between the crafts and send their position data to the shore station
<ul style="list-style-type: none"> ▪ Cyclone Forecasting and Warning Network 	Radars and satellite imagery are used in detecting the development and movement of Tropical Cyclones over oceanic regions.
<ul style="list-style-type: none"> ▪ Drought Warning Network 	The drought monitoring is based on a comparative estimation of satellite detected green vegetation cover of a district in any specific time period.

Case studies on disaster management

Case 01: Mainstreaming disaster risk reduction in agriculture, Mozambique, 2017

Peri-urban and less remote areas in the districts of Quelimane and Nicoadala, study conducted by Vincent Potier, 2017 [7].

Table 7: Management techniques for disaster in agriculture

	Drought and irregular rainfall	Pests (rats)		Pests (insects)		Newcastle disease	Flood and cyclone
		In the field	In storage	In the field	In storage		
Crop diversification	X						X
Improved crops varieties	X						
Improved farming techniques	X						
Livestock	X						
Conservation agriculture	X						
Improved storage			X		X		X
Bio-pesticides				X			

Strategies for disaster risk reduction techniques

- First strategy: Diversification of crops through the introduction of new crops such as sesame, soybean, vegetable and orange fleshed sweet potato. Promotion of drought resistant crop such as sweet cassava and sweet potato and introduced small-scale irrigation system particularly to support vegetable production during the dry season.
- Second strategy: Testing and extension of improved varieties of existing crops, including short cycle, drought tolerant and higher yielding varieties of maize, rice, cowpea and sweet cassava
- Third strategy: The extension of improved farming techniques, including sowing in lines and applying adequate planting density with the expected benefit of

- improved crop performance enabling better yields.
- Forth strategy: Conservation agriculture practices which include minimal tillage/zero tillage, soil cover and crop rotation.
- Fifth strategy: Pests damaging crops the project strategy focused on use of bio pesticides and promoting better storage practices whereby community storage aimed at protecting grain and seeds from rats and flood, the “gorongosa” silo and use of Super Bags provide protection from weevils and humidity.

Case 02: Disaster management in agriculture: An analytical study of floods in Kurnool district of Andra Praesh, Aravinda Dabbadi, 2011 [2]

Table 8: Distribution of respondents according to their awareness about disaster management (N = 80)

Items	Response of sampled farmers	
	N	%
A. Before disaster		
a. Early warning	19	23.75
b. Crop insurance	32	40
c. Storing of seed and input materials in advance in case of crop failures	17	21.25
d. Storing adequate fodder	17	21.25
e. Training in coping mechanism	11	13.75
B. During disaster		
a. Search and rescue	53	66.25
b. Shifting cattle to safe places	39	48.75
c. Need and damage assessment	19	23.75
d. Provision of relief materials	71	88.75
C. After disaster		
a. Offering compensation	63	78.75
b. Soil reclamation	31	38.75
c. Saving the standing crops	34	42.25

Disaster management in agriculture: An analytical study of floods in Kurnool district of Andhra Pradesh, Aravinda Dabbadi, 2011 ^[2]

Table 9: Distribution of respondents according their knowledge about mitigation mechanisms (N = 80)

Sl. No.	Mitigation mechanism	Possessed	
		F	%
1	Saving the seeds	34	42.50
2	Mixed farming	13	16.25
3	Adjusting cropping pattern	39	48.75
4	Crop insurance	31	38.75
5	Soil reclamation and desilting of fields	31	38.75
6	Forming check dams and rock dams	16	20
7	Planting trees on bunds	13	16.25

Conclusion

Disaster cannot be prevented totally. However, timely warning and planning can minimize the effect of disasters. A new culture of preparedness, quick response, and immediate attention must be paid to contingency crop planning and training of the various functionaries and initiatives being taken by the Central and State Governments and the use of modern technology like GIS, Remote Sensing and media also have a key role to play in achieving our goal of moving together, towards a safer world.

References

1. Anonymous. National Geophysical Data Center (NGDC). "Comments for the Significant Earthquake" 2001.
2. Aravinda D. Disaster Management in Agriculture: An analytical study of floods in Kurnool district of Andhra Pradesh, M.Sc., thesis (Unpub), IARI, New Delhi 2011.
3. Anonymous. Disaster management status report, Ministry of Home Affairs, Govt. of India, New Delhi 2014.
4. Anonymous. Government of Nepal National Planning Commission, Nepal Earthquake Post Disaster Needs Assessment: Key Findings 2015.
5. http://www.npc.gov.np/images/category/PDNA_Volume_A.pdf.
6. Anonymous 2018. <https://timesofindia.indiatimes.com/city/mangaluru/kerala-floods-may-have-caused-damage-of-rs-20000-crore-asso-cham/articleshow/65457993.cms>.
7. Fummi M, Yonas TB, Andries JJ. The role of indigenous knowledge in drought risk reduction: A case of communal farmers in South Africa. *Journal of Disaster Risk Studies* 2017;9(1):1-6.
8. Vincent Potier. Mainstreaming Disaster Risk Reduction in Agriculture, Mozambique 2017, 1-15.
9. <https://www.ndtv.com/india-news/2013>.
10. <http://ibnlive.in.com/news/bihar-floods-death-toll-mounts-to-201-light-rains-expected-in-several-districts/420521-3-232.html> 2013.
11. "Maharashtra Drought 2013". India Behind The Lens (News Centre) IBTL 2013.
12. "Kashmir floods: Phones down, roads submerged; toll touches 200, rescue ops on". Hindustan Times 2014.
13. <https://www.thehindubusinessline.com>
14. www.firstpost.com/india/kodagu-floods-karnatakas-coffee-growing-region-stares-at-heavy-losses-after-rains