Identifying the Constraints faced by Paddy Farmers due to Natural Disasters in Andhra Pradesh

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ABSTRACT: Climate change has been realized globally as an ever increasing threat to our planet that is becoming impossible to ignore. Andhra Pradesh is the coastal state in south eastern India which is recorded as one of the states mostly affected by tropical cyclones. In the present paper, constraints faced by paddy farmers were identified during the phase of Disaster response and recovery. The study was conducted in the Krishna and NTR districts of Andhra Pradesh with sample of size of 240 paddy growers who were affected by natural disasters. A structured interview schedule was used to identify the constraints faced by farmers. Constraints were categorized in to operational, technology, economic and social constraints. Lack of information regarding weather forecasting mechanisms, lack of need based technology, poor marketing of the cyclone affected produce and Non availability of relief materials in required quantity were some of the major constraints faced by farmers. Along with the identified constraints suggestions are given to make suitable policy decisions under adverse climatic situations.

Keywords: Tropical cyclones, constraints, paddy farmers, natural disasters, forecasting mechanisms.

INTRODUCTION

Natural disasters frequently occur across the world. Considering the recent past, Asia has faced the highest number of natural calamities in comparison with other parts of the world. (Yadav and Barve 2017). Among the natural disasters, tropical cyclones are the most destructive and they affect the coastal regions with varying intensities. (Hoque *et al*., 2017).

Tropical cyclones are the most frequent natural disasters in India. Storm surge, flood, high winds, inundation and erosion were some of the consequences of the tropical cyclone. It also results in loss of life, casualties and damages to the properties causing socio - economic loss (Nair *et al.,* 2018). In India, approximately 370 million people are exposed to cyclones and its associated impacts such as storm surges and floods every year (Nair *et al*., 2018).

Andhra Pradesh is a coastal state in south eastern India. It is one of the most exposed states in India to cyclones. Its proximity to the Bay of Bengal and its low-lying topography are compounded by high population density, poorly maintained flood protection and drainage systems making coastal Andhra Pradesh highly vulnerable to the impacts of cyclones and floods (Rao *et al*., 2017). Climatic conditions play an important role in agricultural production. It has profound influence on crop growth, development, incidence of pests & diseases, yields, etc. As a result of global warming the occurrence of unanticipated weather aberrations increased in the recent past (Jyothi *et al*., 2020). Rice is the major staple food grain crop in Andhra Pradesh. The state has significant strengths in rice production enjoying the right conditions for growing rice. Cyclone Nivar caused damaged to 30000 hectares of agriculture and horticultural crops. Paddy suffered the highest damage in 16,290 hectares, black gram in 7,362 ha and cotton in 3,571 ha. Roads in over 180 km were damaged due to the floods (Times of India, 2020). Nearly 8000 acres of paddy crop got inundated due to recent cyclone of Mandous (The Hans India, 2022)

Considering the disasters and the nature of its effects, it is imperative to explore the disasters in a phase-based approach. The early disaster phase involving disaster preparedness and response proceeding into later phases

of mitigation and recovery are documented in various studies with respect to the concept and role. Yet the constraints encountered by the farmers in each phase remains unexplored especially in case of cyclones and floods. The present study attempted to study the constraints faced by a farmer after the occurrence of natural disasters.

REVIEW OF LITERATURE

Due to heavy rains in Rajasthan, non-availability of communication means (33.67%), financial crisis in family (57.00%) are the major constraints faced by farmers during natural disasters (Sharma *et al.*, 2016). In a study on women farmer constraints in adaptation of climate change in Malawi found that many smallholders women have either limited or no access to basic agricultural tools, transport, and rural energy Murray *et al.* (2016). In a study regarding traditional prediction of drought in southern region of Mozambique found that farmers felt current unpredictability, variability, and changes in weather and climate have negatively affected the interpretation, accuracy, and reliability of most of their prediction indicators. A study on natural calamities perspective on socio economic status of farmers in Bangladesh reported that 37.10% of farmers expressed higher market price for inputs during natural calamities, 34.00% of farmers expressed that damaged farm infrastructure (Uddin *et al.*, 2018). A similar study on impact of natural disasters on small hold farmers in various cases reported that remoteness, lack of disaster preparedness, inadequate rescue and relief infrastructure, lack of accurate and adequate early warning and information systems, and policy and implementation shortfalls are the constraints faced by farmers (Chapagain and Raizada 2017). A study on impact of natural hazards on rice agriculture in Vietnam found that natural hazards not only affect rice quality and quantity but may also amplify some of the problems created by human activities; for instance, typhoons and sea level rise may induce saltwater flooding and aggravate salinity intrusion (Yuen *et al.*, (2021).

Description of the Study area. Andhra Pradesh state spread over two geographical areas, namely Coastal Andhra and Rayalaseema. The nation is mainly an agricultural state in which 70 Percent of its population is holding out in rural regions. The state is conventionally split into three Agro-ecological regions, namely, North Costal Andhra (Srikakulam, Vizianagaram and Visakhapatnam districts), South

Coastal Andhra (East Godavari, West Godavari, Krishna, Guntur, Prakasam and Nellore districts), Rayalaseema (Chittoor, Cuddapah, Anantapur and Kurnool districts). The coastline districts are normally affected by cyclones and floods, whereas the western and northern parts of Andhra Pradesh often experience severe drought conditions. The Krishna is the second largest Eastward Draining River in Peninsular India covering vast area in the States of Maharashtra, Karnataka and Andhra Pradesh. It is the major river passing through Krishna and NTR districts.

Among the 26 districts of Andhra Pradesh, Krishna and NTR district were selected as these districts are highly susceptible for the freaky incidence of disasters. So the present research work was conducted in Krishna and NTR districts of Andhra Pradesh. Three mandals from each district were selected based on the severity and intensity of damage due to natural disasters. Totally six mandals were selected for the purpose of study. From the list of mandals, two villages from each Mandal which are regularly affected by disasters were also purposively selected. Thus a total of 12 villages were selected for the purpose of the investigation. Forty farmers from each mandal were selected using proportionate random sampling technique. Thus, totally a 240 respondents selected for the study.

RESULTS AND DISCUSSION

A. Constraints faced by the farmers in Disaster response

Disaster response essentially includes actions taken immediately before, during or directly after an emergency occurs, to save lives and minimize property damage. Disaster response is a part of disaster phases where both individuals and state agencies coordinate together and instantly react before, during, and immediately after the occurrence of disasters.

Above Table 1 indicated that, Lack of sufficient information regarding weather forecast mechanisms was perceived as a major constraint among the farmers. Previously, farmers relied on their past experiences and perception to predict the weather. As a result, they experienced significant losses due to poor judgment. Farmers in the study area were unaware of the weather forecasting mechanisms and most of the time they were not informed about the disaster occurrence. However, the absence of the facility will undoubtedly make the farmers become ignorant of the weather situations and hence become vulnerable to the impact of changes in the climate and weather.

Table 1: Garret ranking of Constraints faced by the farmers in Disaster response.

Sr. No.	Constraints	Garret score	Garret ranking
1.	Lack of information about the accurate weather forecast	62.83	1
2.	Lack of rehabilitation from the government and NGOs	59.21	2
3.	Poor road connectivity	56.72	3
4.	Lack of social cohesiveness	53.18	4
5.	Distance between paddy field and home	49.86	5
6.	Interrupted power supply	42.36	6

Lack of rehabilitation from the government was ranked second among the constraints, with a garret score of 59.21. Rehabilitation measures aim to enable farmers to start cultivation again as soon as possible after a disaster. Farmers in the study area perceived that large numbers of NGOs were active in relief and response activities such as evacuation, provision of food, shelter, health, and sanitation measures but only a few of them worked on measures like restoration of livelihoods, training and capacity building of farmers to recover their crops and soil from damage and to mitigate the effects of floods and cyclones.

Poor road connectivity is the important constraint ranked third by the farmer with a garret score of 56.72. Since the study area is more vulnerable to floor and cyclones, poor road conditions prevent individuals from being displaced from affected regions quickly and effectively thus reduce access to other services. When cyclones or floods started to batter the farms, farmers weren't able to reach and many stayed indoors for many days. Though the trees were cleared after a week by continuous efforts from the state agencies and local volunteers, the damage caused to the roads was phenomenal. It took months to relay the roads and bring things back to normal. This is why poor road connectivity was considered an important constraint by the farmers.

Poor social cohesiveness is one more constraint perceived by the farmers. When a disaster occurs neighbors themselves are affected by the same calamities, dealing with their own household operations and they are not in a position to provide financial help to their fellow farmers.

Distance between the paddy field and home and interrupted power supply are the two more constraints perceived by the farmers with garret scores of 49.86 and 42.36.

B. Constraints Faced by the paddy growers in Disaster Recovery

Disaster recovery could be defined as the differential process of restoring, rebuilding, and reshaping the physical, social, economic, and natural environment through pre-event planning and post-event actions (Rodriguez *et al*., 2006).

The constraints faced by the farmers in the recovery phase were identified through a pilot study and categorized into four categories namely Operational, Economic, Technology and Social Constraints based on their nature.

From the Table 2, increased pest incidence and the emergence of new pest is the major constraint faced by the farmers in the study area. Increased temperature and moisture might provide favourable conditions for most of the specific pest species could result in the proliferation of destructive pest populations. Yellow stem borer and brown plant hopper have been intense in paddy crops due to climatic variation in the study area. The farmers are still finding it difficult to control the damage caused.

Immediate letting out of the water is not practiced is the second most constraint identified with an RBQ score of 76.23. The lack of a diversion channel to divert the flood water and spread it evenly to cropland is a major problem in the study area. The study area is close to the Krishna river which causes more frequent flooding than drought. The aggressive flow of water causes soil erosion and ultimately leads to the leaching of soil nutrients.

Non-availability of timely farm input is the third most constraint perceived by farmers with an RBQ score of 72.12. Farmers expressed that they were getting farm inputs from the market far away from their homes. Only manure & fertilizer, improved seed, and insecticide/pesticide/weedicide were easily available for them but purchasing of high yielding varieties, flood resistant and drought tolerant varieties required a considerable amount of money and the cost of these inputs was really very high for them less subsidies on those inputs.

Above Table 3 cleared that, With respect to the technology constraints, lack of need based technology, lack of technical guidance and difficulty in technology adoption are the major constraints faced by farmers with RBQ scores of 82.56, 79.65 and 75.26 respectively. Though trainings were conducted regarding rice cultivation, recommended technology does not satisfy the needs of the farmer with respect to natural disasters. This is mainly because the recommended rice cultivation technology may not consider the specific agro-climatic conditions, soil types, or farming practices prevalent in the region. In addition, farmers also lack the necessary knowledge or technical skills to implement and manage the recommended technology effectively.

Table 2: Rank based Quotient of Operational constraints.

Sr. No.	Constraints	RBQ	Rank
1.	Increased pest incidence & emergence of new pest	89.54	I
2.	Immediate letting out of water is not practiced	76.23	II
3.	Non-availability of timely farm inputs	72.12	III
4.	Difficulty to work in field due to high temperature	68.42	IV

Table 3: Rank based Quotient of Technology constraints.

Sr. No.	Constraints	RBQ	Rank
1.	Recommended rice cultivation technology with respect to climate change does not fit into the needs of the farmers	82.56	I
2.	Lack of technical guidance	79.65	II
3.	Difficulty in technology adoption	75.26	III

Table 4: Rank based Quotient of Economic constraints.

Sr. No.	Constraints	RBQ	Rank
1.	Poor marketing of the cyclone or flood-affected produce	92.35	I
2.	Long distance of regulated market from village	86.52	II
3.	Delay in settlement of crop insurance claim	82.15	III
4.	Rise in labour charges for intercultural operations	76.25	IV

Above Table 4 indicated that, Poor marketing of the cyclone affected produce ranked first among the economic constraints. The occurrence of cyclones during vital periods of crop growth results in heavy damage to produce which result in decreasing the price and also demand for the produce. Traders in the study area were hesitant to purchase products that appear damaged or bruised.

In regions where agriculture is the primary economic activity and villages are located in close proximity to major towns or cities, the distance to the nearest regulated market can be relatively short. This is particularly true in densely populated regions or areas with well-developed transportation infrastructure. Farmers in the study area reported that, villages located far away from the nearest regulated market which is difficult for the farmers to facilitate the trading of agricultural produce and other commodities.

Crop insurance has been a strategy for the mitigation of the impact of disaster on farming community. Getting crop loan and crop insurance claim process has to undergo a series of systematic process which would consume considerable amount of time. Rise in labour charges for intercultural operations was the last ranked issue among the economic constraints, with RBQ value of 50.47.

Table 5 reported that, Non-availability of relief materials at the right time, in the right quantity was one of those issues ranked first among the social constraints. The relief materials refer to the compensation amount, basic utilities for household, quality planting material for replanting etc. The farmers opined that they were not able to avail relief at the right time in right quantity due to various reasons.

Table 5: Rank based Quotient of Social constraints.

Sr. No.	Constraints	RBQ	Rank
1.	Non availability of relief materials in required quantity	85.32	I
2.	Lacking of training programmes on disaster management	81.02	II
3.	Lack of awareness about flood or drought tolerant varieties	79.13	III
4.	Poor extension system	72.56	IV

Lack of training programme on disaster management is the second most constraint faced by the farmers in the study area. Training farmers on disaster coping mechanisms is crucial to help them mitigate the impact of disasters on their agricultural practices and livelihoods. Most of the farmers in the study area have not participated in training regarding disaster preparedness or disaster recovery. Although agricultural departments and Krishi Vigyan Kendras (KVKs) play a crucial role in educating and training farmers, their efforts do not reach the farmers.

Lack of awareness on the flood or drought-tolerant varieties is an important constraint ranked third with an RBQ score of 79.13. This is due to a lack of sufficient information and limited outreach efforts resulting in farmers not understanding the advantages and potential yield gains associated with these varieties. The main reason is due to farmers often have established preferences for certain crop varieties based on their familiarity and experiences. They were hesitant to switch to new varieties, even if they offer drought or flood tolerance traits, due to a lack of trust or uncertainty about their performance and market acceptability.

SUGGESTIONS

1. In the study area farmers were unaware and lacking information about weather forecasting mechanisms. This study, therefore, recommends the dissemination of information to be a critical element because farmers were not informed about climate change in the study area. Extension officers who are already agents of information can be assigned to convey messages about climate change-related weather forecasts to farmers.

2. All the main villages should be linked with two or more main villages with pucca roads to facilitate the quick evacuation of people from this settlement. The basic infrastructure in all the disaster-prone areas could be provided with a special package of funds before every monsoon to ensure better preparedness before the disaster and faster recovery after the disaster.

3. Conducting targeted awareness campaigns and farmer training programs can help educate farmers about the benefits and performance of drought and flood-tolerant varieties. In addition, involving farmers in the selection and evaluation of drought and flood-tolerant varieties can build trust and increase their confidence in the performance of these crops. Participatory varietal selection trials and farmer-to-farmer knowledge sharing can be effective strategies.

4. Most of the respondents perceived that delay in insurance claims was the constraint experienced. The establishment of more financial institutions at the village level, sanctioning of crop loans before the commencement of cropping season by the financial institutions, timely settlement of the crop insurance claim, and simplified procedures for accessing the crop insurance scheme would solve the economic crisis of the farmers to some extent.

5. Development departments need to make suitable policy decisions in providing agricultural inputs at the appropriate time in the villages. Should provide support prices, insurance to all crops and subsidies to be given to targeted farmers in order to sustain their lives under adverse climatic situations.

CONCLUSIONS

The present study provides significant insights into the farmers' perspective of constraints and suggestions to overcome their constraints. The analysis is based on the primary data collected from the paddy farmers affected due to natural disasters in study area. The analysis identified that Lack of information about the accurate weather forecast is the major constraint faced by farmers during disaster response phase. Increased pest incidence & emergence of new pest, lack of need based technology, poor marketing of the cyclone or flood-affected produce and non availability of relief materials in required quantity were the some of the constraints faced by farmers during disaster recovery phase. The above provided suggestions could help farmer to overcome the constraints. Government and policy makers should concentrate on those areas to make the farmer to resilient towards natural disasters and to develop disaster resilient community in India.

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