



Evaluation of impacts of cyclones on the livelihood status of the people of coastal Odisha and its remedial measures

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ABSTRACT

The present paper evaluates the impact of cyclones on the livelihood of people in Coastal Odisha (period). Fourteen years after the super cyclone 1999, the severe cyclonic storm Phailin hits the coasts of Odisha on October 12, 2013. The very next year 2014, Odisha was under the threat of another very severe cyclonic storm (VSCS) Hudhud. While the tropical cyclone Daye made the landfall near Gopalpur on September 20, 2018 VSCS Titli made its landfall in Andhra Pradesh coast, adjacent to Gopalpur further south, resulting in severe damage to crops. The storm especially devastated farmers who were preparing to harvest paddy and other crops. Summer crops, orchards, plantations were devastated in a large scale. Although the number of casualties in the recent cyclones had been quite less as compared to the super cyclone 1999, there had been severe economic and ecological losses. Keeping view of the above, the study was conducted in the coastal districts of Puri and Ganjam which are vulnerable to frequent cyclones and its associated disasters. The study findings over agriculture, animal husbandry and fishery sector demonstrated that the cyclones and its related weather vagaries have affected the people, their livelihood and economy in the study area significantly.

Key words: Agriculture, cyclone, economic loss, fisheries, livelihood, vulnerable

INTRODUCTION

Tropical cyclones are known to have significant global impacts on human health, livelihood and economic activity. In many tropical countries, smallholder farmers are highly vulnerable to cyclones and experience significant crop losses, food insecurity affecting income from agriculture and allied sector significantly. Smallholder farmers are vulnerable to climate shocks due to their dependence on rain fed agriculture, limited areas of arable land, high poverty levels, food insecurity, lack of access to information and limited resources to prepare for and to cope with the impacts of cyclone (Mutabazi et al., 2015). Smallholder farms and climate change in Bangladesh with policy options have been studied and recommended by (Rahman et al., 2014). Odisha, the largest livelihood occupation

in agriculture in the coastal zone is frequently affected by climate extremes such as cyclones and floods. (Bahinipati et al., 2015) studied the current adaptation strategies of the farm households and the inputs from the analysis can potentially help the future policies. Odisha is one of the most important states in eastern India which is endowed with plenty of natural resources. However its crop productivity has been found to be quite poor due to water logging and cyclone and/flood problem. Crop damages due to tropical cyclones include many factors, such as salt injury due to blowing tides inland, insufficient oxygen caused by overhead flooding, flash floods wind injury to plant organs and water stress induced by enforced respiration, all of which occur at the same time (Ilizumi et al., 2008; Masutomi et al., 2012). Different farm level

adaptation practices to climate extremes have been recommended by (Bahinipati et al., 2015). Fishing is a high-risk livelihood activity due to the fugitive nature of the resource, the hostile environment of the seas and perishability of the product” (Anon. 2011). The direct impact of climatic shocks can be cyclones, floods, loss of life etc. Cyclones and floods damage boats, nets, fishing gear, and fish landing centres as well as affect education, health, housing and other community infrastructure (Jallow et al., 1999; Westlund et al., 2007). Odisha’s geographic location on the east coast of India and its climatic condition have meant that the state has historically been highly prone to climate change and multiple hazards, such as cyclones, droughts and floods (Bhatta, 1997).

STUDY AREA

The study was conducted in four villages from district Puri (Udayakani and Bamanal) and Ganjam (Podompeta and Sananalia nuagaon). The area experienced the devastating impact of super cyclone 1999, Phalin 2013 and Titli 2018. The agriculture, animal husbandry and fishing sector in the area faces severe challenges due to natural disasters causing heavy crop loss, poor crop productivity and less fish catch. Several times, these disasters create more havoc as they result in another associated unfavorable event. For example a cyclone disaster is always accompanied with storms, floods and heavy wind and thus cumulates the disaster effect. The study here is concerned with cyclone related risks and hazards that affects the inhabitant’s livelihood of the study area.

METHODOLOGY

Cyclone and livelihood related information were collected from the head of the selected households and local leaders through data sheet, FAQs (Frequent Asked Questions), questionnaires and informal dialogues. For the above study, 660 and 669 respondents were taken up from 240 different households of Puri and Ganjam districts respectively. One focus group discussion (FGD) was also conducted in each study village. Informal discussions and FGDs were carried out to gain additional insights regarding post-cyclone

livelihood strategies at household level. Secondary information was conducted by collecting data from government offices and non-government organizations such as State Disaster Mitigation Authority (OSDMA), Government of Odisha, Bhubaneswar, Nabakrishna Choudhury Centre for Development Studies, Bhubaneswar, Block Disaster Management Plan: Balikuda Block, Jagatsighpur District, Revenue Department etc. which could give an insight into the background, challenges and perspectives over all these cyclones and other natural calamities occurred in yesteryears (Anon, 2002a,b,c,d).

RESULTS AND DISCUSSION

The livelihoods in the study area were clustered into two groups such as natural resource based (agriculture, fishing, aquaculture, coconut and cashew plantation) and human resource based (boat building, net making, labour). In the present study based on field survey, observation and focus group discussions and analysis of data sheets, major livelihood groups were identified as farmers, fishermen and others (labourers, poultry owners , businessmen) illustrated in Fig. 1.

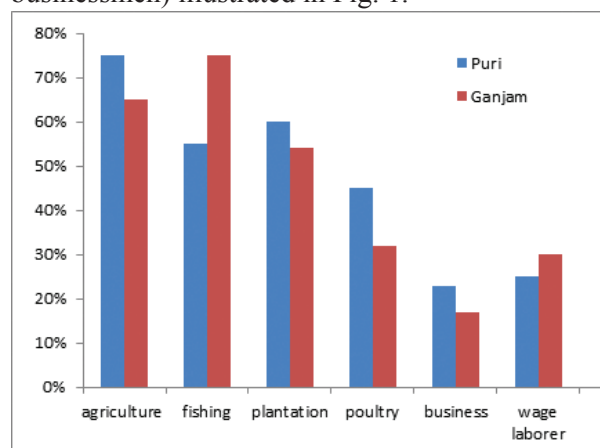


Fig. 1. Major livelihood groups in the study area

The data were collected through the interviews of different livelihood groups to analyze the losses incurred in agriculture and allied sector. The data collected were classified, tabulated and analysed. Based on the enquired data from the respondents, different areas of livelihood affection were categorized and interpreted (Table 1).

Table 1. Effect of cyclone on livelihood

Effect on livelihood	Study villages			
	Puri		Ganjam	
	Number of people interviewed	%	Number of people interviewed	%
Cause frequent flood	43	6.51	44	6.57
Prolonged dry spell	31	4.69	22	3.28
Damage of crops due to water logging	42	6.36	50	7.47
Pest attack	33	5	23	3.43
High incidence of crop failure	64	9.69	40	5.97
Prolonged and repeated illness	33	5	11	1.64
Boat damage	42	6.36	62	9.26
No communication for transportation	33	5	61	9.11
Poor fish catch	45	6.81	73	10.9
Non-availability of fish in shore lines	33	5	81	12.1
Over flowing of ponds and loss of pisci-culture	34	5.15	54	8.07
Shortage of marine fishing due to weather condition	55	8.33	76	11.3
Loss of poultry	31	4.69	13	1.94
Loss of coconut trees	61	9.24	32	4.78
Loss of agricultural crops due to lodging	62	9.39	22	3.28
Loss of livestock	19	2.87	6	0.89
N (Number of People interviewed)	660	100%	669	100%

Source: Household Survey (2019)

Effects of cyclone on Agriculture

The agricultural sector includes field crops, horticultural crops, agro-forestry plants, livestock and fisheries. Cyclones in coastal areas severely affect all these components of agriculture sector through direct damage by high speed wind, torrential rain and extensive flooding. High tide brings in saline water and sand mass making the fields unsuitable for agriculture. The indirect effects include infection and disease of farm animals, fish

and crop plants. Agricultural marketing and trade is adversely affected during and post cyclone. Cyclones in Puri district affected lakhs of coconut trees an important source of secondary income (Fig. 3). Although some farmers are going for replantation programmes initiated by government of Odisha, but new coconut trees will require 5 to 7 years to fully grow and bear fruit. In the process, the agricultural and horticultural land areas have been severely affected (Fig. 2 and Table 2).

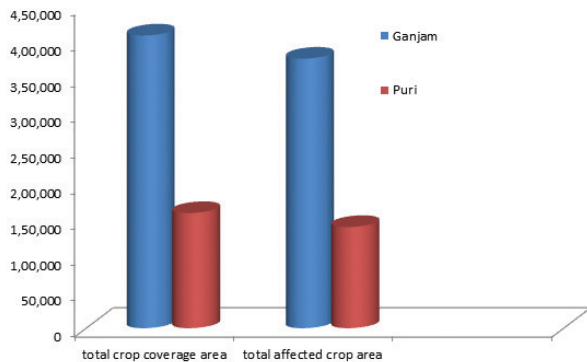


Fig. 2. Agriculture land (ha) affected due to cyclone (Source: Department of Agriculture, Government of Odisha)

Table 2. Horticulture crop area (ha) damaged

Districts	Type of crop	Area affected (ha)	Remarks
Ganjam	perennial fruits	8157	coconut
	vegetables	24,489	
	Kewda	734	
	Floriculture	245	
	Betel Vine	528	
Puri	perennial	1340	coconut, palm
	non-perennial	840	banana, papaya
	vegetables	2990	

Source : Department of Agriculture, Government of Odisha



Fig. 3. Coconut plantation affected due to cyclone

Cyclonic impact on Livestock Resources

As per Odisha rapid damage and need assessment report, the cyclone has caused a significant impact on the livestock in Odisha impacting the food security of the affected households (Anon, 2013). The total number of livestock that are affected in the thirteen districts due to the cyclone and floods are reported as 7.02 million which is about 16.7% of the total livestock population of the state. The reported number of livestock deaths in the three most severely affected districts i.e. Puri, Ganjam and Khordha includes 1,425 large animals (cow/buffalo), 2,906 small animals (goats/sheeps) and about 156,000 poultry.

Effect of cyclone on Fisheries Resources

Fishery based livelihood in the above households have high exposure to climate related shocks and stresses, especially floods and cyclones, because the communities are located in the coastline and livelihoods are dependent upon marine fishing from small vessels. Due to frequent cyclones, storms the fishermen have to abandon their fishing trips and have to return back to the coast. The incomplete trips caused a huge loss to the fishermen (Fig. 4). As per the Odisha rapid damage and need assessment report, the fisheries activities (inland, lagoon and marine) in Ganjam, Puri and Khordha districts have been severely affected (Anon, 2013). As of November 29, 2013, an estimated total of 8,423 boats (including catamarans), 33,398 nets



Fig. 4. Fishery affected due to cyclones

and 5,742 ha of inland fish tanks have been fully or partially damaged in the three districts. Due to the disaster, the tanks and the inland fish farms were contaminated and the fish escaped as the water table increased. Hence, there have been severe decline in fish production (Fig. 5). Tropical cyclones and tidal surges damaged house, boat, fish landing jetty, road and other physical assets that make the fishing community workless. Lack of other source of income made them bound for fishing even in rough weather.

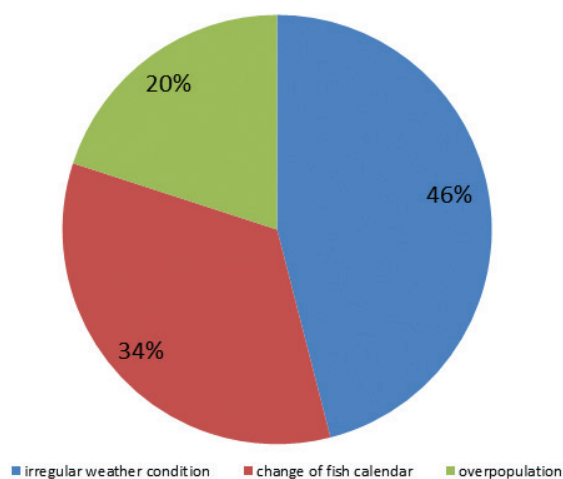


Fig. 5. Reasons for decline in fish production (Household survey, 2019)

CONCLUSION

The study finds that agriculture, animal husbandry and fishery sectors, the main sources of livelihood in coastal Odisha were worst affected due to frequent cyclones. Although the number of causality has decreased after the super cyclone of 1999 due to good disaster management practices by the government, more focus need to be given on protection of livelihood source of poor farmers and fishermen.

SUGGESTIVE MEASURES

- The adaptation practices as well as the coastal ecosystem specific opportunities like provision of wind-brake plantation should be adopted.

- Massive plantation in coastal zone helps in reducing the wind speed and simultaneously provides fuel, wood and timber.
- However, in case of post cyclonic phase, advanced crop management interventions and moisture conservation techniques should form the main component and that should be adopted by the farmers on large scale to sustain the cultivated land.
- Creeper vegetables like water melon, pumpkin, ridge gourd, cucumber, and bitter gourd can be planted to provide immediate economic support.
- More investment should be directed into the agriculture, animal husbandry and fishing sector. Options for microcredit loans should be explored to increase the output in agriculture and allied sector, particularly in a cyclone disaster recovery stage when livelihood are likely to be damaged by salt water intrusion and heavy winds.
- Selection of rice varieties, to escape maturity during this peak period of cyclonic disturbances is one option. Rice varieties like Durga and Varsha Dhan maturing after mid December may be adopted in suitable ecosystem.
- Plants such as lemongrass and citronella can be popularized among farmers living in saline areas as these crops are strong and can provide aroma oils.
- Promotion of natural calamity insurance can be one of the best initiatives to enhance cyclone resilient agri and allied communities.
- Alternative livelihood options like fish pickling, making of hand fan with coconut leaf, appropriate training on new innovative fish farming should be provided.
- Moreover, small and cottage industries including design and embroidery clothes, preparing mat, making of bamboo made fishing traps can be other innovative options of livelihood.

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