GLOBAL JOURNAL OF BIO-SCIENCE AND BIOTECHNOLOGY

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IMPACTS ON AGRICULTURE FOLLOWING THE 2009 CYCLONE AILA: LESSONS FOR RECOVERY

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ABSTRACT
Agriculture in India faces severe challenges in the form of climate change, increasing population, environmental degradation, natural disasters resulting in loss of crop and reduces productivity. The number of people at risk has been growing each year in the world and more vulnerable to disasters. This study explores how affected agriculture and rural communities have adapted and mitigated impacts following a cyclone and floods from the 24th May, 2009, one of the largest cyclones of the twentieth century in West Bengal, India. Cyclones are some of the most common and devastating natural disasters on the Indian Subcontinent. The cyclone followed by flood causes severe damage to agriculture in many folds. To mitigate the effects of natural calamities, short-term strategies like relief and long term programmes such as avenue plantations, construction of major and medium projects, soil and water conservation measures may serve to minimize flood and cyclone. To overcome the loss of agriculture integrated farming system should be developed. This study suggested people demand more financial support by the government. 50 % of the respondents suggested that planting trees besides the river to protect from strong wind and 34 % percent of the respondent suggested that they need more relief materials from govt. Cultivation of some aquatic crops such as water chestnut, typha species and colocasia species along with pisiculture (Cultivation of fish) reclaimed the waterlogged areas.

KEYWORDS: Agriculture, cyclone, impacts, recovery, mitigation, disaster.

INTRODUCTION

The Asia Pacific Region faces over 60% of the world's natural disasters. India, on account of its geographical position, climate and geological setting, has had from time immemorial, a fair share of these disasters. There is hardly a year when some part of the country or other does not face the spectra of drought, due to the failure of monsoons in vulnerable areas. One or two cyclones strike the peninsular region of the country every year. Similarly, floods are a regular feature of the eastern India where Himalayan Rivers inundate large part of its catchment area uprooting people, disrupting livelihood and damaging infrastructure (GOI-UNDP, 2009).

Cyclone *Aila* was the second tropical storm formed in Northern Indian Ocean in 2009. According to the Government data more than 11, 00,000 people who fled (their) homes had been sheltered in several hundred shelters in eight coastal districts so far. The Government estimated that the total 111 blocks, 40 municipalities, 15401 villages and 4,53,0000.00 people were affected. (GOI, 2009).The cyclone collapsed more than 500 kilometers of embankments and 926,000 semi permanent houses. In West Bengal, the damage in North and South 24 Parganas districts of West Bengal in India has been the maximum. The total crop area affected were 2, 60,000 ha.

Agriculture plays an important role in the social and economic life of people in India, and will continue to do so in the foreseeable future. About 70 percent of the total population directly or indirectly dependent on agriculture as the main source of livelihood. Now a day's agriculture faces important challenges in India due to environmental degradation, deforestation, global warming, increasing population, nuclear explosions, air pollution *etc*. Currently almost 46 percent of India's geographical area is under agriculture. A large percentage of this land falls in rain-fed regions generating 55 percent of the country's agricultural output, providing food to 40 percent of the nation's population (Ahmad *et al*., 2011; Planning Commission, 2012). More than 80% of the farmers are smallholder producers, with very poor capacity and resources to deal with the vagaries of weather and changes in climate. Keeping this in mind the major objective of this study is to impact of disaster in agriculture.

MATERIALS AND METHODS

The districts North and South 24 Parganas of West Bengal were selected purposively for the study because these two districts were the most severely affected by cyclones and floods. Seven blocks namely Basanti, Gosaba, Namkhana, Kakdwip, Sandeshkhali I, Sandeshkhali-II and Parthar pratima and were selected purposively. From the selected blocks, 60 local institutions and 150 villagers were selected randomly as respondents. The study area a coastal, underdeveloped area is one of the most visible victims of the ravages of climate change in India. Fragility of the ecosystem coupled with underdevelopment has made this region particularly vulnerable.

RESULTS AND DISCUSSION

From the above table-1, it is amply evident that natural disaster occurs in the study areas in every year except in the year 2000, 2001, 2004 and 2005. However their

impact of life varies from high to severe. In the year 2002 and 2003 their impact of life was high, in 1999, 2007 and 2008 was moderate and 2006 and 2009 was severe. A severe cyclonic storm passed over Sandeshkhali-I, Sandeshkhali-II, Hingalgunj and Minakhan blocks on 11.11.2002 affecting 5483 number of people. 195 numbers of houses were destroyed and 731 were damaged due to the calamity. The event of crop area damaged was 644.30 ha. Heavy rainfall in 2003 caused flood, breach of embankments and erosion were reported from Sandeshkhali-I and Sandeshkhali-II blocks. Due to the calamity, 14 Blocks in North 24 Parganas district were severely affected. On 25 May, Cyclone Aila hit costal Bengal with a maximum wind speed of 120 kmph affecting over 1.5 million people. Over 6.77 million people have been affected and 137 killed in North 24 Parganas and South 24 Parganas.

TABLE 1- Occurrence of Natural Disasters (last 10 years) and its impact on the study area

Sl. No	Type of hazard	Year of occurence	Duration	Impact on people	Impact on livestock	Remarks
1.	Drought	1998-99	One week	Moderate	Affected to a great extent	Damage of crops for want of sufficient water
2.	Cyclone	1999	2- 3 days	Moderate	Death of some livestock	Washing out of embankments
3.	Cyclonic storm with flood	2002	One week	High	Moderately affected	Crop area damaged
4.	Flood	2003	One week	High	Moderate	Crop sector and Fisheries sector were severely affected
5.	Cyclone	2006	2-3 days	Severe	Affected to a great extent	Damage of mud houses was very high.
6.	Flood	2007	One week	Moderate	Moderate	Damage of seasonal Crops
7.	Flood	2008	One week	Moderate	Affected to some extent	Houses were damaged to a considerable extent
8.	Cyclonic storm with flood	2009	Two weeks	Severe	Causes death of huge livestock	Extreme damage on people, livestock and infrastructure

TABLE 2: Assessment of damage in terms of human lives in the study area (1999-2009)

Sl. No	Block	Name of G.P	Human casualty		
			Death (No)	Affected population(No)	Vulnerable/ immobile people (No)
1.	Basanti	Basanti	00	15026	08
		Bharatgarh	00	26416	04
		Jharkhali	2	18496	02
		Ramchandra khali	00	19118	07
		Nafar ganj	00	14767	03
2.	Gosaba	Choto molla khali	01	18430	15
		Satzelia	2	16693	22
		Lahiripur	5	20752	14
		Kumir mari	5	16192	11
		Rangabelia	00	13801	05
3.	Kakdwip	Surjanagar	00	14454	11
		Rishi Bankim Chandra	00	24030	08
4.	Namkhana	Mousuni	02	20013	26
		Sibarampur	00	26124	12
		Namkhana	00	25563	10
		Budha khali	00	18790	09
		Haripur	00	21765	07
5.	Pathar pratima	Dakshin roy pur	01	23385	08
		G-Plot	8	25561	17
		Pathar pratima	00	26604	24
		Digambarpur	00	18229	10
		Ramganga	2	14425	33
		Durbachati	00	16655	14
6.	Sandeshkhali-I	Kalinagar	1	21160	23
		Hatgachi	01	17285	19
		Bayermari – I	02	14570	21
7.	Sandeshkhali-II	Bermajur-II	02	15932	15
		Bermajur-I	01	10895	23
		Sandeshkhali	04	17450	16
		Jelia khali	02	18736	25
	Total		41	571317	422

Source: Records of the concerned local self government

TABLE 3: -Impact of loss on land area (1999-2009**)**

Sl. no	Block	Name of the G.P	Agricultural Land effected (ha)	Shrimp farm area effected (ha)
		Bharatgarh	974	60
		Jharkhali	3246	98
		Ramchandra khali	1400	58
		Nafar ganj	2000	42
		Choto molla khali	1355	56
		Satzelia	1231	51
2.		Lahiripur	1600	70
	Gosaba	Kumir mari	1515	110
		Rangabelia	722	40
		Surjanagar	1973	45
3.	Kakdwip	Rishi Bankim Chandra	655	42
		Mousuni	637	80
		Sibarampur	2042	43
4.		Namkhana	1245	100
	Namkhana	Budha khali	2030	32
		Haripur	876	41
		Dakshin roy pur	1451	105
		G-Plot	3000	88
	Pathar pratima	Pathar pratima	2677	78
5.		Digambarpur	2536	123
		Ramganga	2369	64
		Durbachati	3765	123
		Kalinagar	1526	135
6.	Sandeshkhali-I	Hatgachi	1271	55
		Bayermari – I	1240	78
		Bermajur-II	874	92
	Sandeshkhali-II	Bermajur-I	723	43
7.		Sandeshkhali	1852	102
		Jelia khali	1459	67
		Total	49476	2196

Source: Records of the concerned local self government (2009)

TABLE 4:- Impact on Livelihood

Sl. No.	Main source of income	Before disaster (%)	After disaster (%)
1.	Agriculture	60%	22%
2.	Daily wages	25%	65%
3.	Aquaculture	5%	4%
4.	Small business	3%	3%
5.	Service	2%	2%
6.	Animal husbandry	2%	2%
7.	Honey collection	3%	2%

TABLE 5:-Distribution of respondents according to their suggestion to disaster management

Sl. No	Suggestions given by respondents	Number	Percentage
1.	Strengthening coastal embankments and infrastructure	30	20.00
2.	Providing basic support services	39	26.00
3.	Build up disaster resistance houses	24	16.00
4.	Supply of agricultural inputs	45	30.00
5.	Supporting long-term income generation activities	24	16.00
6.	Arrangement of disaster shelters	42	28.00
7.	More financial support from the government	51	34.00
8.	Repair/ maintenance of river embankment	27	18.00
9.	Planting trees besides the river to protect from wind	75	50.00
10.	Early warning system should be forecasted well in advance	48	32.00
11.	Local institutions must be taken more initiative in future	28	18.67
12.	Need more relief materials from govt.	51	34.00
13.	Training and orientation for capacity building	07	4.67

Out of 41 deaths in seven blocks, the Pathar Pratima alone accounted for 11, followed by 9 in Sandeshkhali –II block as can be observed from Table 2. The highest number of deaths occurred in G-Plot gram panchayat in Pathar Pratima block followed by Kumirmari, Lahiripur gram panchayats in South 24 Parganas district. In North 24 Parganas district four persons were killed in Sandeshkhali gram panchayat followed by two in Bayermari – I gram panchayat in Sandeshkhali-II block.

The damages to the houses and other infrastructure seems to be very high, as large amount of water that inundated the village soaked the region and the mud and thatched houses sunk into the mud. 422 vulnerable people were rescued and evacuated by the local institutions and Non-Governmental Organizations in the study areas. Vulnerable people include pregnant women/ lactating mothers, children below 5 yrs, uncared aged/ destitute, single women headed household, fishermen, deaf /dumb, blind, mentally challenged, sick and ailing, inhabitants of thatched houses, houses living near seas/ rivers. Around seven million people have been affected and more than hundred people died in the study areas according to the Government of West Bengal, India. More than 500 kilometers of embankment damaged due to the cyclone. In all the affected villages of study areas, there was a high demand for safe drinking water, sanitation facilities, and good hygiene practices, access to healthy food, temporary shelters and critical medical facilities.

Table-3 shows the impact of disaster on agricultural land and shrimp farm areas in the study area. The storm was especially devastating for farmers who were preparing to harvest rice and other crops. The cyclone, which was accompanied by heavy rainfall, flood and landslide, had led to a situation which was precarious and caused severe damage in South 24 Parganas and North 24 Parganas districts. As far as damage to agriculture was concerned, 49476 ha of agricultural land with kharif crop were destroyed because of rise in salinity in the soil and loss of embankments. Maximum damage to agriculture land occurred in Pathar Pratima followed by Basanti and Namkhana.

The economy of the study areas was based on agriculture, fishing and collection of non-timber forest produce (NTFP), all natural resource-based activities. Around 61 percent of the population consisting of both cultivators and daily wage labourers depends on agriculture and fishing to sustain their livelihood. Approximately 22 per cent of the workforce engaged in organized and unorganized sectors such as trivial jobs with the government, labourers and the self-employed. Of this, just about 9 per cent on an average work in the organized sector, such as at petty government jobs with the public distribution system or the post office. About 7 percent hold regular jobs in the unorganized sector, such as in cottage industries (Centre for Science and Environment, 2012).

Agricultural production system was totally hampered after disaster due to high salinity and PH condition of soil. Paddy, Wheat, Sugarcane, Chilli and Pulses production was highly destroyed. Mainly two type of paddy were cultivated in this region (Debnath, 2013).

Table-4 depicts the impact of livelihood in the study areas. Before the disaster the majority of people in the affected areas were self-sufficient and largely depended on agriculture for their livelihood. After the disaster major portion of work force shifted their occupation from agriculture to daily wages. The others continued their occupation remain more or less same. Following the disaster, many farmers and fishermen were left jobless as most of the agriculture land was inundated with saline water. Inundation in the agriculture land has caused huge damage to crop. It is evident from the above information that major portions of the workforce engaged to daily wages labourers. For this, a major portion of the workforce migrates to nearby districts even to outside states for a gainful employment. However Mahatma Gandhi National Rural Employment Programme has created some scope for creating additional employment to the job – seekers at GP level. People were migrated to nearby town or cities for searching of jobs, as the only alternative for livelihood earning. Migration has highly increased after this disaster. Most cultivators can cultivate only one crop a year. Many have become wage labours and have left for other places in India in search of jobs. The women folk, back at home, have to do all the work on field and home. Children hardly find time to go to school. Aged does not want to leave their ancestral home even if in dilapidated condition and susceptible to further hazards.

Table-5 shows that respondents suggested arranging for permanent disaster shelters in near future. The few temporary cyclone shelters available at present are not sufficient to protect majority of people at the study sites. Therefore, sufficient number of cyclone shelters should be constructed at the sites before any other cyclone. Maximum number of the respondents suggested repair and maintenance of the damaged embankments and communication system on a priority basis to protect the affected area from further flooding and tidal surges. While distributing relief materials and financial support by the local institutions there were some biases in selecting the victims. Government provides only Rs.10, 000 and Rs. 2,500 for the Aila victims whose houses were fully and partially damaged, respectively. They suggested more financial support by the government. 50 % of the respondents suggested that planting trees besides the river to protect from strong wind and 34 % percent of the respondent suggested that they need more relief materials from govt. A glance of the table suggests that majority of the respondent were in favor of permanent solutions rather than token and temporary measures. For improving the livelihood of the poor people proper livestock management is required. Food (fodder) is very important for rearing livestock. So for supplementary food, saline resistant fodder varieties like Coix commonly known as Kara, Gargara etc. should be cultivated. Low cost technologies must be adopted in a way that does not affect the socio-economic condition of the poor underprivileged people.

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