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Impact of Climate Change on Food Security: Study on Odisha State

Ranjan Kumar Pradhan

Lecturer, Department of Economics, Banamalipur College, Khurda, Odisha, India

Jiban Kumar Parida

Research Scholar, Department of Management, Berhampur University, Berhampur, Odisha, India

Abstract:

Climate change being one the centre point of academic and policy discussion round the world which reveal that agriculture has always been affected by climate variability often resulting in food insecurity, hunger and poverty. The greatest challenge that the world faces today is the devastation of climate change. As per the Intergovernmental Panel on Climate Change (IPCC) projects, which predicts the global mean temperature may increase between 1.4 and 5.8 degree Celsius by 2100. In turn it is expected to have severe impacts on global hydrological system, ecological system, sea level, agricultural production and many other related processes posing a challenge for the sustainable development. It shall definitely slow down the pace of development through increased exposure to climate variability and erosion of capacity to adapt. With these surroundings an attempt has been made in the present paper to study the impact of climate change on food security based on Odisha state.

Keywords: Food security, sustainable development, climate

1. Introduction

To meet ever increasing demand of foods for rapidly growing population in context of climate change is the major concern of many countries of the world. By 2050 approximately 70 percent more food will have to be produced to feed growing populations, in particularly in developing countries (UN. 2009, FAO 2001). Agriculture has been placing greater pressure on biological diversities. As climate change causes temperature to rise and precipitation pattern to change, more weather extremes will potentially reduce global food production (Nelson et al. .2010). Climate change aggravates the situation for both biodiversity conservation and food security by increased risks of crop failure. Climate change is an unprecedented threat to food security of a larger section of people who depend on agriculture for their livelihood. Climate change affect agriculture and food security and the likewise agriculture and natural resources management affect the climate system. In many less developed countries of the world increased production has occurred by the expansion of agricultural land rather than the expansion of productivity of land. Both intensification and intensification have negative impact on the environment. The need to reduce the environmental impacts while increasing productivity requires a significant change in the way agriculture currently operate.

Climate change is the most dangerous effect of global warming. Prolonged heat waves and increase in length of summer season, short stay of winter, irregular and uncertain rainfall would adversely affect the ecology. Increasing instances of sunstroke death, drought and desertification would be the fallout of climate change. Global warming would adversely affect agricultural production and productivity. There would be shift of climate and agricultural zones pole ward. Average temperature is expected to increase more near the poles than the near the equator. A warmer climate would reduce soil moisture and evaporation rates. This will reduce crop yield like that of rain fed rice. Unseasonal rainfall will pose a threat to crops nearing maturity. Extreme weather conditions like severe rainfall and scarcely rainfall would bring flood and drought effective's agricultural production and endangering food security. The threat of climate change looms large over Indian agriculture. A 1⁰C increase in the temperature will reduce the duration of wheat and rice in north and western India by a week. This will result in reduction of rice yield by 4 to 5 quintals per hectare. Besides affecting the productivity climate change will result in emergence of new seeds, pests, shifting the range of various species, decline in milk production and increased susceptibility to various diseases.

2. Extent of Climate Change in Odisha

The climate of Odisha is tropical, characterized by high humidity, high temperature, medium to high rainfall and mild winters. The normal annual rainfall is 1451.2mm.About 84 per cent of rain fall is received during the period from June to September (south-west monsoon). Even the quantum of rain fall is quite high; its distribution during the monsoon period is highly uneven and erratic. Flood, drought and cyclone occur regularly with varying intensity. Due to frequent occurrence of these natural calamities, either alone or in combination, the production of Kharif rice, the major crops of the state suffers badly. Similarly, in drought years there is considerable impact in production of pulses and oilseeds both during kharif and rabi. With 2/3rd of crops grown rain fed, a good harvest is much dependent on a favorable monsoon. In spite of all these, agriculture has proven to be the most resilient industry registering a reck on

able growth over years. From the physiographic point of the view the state has been divided into four zones such as the Northern Plateau, the Eastern Ghat zone, the Central Table land and the coastal zone. On the basis of climate, soil rainfall and topography, the state has been divided into 10 agro-climatic zones. The state's agriculture sector frequently suffers from natural socks like cyclones, droughts and flash floods. The land available for agricultural use has been declining in Odisha. The agricultural and animal husbandry subsector form 83.36 per cent of Gross State Domestic Product share of the Agriculture sector for the year 20012-13.

The climate of Odisha has undergone a considerable change due to various reasons. The age-old six seasons of a year has turned into practically two seasons- summer and rainy. The variation of day's temperature and annual rainfall is very significant. Now annual rainfall is confined to 4 months in a year and number of rain days has come down from 120 days to 90 days. In some years there is 2 to 3 times of the normal rainfall per annum. Similarly the mean temperature has increased about 25 percent. As a result frequent floods, cyclones and droughts are visited to the state. These climate change related natural calamities affecting production and productivity of food grain adversely. Climate is an important input for enhancement of food grain productions and assurance of food security of the people of Odisha.

There are two major climate stressed regions in Odisha such as (i) the coastal belt and flood plains and (ii) drought prone Western and Northern Part of Odisha. The people face perpetual flood and a high drought like situation. The pattern of drought in the state is of a varied one, sometimes affecting the entire state, sometimes a few regions and sometimes a few districts. However, the contiguous patch consisting of the subdivisions of Padmapur, Bolangiri, Titilagarh, Patnagarh, Khariar, Nuapada, Bhabanipatana and Phullabani comprises 47 blocks have been identified as the drought prone area. In 1950, only three districts were drought prone districts. By 1980 the whole of the western Odisha has been drought affected. Now 25 districts out of 30 districts have affected. A new trend is that previously unaffected areas like Sundargarh and even coastal districts like Kendrapara have to affect. Frequency of occurrence of drought exceeds that of the flood and the cyclone.

SI No	Year	Normal Rainfall (mm)	Actual Rainfall (mm)	Natural Calamities
1	1951	1482.2	1350.0	
2	1952	1482.2	1574.5	
3	1953	1842.2	1456.7	
4	1954	1842.2	1211.1	
5	1955	1482.2	1509.8	Flood
6	1956	1482.2	1834.6	Flood
7	1957	1842.2	1436.4	
8	1958	1842.2	1478.5	
9	1959	1842.2	1352.8	
10	1960	1842.2	1395.4	
11	1961	1502.5	1262.8	Flood
12	1962	1502.5	1169.9	
13	1963	1502.5	1467.0	
14	1964	1502.5	1414.1	
15	1965	1502.5	997.1	Severe Drought
16	1966	1502.5	1134.9	Drought
17	1967	1502.5	1326.7	Cyclone, Flood
18	1968	1502.5	1296.1	Cyclone & Flood
19	1969	1502.5	1802.1	Flood
20	1970	1502.5	1660.2	Flood
21	1971	1502.5	1791.5	Severe Cyclone, & Flood
22	1972	1502.5	1177.1	Drought & Flood
23	1973	1502.5	1360.1	Flood
24	1974	1502.5	951.2	Flood, & Severe Drought
25	1975	1502.5	1325.6	Flood
26	1976	1502.5	1012.5	Severe Drought
27	1977	1502.5	1326.9	Flood
28	1978	1502.5	1261.3	
29	1979	1502.5	950.7	Severe & Drought
30	1980	1502.5	1321.7	Flood & Drought
31	1981	1502.5	1187.4	Flood, Drought, Tornado
32	1982	1502.5	1179.9	High Flood & Cyclone
33	1983	1502.5	1374.1	
34	1984	1502.5	1302.8	Drought
35	1985	1502.5	1606.8	Flood
36	1986	1502.5	1566.1	Drought & Cyclone
37	1987	1502.5	1040.8	Drought

38	1988	1502.5	1270.5	Drought
39	1989	1502.5	1283.9	
40	1990	1502.5	1865.8	Flood
41	1991	1502.5	1465.7	
42	1992	1502.5	1344.1	Flood & Drought
43	1993	1502.5	1421.6	
44	1994	1502.5	1700.2	
45	1995	1502.5	1588.0	
46	1996	1502.5	990.1	Severe drought
47	1997	1502.5	1493.0	
48	1998	1502.5	1277.5	Severe Drought
49	1999	1502.5	1435.7	Super cyclone
50	2000	1502.5	1035.1	Flood & drought
51	2001	1482.2	1616.2	Flood
52	2002	1482.1	1007.8	Severe drought
53	2003	1482.2	1663.5	Flood
54	2004	1482.2	1273.6	Moisture stress
55	2005	1451.2	1519.5	Moisture stress
56	2006	1451.2	1682.8	Moisture stress/Flood
57	2007	1451.2	1591.5	Flood
58	2008	1451.2	1523.6	Flood & Moisture stress
59	2009	1451.2	1362.6	Flood , Moisture stress, Pest attack
60	2010	1451.2	1293.0	Drought & unseasonal rain
61	2011	1451.2	1327.8	Drought & flood
62	2012	1451.2	1391.3	Drought in Balasore, Bhadrak, Mayurbhanja and Nuapade
63	2013	1451.2	--	Cyclone
64	2014	1451.2	-	Cyclone

Table 1: Rainfall and Natural calamities in Odisha

Source: 1) Board of Revenue, Odisha, 2) Agricultural Statistics of Odisha, 3) Director of Agriculture and Food Production, Odisha

The disasters, recurring droughts, floods and cyclones are regular features of Odisha and have crippling effect on the economy. The state experiences either heavy flood or drought almost in alternate years due to uneven distribution of rainfall. Due to these during last 64 years (1951-2014) the state has passed through about 45 numbers of natural calamities, of them floods have occurred 25 times, cyclone 8 times and drought 20 times. The flood in 1980, 1982, 2001 and 2003 were particularly severe and there have been notable flood events in each of the 4 years. In the state 1.40 lakh hectares are flood prone and there are 516 numbers of vulnerable points.

The frequent flood and cyclones destroy transport system in rural areas. The standing crops are completely damaged by flood due to long period of submergence of crops plants. It is estimated only 5-10 per cent of normal yield of crops is harvested by farmers. Outflow from rivers and its force erodes the top soil of fields and fills them with saline sands.

The Super Cyclone of 1999 about 17.33 lakhs hectares of land were severely affected and yield rates were low and food grains produced was reduced to 56.01 lakh MT. the cyclone alone destroyed 2 million tons of rice crop. It is estimated that on an average lakh per hectare of production are lost every year between 1980 and 2000, agriculture contribution to SGDP fell by 16 percent (Bhuyan et al. 2003).

The climate change contributes significantly to poverty in various degrees in different zones in Odisha

Years	Coastal areas	Southern area	Northern area
1993-94	43.03	25.26	31.71
1999-2000	31.44	33.40	35.15
2004-05	24.01	33.60	42.39

Table 2: Poverty incidence in Odisha (In per cent)

Source: Economic Survey, Government of Odisha, 2009-10

The table -2 shows that concentration of poverty in coastal areas was more (43.03 %) in comparison to southern and northern area of Odisha in the year 1993-94 and it has been reduced in later periods. But in southern and northern areas incidence of poverty has been increasing in subsequent periods.

3. Food Security

The fluctuation of the agricultural production in Odisha is due to climate change. So food security of the state is in jeopardy. Majority of the people of Odisha are now suffering from chronic food insecurity and under nutrition as per Planning Commission of India. With over more than 30 per cent of people unsure about accessing their daily bread, 50 per cent of our children are under nourished and about 25 out of 1000 dying before the age of one year, food security is undoubtedly a major issue before us. Poor productivity, vagaries of nature and threat of climate change are the biggest challenges for food security. Food security normally involves strengthening livelihood security of the member of household by ensuring physical and economical access to balance diet, safe drinking water and environmental sanitations, basic health care and primary education.

The hunger index of Odisha is 12 as against in Andhra Pradesh, and 1 in Punjab. As per Planning Commission of India the incidence of poverty in the state 37.4 per cent as against 27.5 per cent in all India level. The living conditions of the tribal people are still worse. They live on tree roots and forest products. The climate change affects adversely the marginal, small and tribal farmers in the state. The small and marginal farmers which constitute 50 per cent of the total farming community practice subsistence farming. Their problems are different than large size farmers, who can face impact of climate change. The benefits of technology go to resourceful farmers.

Odisha is bestowed with rich natural endowments. Abundant water resources and diversified agro-climatic conditions suitable for growing innumerable crop varieties could be optimally exploited to bring about sustainable development in the field of agriculture.

4. Suggestive Measures

The following suggestion may be recommended to avert adverse climatic conditions and food security in Odisha.

- i. Natural calamities are the regular feature of the state and these are handled with care. To ensure food security, the research organizations have to recommend different cropping plans for different agro-climatic zone.
- ii. The rural youth can be engaged in construction works, poultry farming and the other to reduce impact of extreme rainfall events in farmers.
- iii. Women Self Help Groups can play important role to supplement the family income by small entrepreneurship and reduce food insecurity in agricultural households.
- iv. In rural agricultural allied sectors like livestock, poultry, fishery enterprises should be encouraged for engagement of unproductive rural youth.
- v. Production of horticulture crops should be increased. With the predicted increase in the vagaries of climate the horticulture sector will have to be oriented towards perennial fruit plantation. Promoting of fruits plantation will lead to enhancing carbon sinks.
- vi. For raising the production of grains the farmers in drought prone areas are advised to grow early varieties of drought tolerant rice of short duration around 100 days. For rain fed hill slope millet based farming system is to be adopted.
- vii. In view of uncertainties associated with the climate change, research and development work should be enhanced. Research will lead to strengthening preparedness to tackle emerging scenarios of pests, increase production of different food grains under various weather conditions.
- viii. Drought proofing technologies may be disseminated to the farmers by extension services by technical personnel of agriculture department.

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