

AN EMPIRICAL STUDY OF IMPACT OF DROUGHT ON AGRICULTURAL PRODUCE AND USE OF INPUTS IN RAJASTHAN

DEV KARAN

Assistant Professor, Department of Economics
Jai Narayan Vyas University, Jodhpur, Rajasthan

REKHA

Assistant Professor, Department of Economics
Jai Narayan Vyas University, Jodhpur, Rajasthan

Abstract

The situation of drought is very common for the state of Rajasthan and drought studies are important in context of Rajasthan because of their influence on the society and the economy this state. An attempt in this direction of thought would certainly help one to understand. the natural process of drought for further work. Drought and Rajasthan seems to be synonymous. Drought is a natural disastrous phenomenon and it differs from other natural hazards. Drought is taken to have occurred over an area where the annual rainfall is less than 75 percent of the normal, and if the annual rainfall is less than 50 percent of the normal it is called a severe drought.

Drought affected areas in Rajasthan are lagging behind in agriculture and also in overall economic growth. They experience wide year-to-year fluctuations in agricultural production and incomes and have a relatively high incidence of poverty. At the time of drought in Rajasthan humans and animals migrate in search of fodder and water to the neighboring states which upsets the economic balance. Present paper tries to analyze the impact of drought on the performance of agriculture sector in Rajasthan.

Keywords: Drought, Cropped area, production, productivity, agriculture inputs.

I. INTRODUCTION

Drought is viewed in different ways by different constituency of water users. Drought definitions are of two types firstly conceptual draught, which help to understand meaning and effects of draught and secondly, operational definition which helps to identify the beginning, end and severity of draught.

India is an agrarian country and agriculture is the backbone of Indian economy. In India, agriculture and animal husbandry are primary occupation and thus prosperity of agriculture is largely responsible for the prosperity of entire Indian economy. The success or failure of farming is intimately related to the state of weather conditions. There is very high diversity in weather conditions from one region to another. In some parts when agriculture suffers from scarcity of rainfall, the flood in other parts playing havoc with the agricultural production and life of human beings and livestock. Mostly it is the drought which poses many problems. Since irrigation facilities are limited in many parts of the country, drought often results in partial or complete failures of crops and hardship to the livestock population.

Rajasthan is predominately an agrarian state where about 66 percent of the population depends on agriculture as a source of livelihood. Water resources in the state are decreasing gradually. At present less

than one fourth of the agricultural area in the state is under irrigation. The gross cropped area has been fluctuating from year to year depending on the monsoon conditions. Agriculture in Rajasthan is primarily rain fed. The period of monsoon is short and the state faces late onset and early withdrawal of monsoon. About 90 percent of the rainfall is received during monsoon seasons. In addition to spatial variation, there is much variation in yearly pattern of rainfall. Approximate 65 percent of the total cultivation is under kharif season and is mostly dependent on rainfall which is aberrant and uncertain. At the same time about 60 percent of the total irrigated area is under wells and tube wells. The ground water table is rapidly and uncertain. Some areas of the monsoon of the state received mild rains and others than the normal rainfall of the state. Therefore the Kharif and Rabi sowing are expected to be less than the normal target.

Rajasthan is facing draught since ancient times, so it received attention from all rulers of that time and after independence various governments make special provision for draught prone areas in various plans. After independence draughts have received much more attention of policy makers than before. Evolution in the draught policy in Rajasthan is seen over the past few decades and as a result bad affects of famines have been eradicated and starvation deaths are rare or minimized.

National Commission on Agriculture (1976) broadly classified draughts into the following three types.

(i) Meteorological draught: It is a situation when there is a significant decrease in rainfall from the normal over an area.

(ii) Hydrological draught: Meteorological draught, if prolonged, results in hydrological draught

with marked depletion of surface water and consequent drying up of inland water bodies such as lakes, reservoirs, streams and rivers and fall in level of water table.

(iii) Agricultural draught: It occurs when soil moisture and rainfall are inadequate to support crop growth to maturity and cause extreme crop stress leading to the loss of yield.

Apart from the draughts defined by National Commission on Agriculture, Socioeconomic draught is also defined. Socioeconomic draught occurs when physical water shortages start to affect the health, well being and quality of life of the people or when the draught starts to affect the supply

II. REVIEW OF LITERATURE

A number of studies related to the impact of draught on the performance of agriculture sector have been carried out in Rajasthan. Dr. M.S. Rathore, Mathure, K. and Joyal, N.G., Nathuramka, N.K. and Dr. Neeraj saxena, Milind Bokit, Patel, Bharar and other studies the problems of draught and its impact on performance of agriculture sector. They use various statistical techniques and concluded that draught hits the agricultural sector very badly. Due to draught the production and productivity of crops falls but the use of agricultural inputs decreases the impact of draught. These studies show the bad nature of draught and its various impacts is very harmful for the agricultural sector.

Rama Prasad (1990) proposed the draught as the period when the soil moisture value is less than that which is necessary to ensure the crop water demand to be fully met in the growing season. Lei Ji and Peters (2003). It is to be noted here that all the vegetal cover in an area may not be productive and some vegetation may not reflect the water availability in that area. Mishra (2007).The effects of draught

often accumulate slowly over a considerable period of time; they may linger for several years after the drought period ends. As a result, the onset and termination of a drought are difficult to determine precisely and that is why a drought is often referred to as a creeping phenomenon

III. OBJECTIVE OF STUDY

Following are the main objectives of the study:

1. To find out draught intensity in Rajasthan.
2. To find out the impact of drought on total cropped area, production and productivity in Rajasthan.
3. To find out the impact of drought n the use of main agricultural inputs.

Hypothesis

Following are the guided hypotheses of the study;

1. To find out the impact of drought on total cropped area, production and productivity of Kharif and Rabi crops in Rajasthan.
2. In draught, use of main agricultural inputs has been greatly affected.

IV. RESEARCH METHODOLOGY

The methodology of the study is as follows:

Study Area: For the purpose of the present investigation the state of Rajasthan is purposively selected for the study because Rajasthan is a rural state and almost 80 percent population of the state lives in villages where agriculture agriculture and

V. RESULTS AND DISCUSSION

1. Impact on Area, Production And Productivity

In this study, impact of drought on total cropped area, production and productivity of different crops in Rajasthan is assessed. Table-1 shows the impact on total cropped area, production and productivity of Kharif corps. Data shows that when drought intensity is high, total cropped area, production and production and productivity of Kharif crops are low.

animal husbandry are the main sources of income. Drought has eradicated the rural economy of poor farmers of Rajasthan. There is very high diversity in weather conditions from one region to another in Rajasthan and rainfall is always less than the required level in the state. The caused a great damage to the agricultural and livestock economy of Rajasthan. Therefore the study of impacts of drought on the performance of agricultural sector the economy of the state is very important. In the light of this the state Rajasthan is selected for the study.

Tools of data collection and use of statistical techniques: Present study is based on secondary data. These data has been collected from various issues of statistical abstract and Agriculture statistics Report of Rajasthan and different publications of government of India and Rajasthan and other authorities.

Correlation Analysis of collected data has been done using SPSS techniques and correlation between drought intensity and net cropped area, production, productivity, use of fertilize, HYV seeds distribution, plant conservation are determined. Drought intensity has been calculated from the following formula.:

$$\text{Drought intensity} = \frac{\text{Total number of drought affected districts}}{\text{Total number of districts in Rajasthan}} * 100$$

Table-1 Impact of drought on area, production and productivity (Kharif Crops)

year	Drought Intensity (%)	Total Cropped area (hectare)	Production (in tons)	Productivity (kg/hectare)
2000-01	96.87	15143158	7509417	496
2001-02	56.25	13483567	9293387	689
2002-03	100	8040233	3081572	383
2003-04	9.37	14225720	14578489	1025
2004-05	96.87	12633057	8380590	663
2005-06	68.75	13595594	7633566	561
2006-07	68.75	13337202	9253022	694
2007-08	67.25	13777430	10820644	785
2008-09	71.70	12874820	9719530	781
2009-10	81.81	14877743	6561895	441
2010-11	6.06	15777577	15616855	988
2012-13	36.36	15279890	13567690	888
2013-14	87.87	16378420	13821634	844
2014-15	69.70	15423436	14981844	971
2015-16	39.39	16099728	12342637	766

Source: Agricultural Statistics

*Significant at 5% level (two tailed)

** Significant at 1% level (two tailed)

Correlation coefficient between drought intensity and total cropped area is (-) 0.41, while it is (-) 0.71** and (-) 0.72** in the case of production and productivity.

Table- 2 Shows the impact on cropped area, production and productivity of Rabi crops. These data also shows the same results i.e. when drought intensity is high, total cropped area, production and productivity of Rabi crops is low.

Table-2 Impact of drought on area, production and productivity (Rabi Crops)

year	Drought Intensity (%)	Total Cropped area (hectare)	Production (in tons)	Productivity (kg/hectare)
2000-01	96.87	5390530	8396262	1558
2001-02	56.25	629629	104675515	1662
2002-03	100	4786756	7586693	1586
2003-04	9.37	6514442	108519336	1666
2004-05	96.87	7637006	11802366	1545
2005-06	68.75	7704256	12060245	1565
2006-07	68.75	7740859	13942841	1801
2007-08	67.25	7126335	13452540	1905
2008-09	71.70	7074540	13042512	2052
2009-10	81.81	6974229	12759913	1830
2010-11	6.06	10042722	18787018	1870
2012-13	36.36	8876994	18214785	2052

2013-14	87.87	10099049	19031208	1884
2014-15	69.70	9326258	16545966	1774
2015-16	39.39	8392252	18325103	2183

Source: Agricultural Statistics

Correlation coefficient between drought intensity and total cropped area and production is (-) 0.20 and (-) 0.49 while it is (-) 0.39 in the case of productivity due to agriculture development.

2. Impact on use of inputs:

Table-3 shows the impact of drought on the use of agricultural inputs. Fertilizers, H.Y.V. and improved seeds and pesticides are main agricultural inputs. Data shows that when drought intensity is high, the use of fertilizers and improved seeds decreases. Drought is affecting the agricultural economy of the state. The worst situation was in 2002-03 when drought intensity was high the use of these inputs was low. Other inputs like area under plant conservation and use of plant conservation acids also shows the same trend. The use of these inputs is decreasing with the increasable intensity of drought.

Table-3 Impact on use of agricultural inputs

year	Drought intensity (%)	Fertilizers (thousand qtls)	H.Y.V.seeds (thousand qtls)	Plant conservation acids	Plant conservation (area lakh ha).
2000-01	96.87	664.0	489.95	88.32	4628
2001-02	56.25	789.8	504.55	65.11	2496
2002-03	100	550.5	483.94	86.44	3376
2003-04	9.37	778.6	513.11	80.68	3847
2004-05	96.87	761.3	515.11	88.23	3725
2005-06	68.75	884.5	717.00	76.23	2323
2006-07	68.75	901.2	757.35	76.23	2305
2007-08	67.25	950.4	860.20	72.15	2210
2008-09	71.70	1022.0	992.00	70.50	2060
2009-10	81.81	1073.2	852.00	65.02	1962
2010-11	6.06	1318.6	921.00	82.21	2023
2012-13	36.36	1331.6	611.00	70.44	2198
2013-14	87.87	1221.0	820.00	60.02	2013
2014-15	69.70	1298.9	754.00	72.11	2304
2015-16	39.39	1530.6	653.00	68.21	2156

Source: Agricultural Statistics

Correlation coefficient between intensity of drought and fertilizers is (-) 0.46 while it its (-) 0.12 in the case of H.Y.V. Seeds. Correlation coefficient between intensity of drought and area under plant conservation is (+) 0.09 while it is (+) 0.24 in the case of use of plant conservation acids.

VI. CONCLUSIONS AND POLICY IMPLICATIONS

Few decades ago Rajasthan was known for recurring draught situation, but due to policy implications and serious efforts made by government, frequency of draught situation in recent few years is minimal. Droughts have adverse impact on total cropped area, production and productivity of crops.

Similarly, severe draught situation also have great negative impact on use of various agriculture inputs.

The correlation analysis of data shows that there is a negative correlation between intensity of drought and these variables, therefore our first hypothesis is proved true and accepted. Also, drought affects the use of agricultural inputs in the state and the

analytical trend shows that when drought intensity is high the use of inputs was low.

The correlation analysis also reveals that a medium negative correlation exists between drought intensity and use plant conservation acids and area under it. A medium positive correlation has been found between drought intensity and use of fertilizers and H.Y.V. seeds. This relation is found due to the agricultural development of the state.

VII. POLICY IMPLICATIONS

The above study clearly concludes that drought is a very harsh condition Rajasthan is facing today. Every year some parts of the state are attacked by the drought. Drought adversely affects the economic conditions of the state and slows down the economic development in the state. Although the government has constantly made efforts to mitigate the impacts of drought but drought remains a big challenge before the government till today. To minimize the impact of drought, a sound policy implication is required. Following are some recommendations to mitigate the situation of drought in the state:

1. First of all vulnerable areas and population affected by drought should be identified and it is a very significant issue in drought mitigation and relief policy. Presently, it is seen that policies and programmes bypass some of the most deserving and vulnerable areas and people affected by drought. So there is a need to identify such drought-prone areas so that real drought-affected areas may get drought relief immediately. This will also help target development programmes and drought relief to the most deserving population and area.

2. Sometimes some areas are actually affected by severe drought, but they are not declared as drought-prone because of some criteria or procedures. Thus, it is required that criteria and process of

drought declaration should be made feasible and easy so that more and more drought-affected areas can be declared as drought-affected. After drought declaration, fund raising is also a major issue, so drought policy should ensure that sufficient funds are always available with a state facing recurring droughts. It is very essential to formulate appropriate policies, programmes and processes for addressing drought, keeping in mind the existing coping strategies of rural population and status of the state's natural resources.

3. Before declaration of drought, sufficient data are collected and presented for this purpose. If an area is affected by drought, but its data are not generated and presented properly, it failed to be declared as drought-prone area. It is found that present data generation agencies and institutions are not sensitive to recurring drought in the state. So there is a need for consistent collection of data on various impacts of drought.

4. Drought occurs in a situation of less availability of water in all forms, so government authorities and socially active people should educate people for proper use of water.

5. Drought affects the agriculture sector severely which causes a loss in N.S.D.P. and per capita income of the state. Due to recurring droughts in Rajasthan, the purchasing power of those who totally depend on agriculture is declined.

6. There is a need to reduce people's dependence on agriculture by the diversification of the occupation by creating more non-farm employment opportunities. If these policy issues are considered in policy framing then drought will not remain a serious problem for Rajasthan.

VIII. REFERENCE

1. Anil K. Gupta et al., "Drought disaster challenge and mitigation in India: strategic appraisal", Current Science, Vol. 100, No.12, 25 June 2011, pp 1795-1806.
2. Bokil, Milind (2000), 'Drought in Rajasthan, In Search of a Perspective', Economic and Political Weekly, 25 November
3. Kumar, D. 1996. Variability studies in induced mutants of moth bean on rain fed arid lands. Annals of Arid Zone 35:125–128.
4. Mathur, K.and Joyal, N.G. (1993) "Drought policy and politics in India: The need for a long term perspective", Sage Publication, New Delhi.
5. Nathuramka, L. N. (2015) "Economy of Rajasthan"