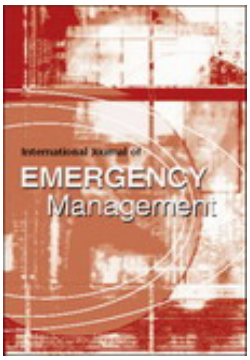

International Journal of Emergency Management

ISSN online: 1741-5071 - ISSN print: 1471-4825
https://www.inderscience.com/ijem

Drought risk management in Madhya Pradesh, India: a policy perspective

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DOI: 10.1504/IJEM.2022.10050715

Article History:

Received:	07 October 2021
Last revised:	30 April 2022
Accepted:	03 June 2022
Published online:	08 March 2023

Drought risk management in Madhya Pradesh, India: a policy perspective

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Abstract: Madhya Pradesh, the central State of India, is susceptible to drought risks due to its unique geophysical characteristics and vulnerable eco-system. The State predominantly depends on agriculture from the employment and occupational engagements perspective. Government intervention is essential to reduce agricultural and other economic losses and support livelihoods. This paper, therefore firstly examines the vulnerability profile of the State towards drought. Secondly, it evaluates the State government's intervention through policies, particularly pre and post-disaster budgetary policy towards drought risk management. The examination focuses on the short-term (relief) and the long-term (mitigation) budgetary allocations to important State run programs and trends to reduce the exposure, vulnerability, and damage caused by droughts. Further, the existing disaster management policies' effectiveness, shortcomings, and challenges are also analysed. These findings are useful for the State government to re-design the policies and improve disaster management framework's shortcomings.

Keywords: droughts; drought risks; drought risk management; vulnerability; mitigation; budgetary allocations; risk management framework.

Reference to this paper should be made as follows: Sharma, A. (2023) 'Drought risk management in Madhya Pradesh, India: a policy perspective', *Int. J. Emergency Management*, Vol. 18, No. 1, pp.23–46.

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1 Introduction

Madhya Pradesh, known as the 'Heart of India', is predominantly an agricultural State. The agriculture sector contributes around 35% (2015–2016) to the State's gross domestic product, which is substantially higher than the national average. As per the 2011 Census, the share of the rural population in the total population of Madhya Pradesh (MP) is 72.4% (Ministry of Home Affairs, 2011), and the rural population depends for its livelihood more on agriculture than on other sectors of the economy. Many districts in the State are vulnerable to rainfall deficiency and droughts due to inadequate irrigation infrastructure (Sharma and Sen, 2021). As rainfall has been insufficient and less than normal in most years (1995–2015), many districts have been facing droughts almost every year for the past two to three decades (SDMP, 2012). The Bundelkhand region[1] of MP is one of the worst drought-affected regions in the State and country. Frequent and intense droughts have led to enhanced migration and other socio-economic adversities in this region (Mishra and Tayal, 2018; Anuja et al., 2018). According to the 2018 'Economic Survey of MP', climate change-induced lower rainfall has also contributed to the vulnerability of the State to droughts (Directorate of Economics and Statistics, 2018).

To mitigate water scarcity and drought risk and their adverse socio-economic effects, governments (of both the Centre and the State) provide financial resources for the long-term (mitigation) as well as the short-term (relief) measures (Manual for Drought Management, 2016). According to the Disaster Management Act (2005) of India, the State government manages droughts. Budgetary expenditure and implementation of programs are entrusted at the State and district level, respectively. However, disaster management policies (mitigation and relief) are framed at the national level. Long-term mitigation measures (such as watershed development programs and irrigation projects) are expected to prevent droughts and soil degradation. This ensures sustained agricultural growth and the well-being of economically weak people. In contrast, the short-term relief provisions (such as post-disaster financial disbursements and drinking water arrangements) fulfil the immediate consumption needs. The present study aims to answer two important research questions with the aforementioned background. First, what is the drought management policy framework of Madhya Pradesh? Second, how effective are the State policies in mitigating the drought risk, and reduce exposure, vulnerability and damages?

The present study undertakes the above inquiry by investigating three inter-related objectives. First, it analyses the vulnerability profile of MP and the existing drought management framework. Second, the study examines the short-term and long-term budgetary allocations to important State run programs and their trends. Third, the present study evaluates the existing drought risk management policies, programs and their effectiveness, shortcomings and challenges. The study approach is descriptive and critical in analysing the available literature. This study is novel as the disaster literature lacks such comprehensive inquiry at the State level in India. The study contributes to the existing literature as it is the first in-depth inquiry for Madhya Pradesh regarding drought management framework and its assessment. We not only critically analyse the policies, provisions and priorities of State government for drought management, but also prescribes a few benchmark practices from disaster literature. This is important as the findings of present inquiry may serve as an inputs to the State government for revisiting the disaster management framework. They may re-design or incorporate a few changes in the existing policies for effectiveness and improved results. We further examine the

trends of budgetary allocations and financial relief disbursement for drought, albeit using limited available data. Future researchers may extend the present work by considering long-period data when it becomes available.

The remaining study is organised as follows to achieve the intended objectives. Section 2 is a literature review. Section 3 presents the statistics of State economy and its vulnerability from droughts. We discuss and examine the disaster management framework of MP in Section 4. Budgetary allocations, the number of projects and other details about the drought prone areas program and post-disaster financial assistance are discussed in Section 5. We also show the trends of budgetary allocations towards integrated wastelands development, integrated watershed management, and expenditure to develop the state irrigation infrastructure. Subsequently, in Section 6, we analyse the major limitations of disaster management policies and implementation constraints. Lastly, Section 7 is conclusion, which includes policy implications and directions for future research.

2 Review of literature

We explore the available literature on two themes. First, we examine the vulnerability profile of MP from rainfall scarcity and droughts. Second, we review the existing drought management framework, policies (mitigation and relief), programs, and their effectiveness in minimising the losses and other adverse socio-economic outcomes. We then synthesise the literature to identify the research gaps and conceptualise the analytical framework to assess the drought management (pre and post) framework in the present study.

Regarding vulnerability, Tripathi et al. (2016) analysed the rainfall pattern and drought occurrences over a hundred years (1901–2010) in MP. The study estimated that Bhind, Datia, Jabalpur, and Ujjain districts are more vulnerable to mild and moderate droughts than other districts of the State. Gupta et al. (2012) show that the Bundelkhand region of MP has a long history of recurrent droughts. One-third of the region's households are particularly at risk and more vulnerable to the disaster shocks than others. The author reasoned that such vulnerability is due to a lack of adequate resources as most are below the poverty line. Further, Singh (2020), through primary survey of 200 households' analysed that climate change and droughts have reduced the livelihood opportunities, employment, and adaptive capacity of the farmers in the Bundelkhand region. Therefore, this region adds significantly to the overall vulnerability of the State. Recently, Raghavendra (2018) found that inadequate rainfall induced droughts are a major concern for crop yield and agricultural growth in MP. The author strongly recommended using a micro-irrigation system to limit water demand, and crop insurance as the main risk management strategy.

The extant literature concerning the drought management framework is limited, less comprehensive, and covers only selective programs or policies for MP. For example, Suthar (2018) studied the 'Bundelkhand Special Package for Development,[2] and found that the approach for drought management was relief-oriented, ignoring the mitigation measures. Therefore, despite the heavy expenditure, it failed to benefit the farmers in the long-run and could not stop their suicides. These results emerged out of primary data analysis and using the interview technique. These findings are important, but limited in scope as it excludes the comprehensive analysis of effectiveness of the State disaster

management framework. In an attempt, Apparao (2020) systematically reviewed the effectiveness of Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA[3]) to generate employment and lower the out-migration of rural poor in normal as well as in drought years. The study observed that MGNREGA in the Indian States, including Madhya Pradesh was ineffective in stopping out-migration during the off-farm season. The author observed many leakages in the framework and implementation of the scheme overshadowing limited success. Similar observations were of Chakraborty and Das (2014). They found that MGNREGA completely neglected the objectives of long-term assets creation and drought-proofing. It could only provide short-term benefits. In addition, the study found that MGNREGA was more focused on water management-related works for floods not droughts. Therefore, the study has limited scope to analyse its effectiveness during water scarcity and droughts.

Further, Nagaraj et al. (2018) studied employment generation and women's participation from 2008–2009 to 2011–2012 in MGNREGA. They show that outcomes on both the parameters were declining in MP and some other Indian States. The study observed 30% decline in employment from a shallow base, which is concerning and raises a question mark on the effectiveness of the scheme for water conservation, drought proofing, and offering resilience to vulnerable households. Kishore et al. (2019) findings for MGNREGA in Bihar, an Indian State, is no different.[4] All these studies concerning employment generation and limiting migration through MGNREGA throw some light on government efforts and efficiency for drought-management. However, lacks a comprehensive analytical approach.

In another study, Khurana (2019) questioned the effectiveness of the drought management framework and the institutions role in mitigating drought risks in India. The author advocated strengthening institutional and regulatory mechanism for water use, conservation and forecasting among others. However, the study findings are not specific to any particular state or policy. Moreover, the study emphasised the role and responsibilities of communities towards the protection, conservation, and usage of water and other initiatives. Therefore, the study has notable limitations. It is narrow and skewed, focusing on outlining community responsibilities rather than analysing the State or national level regulatory framework and its effectiveness. Birthal et al. (2019) also emphasized that institutions at local level should be strong, capable, and empowered and therefore, policies should be framed accordingly.

Kala (2017) evaluated the impact of droughts on agriculture, forestry, tourism and the environment and found that it is enormous. The author recommended various mitigation measures such as the revival of water storage structure, inter-linking of rivers, drip irrigation, and crop diversification as a policy initiative. The study also suggests that relief measures such as waiver of electricity charges, water supply for drinking purposes and effective utilization of MGNREGA funds are required in short run to create employment. Recently, Sharma (2019) examined the drought management policy primarily for India and some Indian States, including MP. It found that disaster management policy is largely ineffective, subjective, and primarily reactive. The author confirms that the drought management policies and practices in India is mainly relief oriented and vary at the sub-national level.[5] It also highlighted the issues in conceptualising the drought definition, monitoring, and qualitatively examining the post-drought relief framework, not pre-disaster (mitigation) strategies. Though it discusses the State level differences in conceptualising the drought, comprehensive State level analysis was lacking, and our study fills this gap in disaster risk management literature.

Regarding post-disaster financial relief, Kamepalli (2019) show that the funds' allotment by finance commission of India was not proportional to the vulnerability profile of states. The author raises a question about the disaster management policy framework's financial relief disbursements criterion, capacity, and effectiveness. The same issue was also studied by Tarquinio (2020) for three Indian States showing that disaster relief disbursements are politically motivated. Further, Aditya (2018) investigated the institutional capabilities to transfer crop loss risk from framers to insurance companies through crop insurance in India. The findings reveal that very few farmers are having crop insurance, primarily due to a lack of awareness. The author emphasises on low-cost crop insurance to mitigate the drought induced crop losses. The study points out that crop insurance is a cost-effective and supplementary institutional mechanism to protect the farmers. The study also observed that weak institutions lower the effectiveness of the crop loss risk management mechanism.

Bandyopadhya (2019) for Gujarat, an Indian State, identified that despite all policy-level interventions by government, droughts occurred frequently. The author observed many shortcomings in the disaster management policy of Gujarat. For example, there has been a lack of coordination between the central and State government efforts toward drought management. The study argues that State must have a dedicated drought management policy rather a common policy for all the disasters (including droughts). It may intensify specific efforts for drought risk management, enhancing the state effectiveness. The same arguments were of Panwar et al. (2020) and Sharma (2019) with a rationale that drought is a different (slow onset) and complex disaster than other fast onset disasters such as floods, cyclones, and earthquakes. Therefore, policies must be framed accordingly, and drought should be managed as separate disaster for improved outcomes.

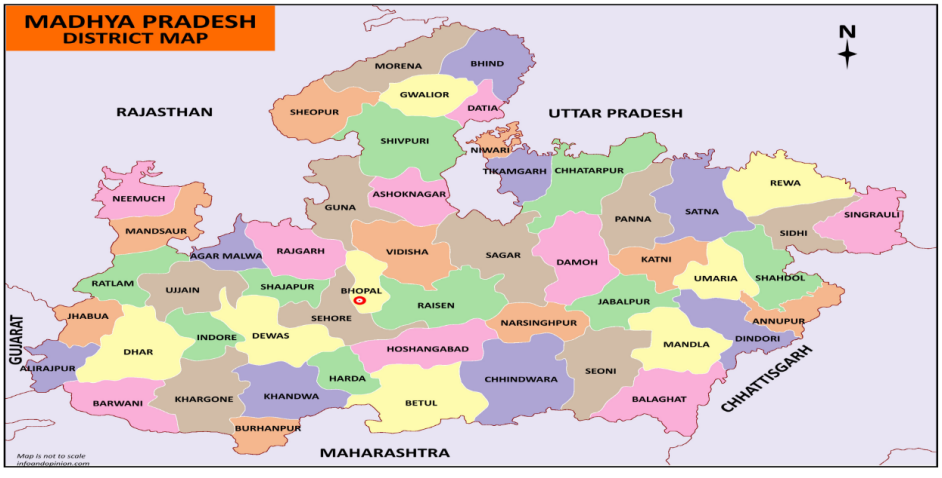
The present study extends the scope of analysis by exploring existing literature on drought management framework. It builds upon the previous studies and analyses the vulnerability profile, effectiveness, shortcomings of the existing disaster management policy framework and provisions (pre and post disaster phases) including the trends and budgetary allocations in Madhya Pradesh. The study conceptualises and categorises the disaster policy (pre and post disaster) and comprehensively analyses the specific provisions related to the drought management in Madhya Pradesh.

3 Economy of Madhya Pradesh and drought

3.1 Economic profile of Madhya Pradesh

This section presents a description about the economy and vulnerability profile of MP due to its high dependence on agriculture. We also present the statistics on rainfall and occurrences of drought disasters. MP touches the boundaries of five States- Rajasthan, Uttar Pradesh, Maharashtra, Gujarat, and Chhattisgarh (Figure 1). It is divided in 52 administrative districts. According to the 2011 Census, State has seven crore population (Ministry of Home Affairs, 2011), which is the sixth highest in the country, accounting for 6% of total national population.

Figure 1 Madhya Pradesh district map (see online version for colours)



Source: Google Map (Infoandopinion.com)

The economically backward class (Scheduled Tribe and Scheduled Caste) population was 36.7% to the total population as per the Census, 2011 (Ministry of Home Affairs, 2011). There were 31% main workers, 12% marginal workers, and 57% non-workers in the total population. Their participation in the work (in numbers) is compared with the country and presented in Table 1. The percentage of cultivators in the State to total workers was 31.2% and the number of agricultural labourers was approximately 1.22 crores; which was 38.6% of the total workers (Directorate of Economics and Statistics, Madhya Pradesh).

Table 1 Work profile for Madhya Pradesh and India, 2011 (in millions)

Status of work	*Madhya Pradesh*	*India*
Total Workers	31.5	481.8
Main Workers	22.7	362.5
Marginal Workers	8.8	119.3
Non-workers	41.0	728.9

Source: Government of India, Ministry of Home Affairs. 2011. Census India. New Delhi: Office of the Registrar General and Census Commissioner of India

The percentage contribution of the agriculture sector to the state economy is significant. Also, from the employment and occupational engagements perspective, dependency on the agriculture is very high. Around 61.6% employed population are in the agriculture and allied sector (NSDC, 2013). Table 2 indicates the percentage share of all the three sectors of the economy in 1991–1992 and 2015–2016. There is a decline in the share of the primary sector during the period. However, it still substantially contributed (34.5%) to the State economy.

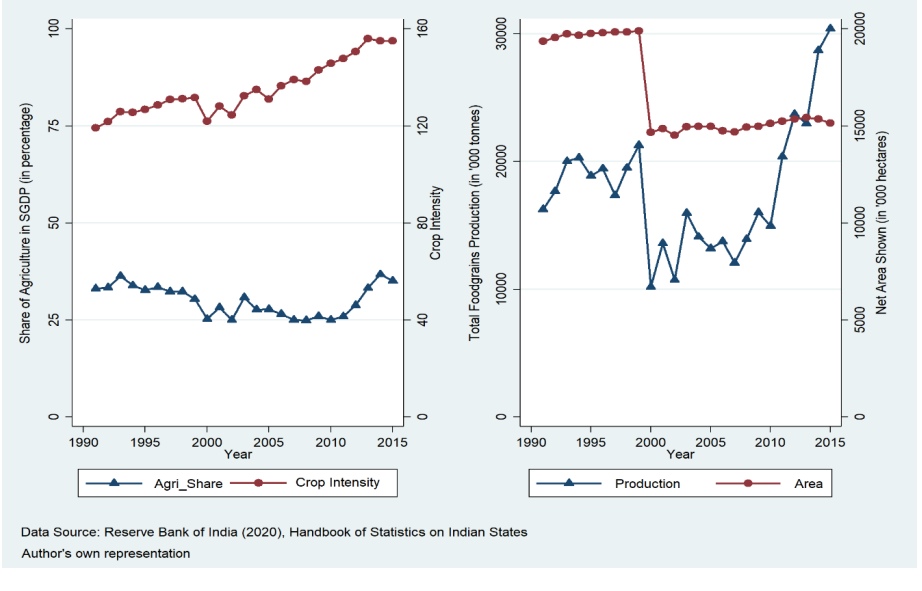
Table 2 Share of primary, manufacturing, and service sector in Madhya Pradesh

Sector	*1991–1992*	*2015–2016*	*% Change*
Primary	42.62	34.5	–8.12
Secondary	23.6	25.2	6.77
Tertiary	33.78	40.3	19.30

Source: Different Series of Estimates of State Domestic Product Madhya Pradesh (2018), Department of Planning, Economics, and Statistics, Directorate of Economics and Statistics, Madhya Pradesh (2018); Estimates are at constant prices.

Among the primary sector, agriculture had 31.6% share in 1991–1992 that increased to 35.1% in 2015–2016 (Reserve Bank of India) (Figure 2). The major crops of MP by area are Soyabean (25.22%), Wheat (19.69%), Gram (14.12%), and Rice (7.27%). MP is the largest producer of Soyabean, a water-intensive crop in the country (Agricultural Statistics, 2015). The State witnessed a decline in average size of farm holding from 2.3 (1995–1996), 2.02 (2005–2006), 1.78 (2010–2011) to 1.57 hectares (2015–2016) (Directorate of Economics and Statistics, Madhya Pradesh, 2018). Figure 2 also shows that the State has registered continuous growth in crop intensity and total food production (since 2001), and the net sown area in the State has been stagnant from many years.

Figure 2 Share of agriculture in the state GDP, crop intensity, total food grains production, and net sown area (see online version for colours)



Further, the per capita income (at constant prices) of the State significantly increased to INR[6] 41287 in 2012–2013 and INR 47646 in 2015–2016, from INR 15927 in 2005–2006. Despite such a rise, it was much lesser than the national average of INR 65538 in

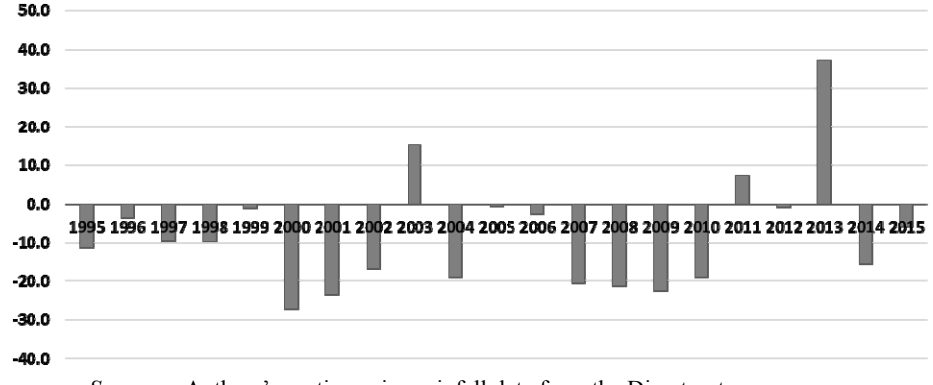
2004–2005 and 77826 in 2015–2016. Low per capita income also adds to the vulnerability of the State. The literacy rate increased significantly to 69.3% (2011) from 45% (1991) and 64% (2001) (Directorate of Economics and Statistics, Madhya Pradesh, 2018).The rural literacy rate in the State improved from 35.4% (1991) to 63.9% (2011). However, it is still lower than the national average of 44.7% (1991) and 74% (2011) (Ministry of Home Affairs, 2011), indicating a concern about human capital development. It is also reflected in UNDP's Human Development Index, where Madhya Pradesh fares lower (0.588) than the country average (0.630) (Sub National Human Development Index, UNDP).

These statistics clearly show that Madhya Pradesh is an agrarian State, has a lower per capita income than the national average, lags in human capital, and has a higher rural population than urban. MP is highly vulnerable to water scarcity and droughts due to its profound dependency on rainfall for agriculture growth. The following sub-section presents the drought history and the State's susceptibility to water scarcity.

3.2 Droughts (vulnerability profile) in Madhya Pradesh

Figure 3 depicts the rainfall pattern in the state from 1995 to 2015. The State has faced inadequate, scant, and variable rainfall causing frequent droughts.

Figure 3 Rainfall deviation from the long-term mean in MP 1995–2015 (in percent)



Source: Authors' creation using rainfall data from the Directorate of Economics and Statistics, MP

Figures 4 and 5 show the number of drought-affected districts for the period 1991–1992 to 1999–2000, and drought-affected districts and tehsils[7] for 2000–2001 to 2015–2016, respectively. Figure 5 depicts the frequency and number of drought events have significantly increased since 2000–2001.

Drought has affected districts in the State at different periods (Table 3). Among many others, six districts (Chhatarpur, Damoh, Datia, Panna, Sagar, and Tikamgarh) in the Bundelkhand region of the State are highly vulnerable. They have been facing regular droughts due to irregular and less rainfall than average. The groundwater level in the region is also depleting fast and has dropped to even 400 feet in many villages (Niazi

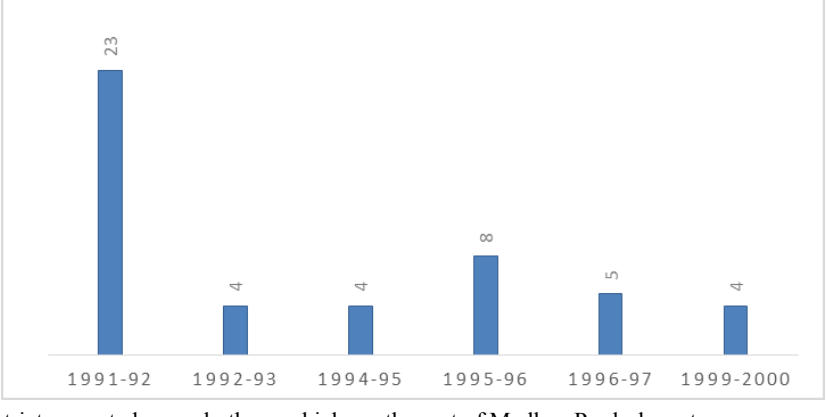
2008, MP SPSP). Soyabean is the region's (and the State) main crop, which requires abundant water to grow. Frequent droughts had adversely affected the region's agriculture and aggregate economic growth causing distress migration (Suthar 2010; Anuja et al., 2018).

Table 3 Drought-affected districts in Madhya Pradesh (1991–2015)

Year	*Number of drought-affected districts*
1991	23
1992	4
1994	4
1995	8
1996	3
1997	35
1998	23
1999	4
2000	30
2001	6
2002	33
2004	26
2006	10
2007	38
2009	37
2015	43

Source: Author's compilation from various sources. These reported numbers are indicative and may vary according to different estimates, types of drought, and time period considered in a year.

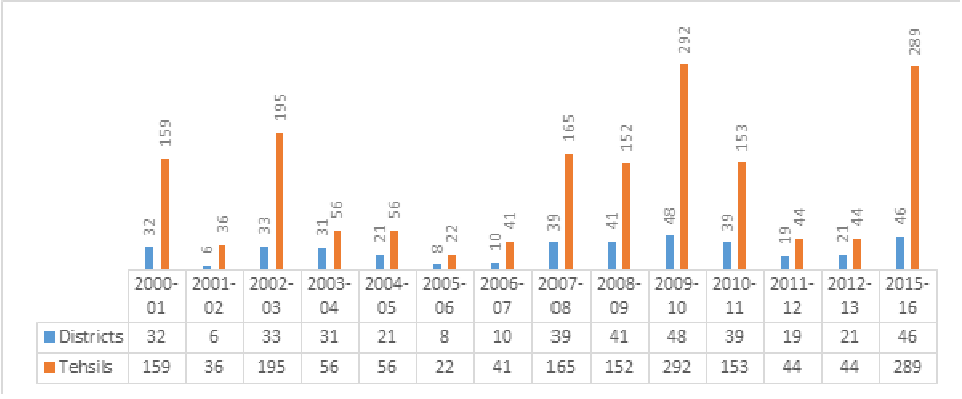
Figure 4 Drought-affected districts (1991–2000) (see online version for colours)



The districts reported are only those which are the part of Madhya Pradesh post bifurcation. No district of Chhattisgarh is reported.

Source: Department of Land Uses, Madhya Pradesh. Accessible at: https://dolr.gov.in/sites/default/files/Madhya%20Pradesh_SPSP.pdf

Figure 5 Drought affected districts and tehsils (2000–2001 to 2015–2016) (see online version for colours)



	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2015-16
Districts	32	6	33	31	21	8	10	39	41	48	39	19	21	46
Tehsils	159	36	195	56	56	22	41	165	152	292	153	44	44	289

The 2015–2016 figures are from a press release by the Ministry of Agriculture & Farmers Welfare, Government of India, Accessible at: https://pib.gov.in/newsite/PrintRelease.aspx?relid=145003

Source: Disaster Management Note, Revenue Department, Govt. of Madhya Pradesh; Table on the history of droughts, floods frost, and cold waves in MP; Accessible at: www.finance.mp.gov.in/ffc/TopicNotes16.doc

We now present and analyse the disaster management framework, its effectiveness, and provisions to combat the drought risk in MP.

4 Disaster management framework and provisions in Madhya Pradesh

The revenue department of MP government follows an official rule book (guidelines) to execute drought management and relief strategies and programs. The handbook (Relief Manual, 2015, Madhya Pradesh) lists various strategies and directives to implement at the local (district) level administration. Such directives are essential and relevant; however, their practical implementation at the ground level is often weak. Most of these provisions are reactive (provides post-disaster relief) and not proactive (preparedness and mitigation) to prevent or reduce the drought risks and their effects on individuals, households, and the economy. For example, an important provision in the manual is to ensure that the out-migration due to droughts in off-farm seasons can be stopped or minimised (post-disaster measure). A crop that is adversely affected due to inadequate rainfall is the Kharif[8] crop which causes significant losses. To cope with such losses and sustain employment and livelihood, farmers and agricultural labourers migrate. To stop such distressed migration, the local government intervenes by assessing the severity of the drought and calculating crop losses by gathering the data from field. In addition, they also calculate the decline in the sowing of the subsequent Rabi crops. Based on such estimates, State government on the recommendation of district administration, declares those districts or tehsils as drought-affected where the estimates indicate a drought or drought-like situation.

Following this, the district administration starts continuous work at the panchayat, tehsils, or village level to employ agricultural labourers. District Disaster Relief Fund

(DDRF) (under demand no. 58), following the Disaster Management Act, 2005, provides finances for such constructive works. Local administration gives preferences for works that generate direct employment. They prioritise the tasks related to water storage, ponds construction, water conservation (including water harvesting), and cleaning old wells to combat the droughts and water scarcity over forest development-related works. Some of these works also create productive assets, which may help mitigate the drought risks in the following seasons. If, due to any reason, the funds are unavailable, authorities arrange it from the sanctioned accounts of the Member of Parliament and Member of Legislative Assembly.

District officials prefer to create or increase the labour-centric jobs under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). They try to ensure that the scheme reaches the eligible and interested members of households for employment and stops or limits their out-migration during droughts and off-farm seasons. Before planning any works, administrators (district collectors) first study the technicalities associated with each constriction work. Then they compulsorily get necessary permissions and financial approvals for all works in totality (not in parts) from concerned authorities before offering and starting these works in respective districts. Following the manual, various authorities execute their discretionary financial power (Table 4) to fund or arrange the finances to undertake and approve the planned works.

Table 4 Financial powers of Departments in MP (Under Demand No. 58)

S. no.	*Department*	*Approving official*	*Sanctioning limit (INR)*
1	Water Resource	Divisional Commissioner	30 lakh
		Collector	20 Lakh
2	Public Works Department	Divisional Commissioner	20 lakh
		Collector	10 lakh
3	Farmers Welfare & Agricultural Development	Divisional Commissioner	20 lakh
		Collector	10 lakh
4	Panchayat & Rural Development	Divisional Commissioner	10 lakh
		Collector	5 lakh
5	Forest	Divisional Commissioner	10 lakh
		Collector	5 lakh
6	Fisheries	Divisional Commissioner	10 lakh
		Collector	5 lakh
7	Any other department	Divisional Commissioner	10 lakh
		Collector	5 lakh

Source: Authors own creation from Relief manual (2007) of Revenue Department, Madhya Pradesh

District administration also ensures that approved works get completed by 15th June every year. Concerned departments also focus on finishing any incomplete works of the past (and then present unfinished works) within the specified time and then only start any new sanctioned works. The authorities always get permission to start any additional works and continuously monitor progress. These authorities essentially employ manual

labour to pass the relief benefit unless machines can only complete the work. However, authorities can deploy 25% of sanctioned funds for transportation expenses. They route all works (up to INR 5 lakhs) through the Panchayat, Water User Association, or Joint Forest Management Committee. To check and approve the technical aspects, departments like Water Resource and Public Development steps in. The concerned authorities ensure that they make the payments to the labours according to the wage rates of the State, when the technical staffs have assessed the work completion. To provide the timely payments (within 10 days of work completion) authorities also initiate disciplinary action against the concerned officers, if needed. They maintain transparency by disbursing the wages against relief work in the presence of public representatives/Gram Sabha.

Authorities inform about the availability of the works to the interested labourers by displaying/keeping a relief works booklet at all the workplaces in the appropriate quantity. They also show near the worksite a board displaying the work type, starting date, expected completion date, and the availability of job days. The second-level authorities randomly inspect around 10% work. In addition, higher authorities randomly inspect a few works. Authorities complete the works and relief disbursements following pre-defined limits and conditions. For example, they do not keep the funds sanctioned for relief works into any agency account. They are also not allowed to make payments for any unfinished works of two years ago through the relief funds. Therefore, the district authorities send new demand with justification to the relief commissioner and furnish the expenditure details (wages, materials cost, total expenditure, etc.) to the relief commissioner's office every month. Therefore, the disaster management framework has a robust and systematic monitoring system to provide employment and income, create productive assets and provide the post-disaster relief in the State.

Further, the relief manual states that expenditure of the relief funds is primarily allowed for certain heads. They are crop loss compensation, drinking water arrangement, transportation, fodder arrangements for livestock, and supply of foods to malnourished children, among others. District collectors plan to transport drinking water to the villages facing a water crisis and send the expected budget to the relief commissioner. They also transport drinking water to the urban areas if the Urban Administration and Development Department of the State cannot provide finances. If the fodder shortage is expected after the monsoon season in any district, then the district collector prepare a plan for fodder camps (for 60 days and 90 days, in case of mild to moderate and severe drought respectively) with the help of Animal Husbandry Department and accordingly demand the budget from the Relief commissioner. To improve the health of malnourished children (grades 3 and 4), where Aanganbadi does not exist, they spend on daily nutrition supplementation through the relief funds.

In addition, relief funds may also be spent for repairing the damaged hand pumps. Suppose there are any shortages of relief funds, district authorities transfer the responsibility of repairing and paying for the damaged or dried hand pumps to the Public Works Departments (PWD) of the State. The above discussion highlights a significant drawback in the disaster management framework. As all the major heads of relief works are only consumption oriented, they failed to create any productive assets, limiting the State's capabilities towards drought mitigation. Despite a well-structured framework, programs, directives, and timelines to minimise the socio-economic effects of drought, several lacunas exist, including implementation concerns. We discuss such limitations and lacunas after presenting avenues and trends of the State government budgetary allocations for mitigation (long-term) and drought-relief (short-term).

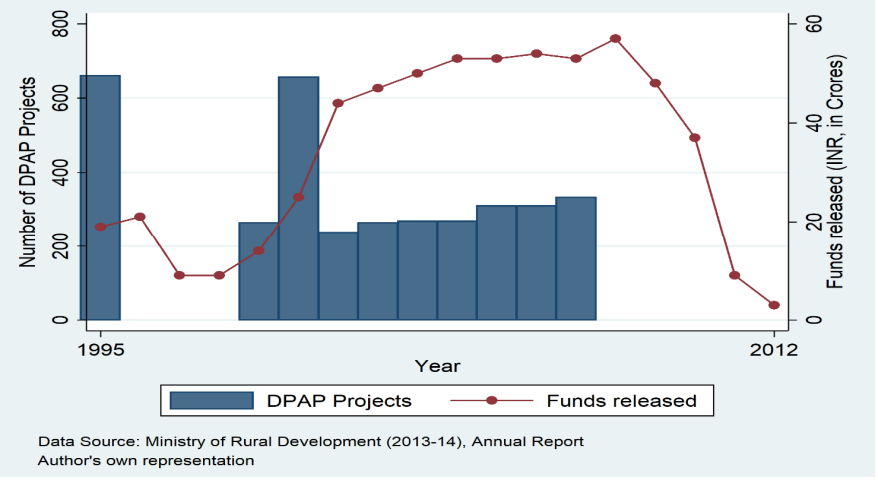
5 Trends for budgetary allocation towards drought risk management

The budgetary allocations are for long and short-term purposes. Long-term measures (such as watershed development programs and irrigation projects) prevent droughts and soil degradation for sustained agricultural growth and well-being of economically weak people. In contrast, Short-term disaster relief and rehabilitation measures aim to provide immediate assistance and relief post-disaster. We first present the budgetary allocations for important long-term State run programs.

5.1 Drought prone area program (DPAP)

DPAP was started in 1987 by the central Government (under Ministry of Rural Development) for the regular and severely drought-affected areas of India. It aims to minimise the effect of droughts on crop production, livestock, land, water, and human beings. The objective was to improve the well-being of marginalised individuals. Financial contributions by Centre and State remained equal (50% each) till 1999 and later changed to 75% and 25% for respective governments. Under the DPAP, watershed-related developmental works were undertaken in 105 blocks of 26 districts, covering 8.9 million hectares of area in Madhya Pradesh (Annual Report 2013–2014, Ministry of Rural Development, GOI). Figure 6 shows the project sanctioned and the funds released under DPAP. The total fund for 3267 projects was nearly INR 605 Crores. In the initial years, the financial allocation was significantly less. However, there was a steady rise in projects and financial disbursements from 2001 to 2007. Notably, from 2007–2008, no new project was sanctioned under the DPAP. However, financial allocations continued to complete the ongoing projects.

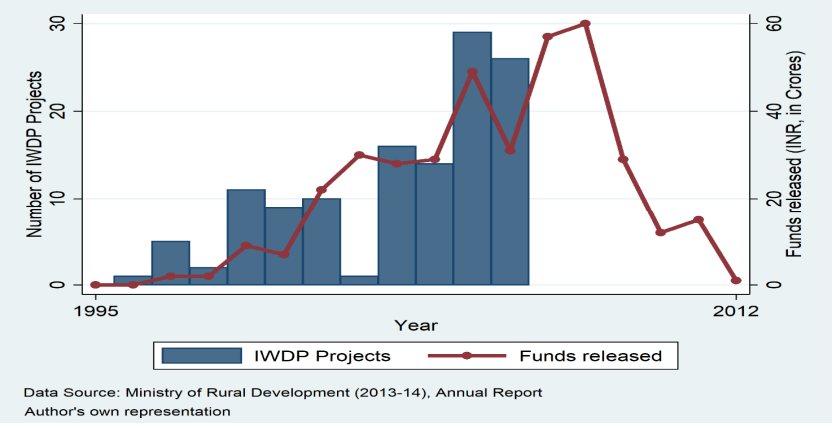
Figure 6 Drought prone area program: projects and financial disbursements (1995–2012) in Madhya Pradesh Integrated Wastelands Development Program (IWDP) (see online version for colours)



It was a centrally sponsored program operational from 1989–1990. The program's main objectives were to generate employment, remove poverty, develop economic resources in villages, and improve land productivity in the selected project areas. These programs

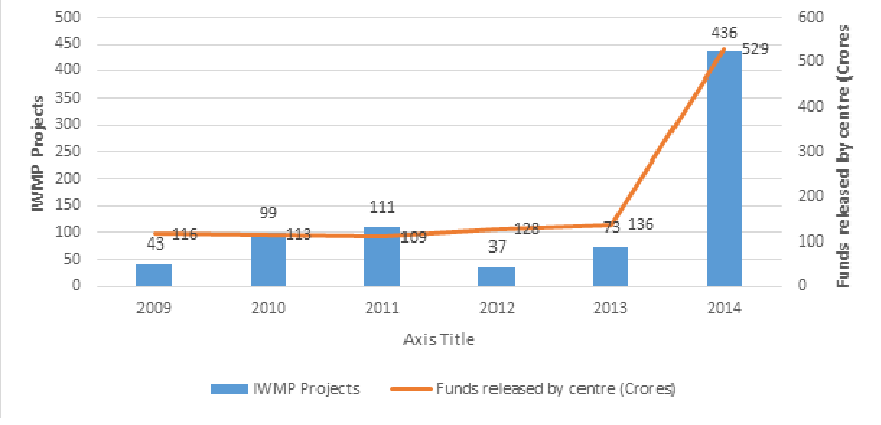
covered those areas not included in the DPAP. Figure 7 depicts that around 124 projects received INR 373 crores from 1995 to 2012.

Figure 7 Projects and financial disbursements (Crores) in Integrated Wastelands Development Program (IWDP), Madhya Pradesh (1995–2012) Integrated Watershed Management Program (IWMP) (see online version for colours)



Drought Prone Area Programme (DPAP), Desert Development Program (DDP), and Integrated Wastelands Development Programme (IWDP) were merged into a common water integration program called as Integrated Watershed Management Program (IWMP) in 2009. The IWMP aims to provide support to families having no assets for livelihood. The program saw a consistent increase in the funds for various sanctioned projects from 2009 to 2014 (Figure 8). Under the IWMP, there were 872 operational projects. The Centre government contributed major funds (INR 529 crores) in 2014. During the entire program, financial disbursements from the Centre were significantly higher than the State government.

Figure 8 Projects and financial disbursements in Integrated Wastelands Management Program (IWMP), Madhya Pradesh (2009–2014) (see online version for colours)

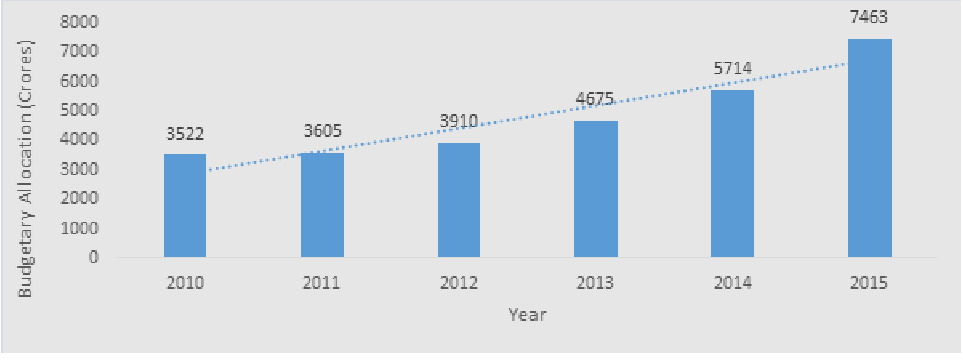


Source: Annual Report 2013–2014, Ministry of Rural Development, Government of India (www.rural.nic.in)

5.2 Irrigation expenditures

There were around 14 irrigation projects (major and medium) under way to cover 7.37 lakh hectares of land as of 2016 in MP. Five major projects among them are Bansagar, Kundalia, Mohanpura, Pench and Bansujara. It is evident (Figure 9) that there has been a continuous rise in the State budget to enhance the irrigation capabilities in the recent past.

Figure 9 State Investments in irrigation infrastructure (2010–2015) (see online version for colours)



Source: Drought tests Madhya Pradesh irrigation drive (2016). Available at: https://www.business standard.com/article/economy-policy/drought-tests-madhya-pradesh-irrigation-drive-116010600006_1.html

As a result, the gross irrigated area increased to 103 lakh hectares in 2014–2015 from 42.85 lakh hectares in 2000–2001. It was an impressive increase of 140%. However, the country-level gross irrigation area increased from 767 lakh hectares to 964 lakh hectares, an increase of only 26% (Reserve Bank of India). Further, irrigation cover was 6.5% (2.30 million hectares to 2.45 million hectares) higher in 2015 from 2014. Budgetary expenditure was also up by 31.6% (INR 5714 crores to INR 7463 crores) during the same period.

5.3 Crop insurance

National Agriculture Insurance Scheme (NAIS), Modified Agriculture Insurance Scheme (MNAIS), and Weather Based Crop Insurance Scheme (WBCIS) were the major insurance schemes in India. However, due to the various issues in implementation, NAIS and MNAIS merged under the newly launched scheme, i.e., Pradhan Mantri Fasal Bima Yojana (PMFBY) in 2016 (Kharif season). Later WBCIS also merged in PBFMY. Earlier, The National Agricultural Insurance Scheme (NAIS) replaced the erstwhile Comprehensive Crop Insurance Scheme (CCIS) in 1999–2000. NAIS aimed to safeguard the farmers against crop losses from natural calamities such as droughts, floods, hailstorms, and other notified disasters. The NAIS mandated that State and Centre governments contribute equally towards premium subsidiary for claim settlements (if it crossed the defined limits of premium collected by an insurance company).

During the Kharif 2016 period, PMFBY covered 26.5% (3.66 crores) of farmers in the country, an increase of 15.7% over Kharif 2015. The scheme covered 388 lakh hectares area, 15% more than the area insured for Kharif 2015.[9] PMFBY ensured that the

finances covering risks must be equal to the sum insured, a drawback under the NAIS. As a result, the enrolment of the farmers increased significantly in the scheme. The cost towards premium is 2% for Kharif, 1.5% for Rabi, and 5% for the horticulture crops of the total sum insured. Farmers get the premium subsidiary up to 75%, shared by the State and Centre equally. Table 5 highlights the important statistics for crop insurance (including the State budgetary outflows) for 15 years.

Table 5 Insurance Statistics from Rabi 1999–2000 to Kharif 2015 of Madhya Pradesh

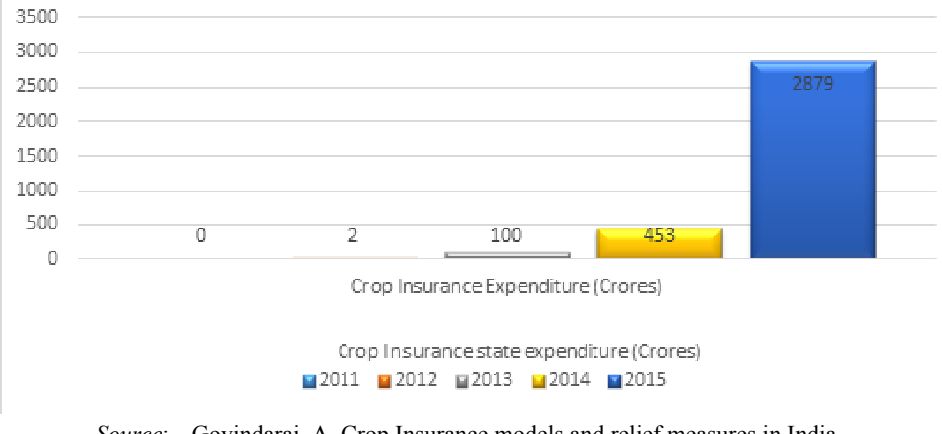
Farmers covered	*Area Insured* (hectare)	*Gross premium* (Lakhs)	*Total subsidy* (Lakhs)	*State share in subsidy* (Lakhs)	*Claims reported*	*State share in claims* (Lakhs)	*Centre share in claims* (Lakhs)	*Farmers benefitted*
42010051	98361916	287581	35685	17843	561376	185182	185182	8670413

The 2015–2016 figures are from a press release by Ministry of Agriculture & Farmers Welfare, Government of India. Accessible at: https://pib.gov.in/newsite/PrintRelease.aspx?relid=145003

Source: Ministry of Agriculture and Farmers Welfare (2016) 'State of Indian Agriculture 2015–2016', Department of Agriculture, Cooperation & Farmers Welfare (Credit Division), Directorate of Economics and Statistics

Further, the Revenue department of Madhya Pradesh showed that the State's total and average budgetary expenditure towards subsidy was INR 3434 crores and INR 858.7 crores for crop insurance premiums from 2012 to 2015 (Figure 10).

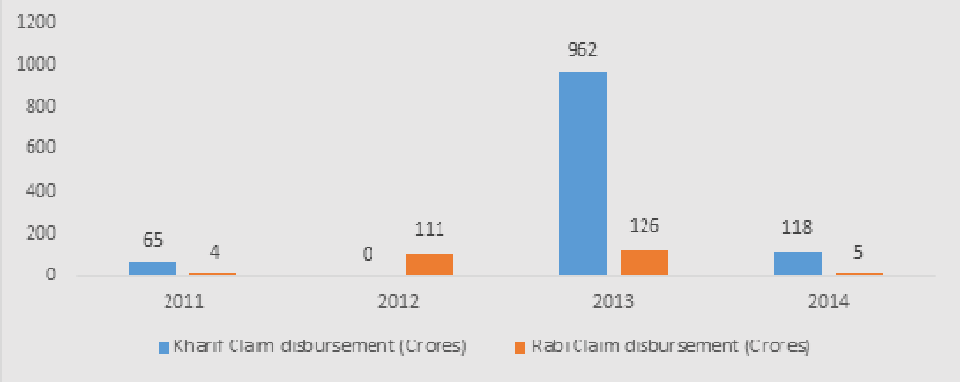
Figure 10 Budgetary expenditure on crop insurance premium, Madhya Pradesh (2011–2015) (see online version for colours)



Source: Govindaraj, A. Crop Insurance models and relief measures in India and Madhya Pradesh Centre for Governance, Atal Bihari Vajpayee Institute of Good Governance & Policy Analysis. (http://www.aiggpa.mp.gov.in/uploads/project/Crop_Insurance_Models_and_Relief_Measures_in_India_and_Madhya_Pradesh.pdf)

Also, the State budgetary outflows were INR 69, 111, 1088, and 123 crores, respectively, for 2011, 2012, 2013, and 2014 against the crop loss claim settlement (Figure 11).

Figure 11 Budgetary outflows against claim amount for crop loss (Kharif and Rabi, 2011–2014) (see online version for colours)

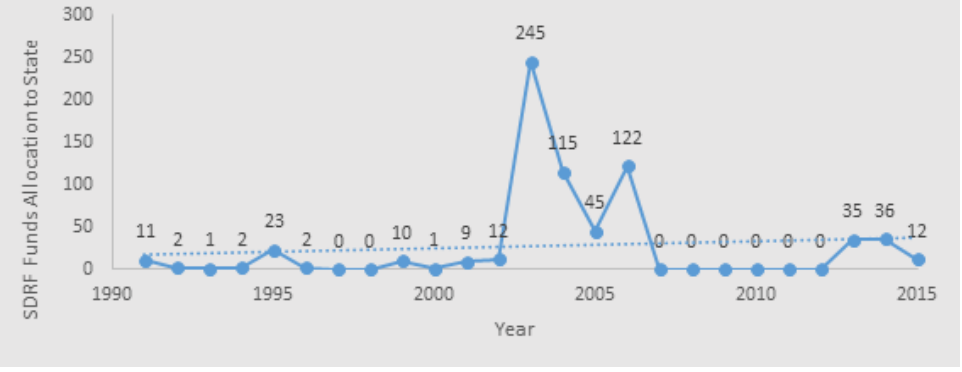


Source: Report of the Controller and Auditor General of India on Economic Sector, 2016 (https://cag.gov.in/sites/default/files/audit_report_files/MP_Report_No_2_of_2017_Economic_Sector.pdf)

5.4 Financial relief against drought at the district level, Madhya Pradesh

Figure 12 depicts the State expenditure on drought relief from the State Disaster Response Fund (SDRF) from 1991 to 2015. Data show that State expenditure was highest during the period 2000 to 2006. SDRF account is a jointly funded account by State and Centre. The contribution of Centre government is 75%, as mandated by Disaster Management Act (2015). Figure 12 shows that State government deployed INR 683 crores from SDRF towards drought relief from 1991 to 2015.

Figure 12 Expenditure from the pooled disaster account (SDRF) as drought relief (1991–2015) (see online version for colours)

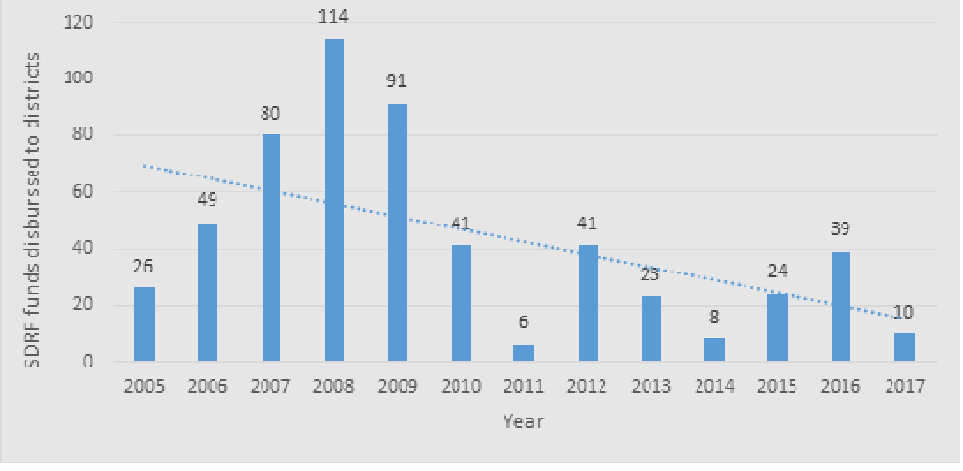


Source: Comptroller and Auditor General of India. State Accounts, Madhya Pradesh (1991–2015) (https://cag.gov.in/State-accounts/madhya-pradesh)

It is observed that if droughts are severe and widespread, financial relief given by SDRF would be inadequate. In such a scenario, State' revenue department seeks funds from State government budget to match the incremental requirements. The actual relief

disbursements (2005 to 2017) to the districts by the Madhya Pradesh government were more than the SDRF allotments to the State (Figure 13). The actual expenditure was approximately twice (INR 502 crores) than the SDRF allocations (INR 250 crores). According to the Revenue Department of Madhya Pradesh, the major head under relief is the drinking water supply at rural and urban areas. Arrangement of drinking water and its transportation to the areas with drinking water shortages or to the areas that may face water shortages in future is the priority for the State government. District collectors are responsible for arranging the relief works as mandated in Disaster Management Act, 2005. Additional provisions for drought like food for malnourished children, crop loss compensation, and fodder supply are other important heads for relief expenditure.

Figure 13 Financial relief to districts by the state government (2005–2017) (see online version for colours)



Authors own creation.

Source: Office of Relief Commissioner, Revenue department, Bhopal, Government of Madhya Pradesh

According to the office of the Relief Commissioner, Madhya Pradesh, Dewas, and Tikamgarh districts received the highest relief funds, whereas Singrouli and Umaria got the least disbursements (2005 to 2017). Six districts of the Bundelkhand region (Datia, Sagar, Damoh, Panna, Chatarpur, and Tikamgarh) received INR 120 crore of relief funds (24%) out of the total State disbursements.

States may demand extra funds from Centre for drought (or other calamities) relief if the scale of drought is large and beyond the State capabilities to fund as per the Disaster Management Act, 2005. Utilising such clause in 2015–2016 and 2017–2018, MP requested additional financial assistance from NDRF, and received INR 2032.68 crores and INR 836.09 crores, respectively, to meet the enhanced relief requirements.[10]

6 Limitations of drought risk management policy

The previous section highlighted that MP witnessed an incremental trend in the budgetary allocations towards drought mitigation. The framework and policies are also carefully

drafted to proactively support the farmers and other affected individuals against water scarcity and droughts and to provide post-disaster support. However, the framework and policies have some notable limitations. This section briefly analyses these limitations and also suggests some ways to improve the drought management strategies for MP.

First, 'Economic Survey of India, 2017–2018' heavily emphasised modern irrigation techniques like drip and sprinkler for efficient water usage (Ministry of Finance, 2018). This is important and urgent due to inadequate rainfall, water scarcity, frequent droughts, and low groundwater level in MP. Despite much emphasis on modern irrigation techniques by experts and policymakers, outreach is limited. According to the Ministry of Agriculture (2017), only 2% of the gross sown area is covered under micro-irrigation such as drip and sprinkler, which is one of the lowest among the Indian states (Jain et al., 2019). Also, the total crop area covered under micro-irrigation is extremely low (Gandhi et al., 2021). Only a handful of wealthy farmers have knowledge and access to such irrigation techniques (Jain et al., 2019). The adoption of these technologies by marginal farmers would depend heavily on the supply of information, materials, and services for installation (Jain et al., 2019). In addition, Sinha (2018) observed that the investment in the modernisation of irrigation systems was insufficient to affect the crop yields in MP significantly.

Second, the flagship employment guarantee scheme (MGNREGA) objective is to provide 100 days of employment to a member of all the interested rural households every year. Therefore, it has the potential to reduce the agricultural and economic distress during droughts in rural areas. However, it has been found that MGNREGA has limited outreach. Not all the interested and eligible members of households always obtain employment. As a result, during drought years', migration is commonly observed (Anuja et al., 2018; Alam, 2017; Patnaik, 2012). Also, the scheme for drought years includes 50 days' additional employment provision. However, such provision is hardly known or available to those living in rural areas. In addition, there is a significant delay observed in the rural wage payments of MGNREGA (Aggarwal, 2016; Narayanan et al., 2019; Shah et al., 2007); it was relatively lower for the females (Jaiswal and Mistry, 2007; Salian and Leelavathi, 2014).

Third, the limitation is with respect to financial relief. The State heavily depends on the central government to compensate for crop losses during a severe drought (Sharma, 2019). However, data suggest that States receive financial relief less than the relief demanded (Manual for Drought Management, 2009; Sharma, 2019). It is also disproportionate to the risk profile of the State (Kamepalli, 2019) toward drought and may seriously limit the States' capabilities and expenditures for post-disaster relief works.

Fourth, the objective of financial relief against drought-induced crop loss is to fulfil immediate consumption and related needs by partially compensating losses. Farmers have limited resources, and their dependency on financial relief is very high. Therefore, any delay in receiving the financial relief may restrict their ability to procure further farming resources. It is observed that farmers do not receive timely financial relief (Gulati et al., 2018). Generally, there remains a delay of 4 months to 1 year in disbursing the relief payments (Sharma, 2019). Such delay may defy the purpose of providing the relief. Further, quantum of financial relief is generally inadequate to compensate for the crop losses (Gulati et al., 2018; Yadav 2016). Lastly, drought management policies are mostly relief-oriented (Manual for Drought Management, 2016). As a result, they are

unable to offer long-term sustainable benefits to the farmers, labourers and the affected households.

Learning from global experiences, drought management framework, policies and implementation may be significantly improved at national and sub-national levels in India. For example, Zarafshani (2016) analysed the drought management in Iran. The author suggested that conceptualisation of drought management framework and mitigation should be based on the vulnerability assessment at before, during, and after droughts. Accordingly, disaster mitigation and financial relief disbursements may be planned. It may help foster the adaptive capacity of individuals and households, supplementing the government efforts. However, the existing framework in India at national and State levels is based on the impact analysis (loss estimation). Further, the policy approach should be proactive to mitigate the drought risk compared to the existing crisis management-oriented approach. Bandyopadhyay (2019) also observed the same for Gujarat, an Indian State which adopted relief centric model ignoring preparedness. As a result, in 2019, Gujarat government spent INR 215 billion in relief works, diverting financial resources from other developmental works. Therefore, the author proposed that government priorities should be mitigation, preparedness and forecasting instead of focus on relief. And in this reference, a few countries, such as Australia and USA, have shown tremendous progress in preparing and implementing the mitigation-based drought management framework.

Fifth, the conceptualisation of drought definition should be uniform at the national and sub-national levels (Sharma, 2019). It will lead to a more scientific assessment of the water scarcity, droughts assessment, drought declaration, monitoring and management. It will also remove any ambiguity in the drought management at State level in India. Further, as Bandyopadhyay (2019) and Sharma and Sen (2021) proposed, drought management should be a bottom-up approach rather than top-down. Drought risk management policies and strategies should be formulated and effectively implemented at district-level. For this, Bahinipati (2021) suggested two risk management tools: irrigation expansion and crop insurance. Further, a robust monitoring system must be developed for effective policy and program implementation at the district level. Echoing the above recommendations, Saini (2021) also proposed that investment in preparedness such as water conservation, drought monitoring and forecasting, timely and effective communication to people, and timely disbursement of financial relief should be the focus areas. Saini (2021) recommended these priorities after assessing the drought management framework of Australia, Israel, and China.

7 Conclusion

The present study examines the vulnerability profile of the Madhya Pradesh, disaster management framework, and the State government policies, particularly pre and post-disaster budgetary policy towards drought risk management. The examination focuses on the short-term (relief) and the long-term (mitigation) budgetary allocations to important State run programs and trends to reduce the exposure, vulnerability and damages caused by droughts in MP. The study also analyses the effectiveness, shortcomings, and challenges of the State's existing drought risk management policies. The present analysis is descriptive and analytical and uses secondary data to accomplish the stated objectives. The study is novel to undertake such a comprehensive policy analysis for the State of MP

in India, which is susceptible to drought risks due to its unique geophysical characteristics and vulnerable eco-system.

The State predominantly depends on agriculture from the employment and occupational engagements perspective. The findings of the study show that disaster framework and policies to reduce and mitigate the drought risk are inadequate and primarily relief oriented. There are several lacunas in implementing the policies, and, therefore could not stop the out-migration during droughts. Government spending towards relief works is stagnant for the mitigation measures such as irrigation infrastructure development. DPAP, IWDP, IWMP, irrigation projects, and crop insurance are the major heads where funds are allocated for long-term mitigation. There is a slight upward trend of budget allocations for DPAP (2001–2007), IWDP (1995–2009), and IWMP (2009–2013), with a few fluctuations in-between. The State also witnessed a consistent rise in the funds for irrigation infrastructure from 2010 to 2015. Similarly, there was a regular increase in budgetary allocations from 2011 to 2015 for the crop insurance premium. The State witnessed a declining trend in budget allocation towards financial relief to districts (from the SDRF) (2005–2017), with some fluctuations in-between.

The study contributes to the existing body of knowledge by comprehensively analysing the drought management framework, policy and shortfalls. The findings may have important implications for the State governments and the policymakers. It may help them re-examine and re-design the existing disaster management policies and further improve the shortcomings in the disaster risk management framework. The data availability for a short period is a limitation of the study and therefore offers scope for future researchers to overcome it. Future researchers may also compare the drought management framework, policies, and their impact on livelihoods, economic sectors, and aggregate economy for the comparable Indian States. Such analysis is beyond the scope of present work given limited data availability and specific study objectives.

Acknowledgement

This research work is a part of author's PhD thesis, and the author thankfully acknowledges all the support, motivation and guidance of the thesis supervisor.

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Notes

[1]Bundelkhand is a severely drought-affected and economically backward region. It has a total of 13 districts. Out of these 13 districts, 6 are part of Madhya Pradesh, and the remaining 7 districts belong to an adjoining state, Uttar Pradesh. The entire Bundelkhand region has faced recurrent and severe droughts in the past two decades.

[2]To relieve the socio-economic distress and for the region's development, the Government of India sanctioned a special package for the districts of the Bundelkhand region.

[3]MGNREGA is an employment guarantee scheme of Central Government of India for one person in each rural household for 100 days in a year for normal years and 150 days in a year during drought years. The scheme aims to stop rural migration during off-farm season to urban areas, create productive assets and ensure economic development.

[4]The study also finds that other social safety schemes such as targeted Public Distribution for food distribution, subsidiaries for power for irrigation, and water conservation and management are inadequate in Bihar.

[5]Disaster management Act, 2005 states that the drought is the State preview (and responsibility) achieved through district (local) level authorities following national guidelines. In addition, definition and conceptualisation of droughts varies at sub-national level. Therefore, the implementation and effectiveness of drought management should be assessed at State level only.

[6]INR denotes the Indian Rupee.

[7]Tehsil is a sub-district, a local unit of administration. There are 428 tehsils under 52 districts of Madhya Pradesh.

[8]Kharif crops such as 'Rice' are those which are grown in summer season, whereas Rabi crops such as 'Wheat' are grown in the winter season in Madhya Pradesh.

[9]Govindaraj, A. Crop Insurance models and relief measures in India and Madhya Pradesh.

[10]Lok Sabha Unstarred Question No. 4057, Ministry of Agriculture and Farmers, Department of Agriculture, Cooperation and Farmers Welfare, Government of India.