



Drought Proofing India: Key Learnings from Bundelkhand Drought Mitigation Package

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Drought is considered to be a natural hazard, which has a slow onset, evolves over months or even years but affects a larger region. Drought is classified as meteorological drought when rainfall is deficient >20% than the normal rainfall in the given area; hydrological drought, when there is significant depletion of surface water; and agricultural drought, when inadequate soil moisture lead to fall in agricultural productivity. On an average, 80-100 districts received deficient rainfall and were declared drought affected in India, every year including the best monsoon years since 2000. Severe countrywide drought occurred for 4 years since 2000, causing widespread hardships to the human and livestock population. Some of the regions spread over in the States of Maharashtra, Karnataka, Andhra Pradesh, Rajasthan, Madhya Pradesh, Uttar Pradesh, Jharkhand, Bihar, Odisha, Telangana are chronically prone to drought. Bundelkhand region of Uttar Pradesh (UP) and Madhya Pradesh (MP) is one such typical drought prone region declared drought affected for at least 5 times since 2000.

Policies and Plans for Drought Management in India

Disaster Management Act, 2005 is the primary law at the national level that provisions for management of disasters in the country. It mandates that there shall be a National Disaster Management Plan (NDMP) for the whole of India which will pertain to the disaster management for the entire country. However, it also specifies that the hazard specific nodal ministries and departments shall be notified by the Government of India who will prepare detailed disaster specific management plans.

Government of India has notified the Department of Agriculture, Cooperation & Farmers' Welfare (DACFW) as the nodal agency to formulate policies, plans and institutional mechanisms related to drought management in the country. DACFW has actively been engaged in devising guidelines and practices that should be followed by the state and district level authorities to mitigate drought conditions in their area.

The revised Drought Management Manual was published by the DACFW in December 2016, which has come into effect from Kharif season of 2017. The Manual is a guide for governments and agencies engaged in the prevention, mitigation and management of drought. It defines various set of indices and parameters appropriate for declaration

of drought in a region. Based on the values of indices like Standardised Precipitation Index, Vegetation Condition Index, Percentage Available Soil Moisture, and Hydrology Indices like Reservoir Storage Index, Stream-flow Drought Index and Ground Water Drought Index, it grades the magnitude of the drought events on a scale of values as “Moderate” and “Severe”.

As ‘Drought declaration’ signifies the beginning of Government response to conditions leading to drought situation, the manual provides objectivity to the process of determination of drought in an area. This also ensures quick assessment of ground scenarios to reduce any time lag in occurrence, assessment and response mechanism for management of drought. Based on the drought indices, state governments are authorized to declare drought and carry out relief operations. In case of severe drought, they can also request Government of India for financial assistance by submitting a Memorandum for Financial Assistance.

Following the declaration of drought, relief and response measures are required to be initiated to minimize damage to life and property. To provide necessary guidance to the implementation authorities, Crisis Management Plan (CMP) and District Agriculture Contingency Plans (DACPs) have been formulated by DACFW in collaboration with ICAR-Central Research Institute for Dryland Agriculture (ICAR-CRIDA).

CMP, a strategic guiding document for Central Ministries and State Governments, is prepared before the commencement of each Kharif season and provides critical steps that need to be taken in different times of the year with respect to drought preparedness. CMP is pressed into action in the event of a drought and delineates the roles and responsibilities of various stakeholders, including central and state government and their agencies in managing the drought effectively. Thus, CMP focuses on management interventions required during the crisis.

DACPs recommend contingency measures in terms of alternate crops/crop varieties/agronomic practices/other management options appropriate for district specific drought scenarios. Specificity of DACPs is extremely exhaustive and provides for measures to cope with drought in rainfed and irrigated farming situations, on account of delayed onset of monsoon (2/4/6/8 weeks delay), for field and horticulture crops and for early/ midseason/terminal drought scenarios. DACP also talks about establishment of seed bank, fodder bank as well as nutrient centres, at strategically advantageous locations for providing

relief to farmers during distress period. DACP also mentions for establishment of Custom Hiring Centres for farm machinery at village level, to enhance availability of implements at low cost, to help in zero tillage, improved seed and fertilizer application etc.

DACFW has also released a Drought Management Plan (DMP) in November 2017 which helps in delineating roles and responsibilities of different Ministries/ Departments of the Government of India involved in drought management for mitigation, preparedness and for relief measures in managing the drought. Key focus of DMP is to ensure better preparation and timely communication among stakeholders, to help reduce the time taken in mobilizing resources for an effective response and enable a harmonious relationship among stakeholders, which is critical in managing a drought.

Institutional Arrangements

DACFW is responsible for monitoring and coordinating the central government response to drought. A Crisis Management Group functions under the Chairmanship of the Central Drought Relief Commissioner with representatives of associated ministries and organizations. The Crisis Management Group meets from time to time to review the drought situation in the country and progress of relief measures.

At the state level, Department of Disaster Management and Relief, headed by a Secretary or Relief Commissioner is responsible for directing drought operations in the State. The Relief Commissioner/ Secretary monitor the drought situation and regulate the release of all financial assistance to the district administration.

At the district level, Collector implements all decisions related to drought management through a number of line departments and field agencies. District collector heads a district drought/disaster management committee consisting of public representatives and line departments. At the sub-district level, Panchayati Raj institutions (PRIs) - Zilla Parishads, Panchayat Samitis, and Village Panchayats – are involved in the implementation of drought management programmes.

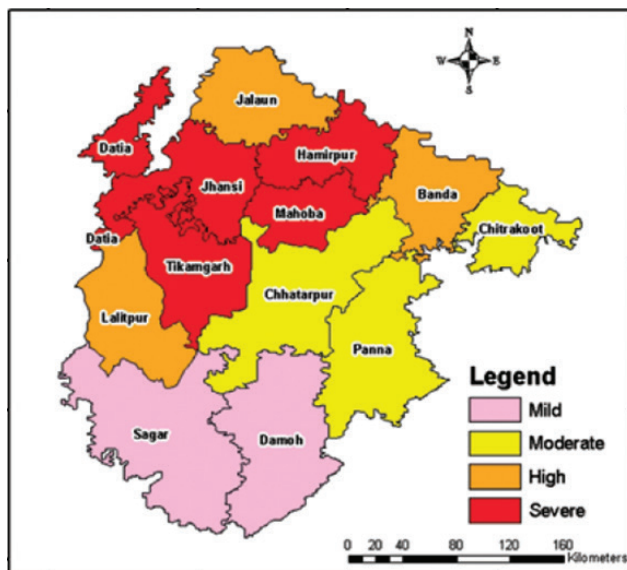
National Agricultural Drought Assessment and Monitoring System (NADAMS), provides near real-time information on prevalence, severity level and persistence of agricultural drought at state/ district/ sub-district level. It covers 14 states of India, which are predominantly agriculture based and prone

to drought situation. Agricultural conditions are monitored at state/ district level using daily satellite data for 9 states.

Bundelkhand Drought Mitigation Package

Bundelkhand Drought Mitigation Package was implemented by erstwhile Planning Commission and now NITI Aayog in the 13 drought prone districts of Bundelkhand region of Uttar Pradesh and Madhya Pradesh for reducing the adverse impacts of drought to the communities in the region.

Bundelkhand package evolved with the consultation workshops held with the local stakeholders organised at village panchayat and district level. These workshops identified the key needs and shortlisted the key areas of interventions as expressed by the stakeholders. An Inter-Ministerial Team (IMT) constituted for the purpose, mentioned that analysis of the various data sets reveals occurrence of severe meteorological, hydrological and agricultural droughts which have built up cumulatively over the past four years. IMT recommended Participatory integrated watershed management for in-situ conservation of the rainwater, recharging of dug wells, renovation and repairs of Bundela, Chandela and Peshwa tanks existing in the region, and digging of farm ponds and open wells.

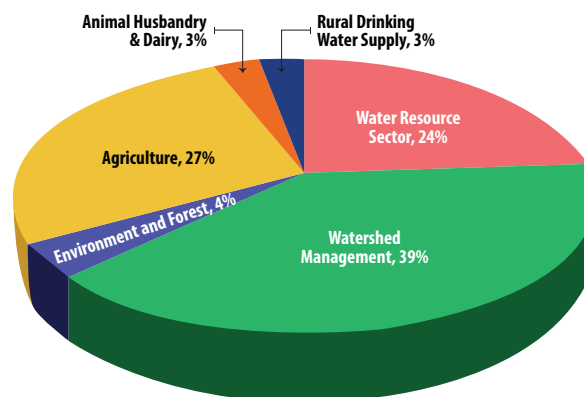


Composite Drought Hazard Map of Bundelkhand regions (Source: NIDM 2014)

Financial Allocation

Based on the comprehensive report and recommendations from IMT, Bundelkhand Drought Mitigation Package was approved on 19th November 2009 with a total outlay of Rs. 7,266 crore. Another

Rs. 200 crore (Rs. 100 crore each for UP and MP) was provided subsequently for drinking water projects making the package to Rs. 7466 crore. Initially the package was approved for XI Plan. The package envisaged convergence with ongoing Central Schemes/ Centrally Sponsored Schemes of various Ministries/ Departments to supplement part of the cost of the package while Rs.3648.96 crore was provided as Additional Central Assistance (ACA). However, due



Sectoral allocation of finances under Bundelkhand Package

to issues in convergence of schemes especially with MGNREGA, the States requested full package as ACA. The Government approved the continuation of the Package during the 12th Plan period (2012-2017) under the Backward Regions Grant Fund (BRGF) with a financial outlay of Rs. 4,400 crore.

Water Positive Investments (WPI)

- These are the interventions which were aimed at improving water availability in the Bundelkhand region. Almost 1/3rd of allocation under WPI activities was spent in the development of Rajghat Project Command Area, which included correction of system deficiency as well as Command Area Development works. This has been successful considering the extension of irrigation facilities to the otherwise unirrigated areas, and increase in the number of irrigation water as reported by farmers. This year a significant increase in rabi crop production has been reported by the farmers as compared to previous years. Construction of main, branch and subsidiary canals have extended the coverage under irrigation network. An additional area of 57,344 Ha has been brought under irrigation facility.
- A significant focus was laid on restoring capacities, repairs, renovation and re-modelling of canals. These works have been reported to have increased

the total irrigated area by 75,064 Ha. This increase has been mainly due to reduction in seepage losses of water and resultant increase in reach of water to distant areas.

- Close to 15,000 wells have either been constructed/deepened in Uttar Pradesh under Bundelkhand package. Similarly, about 7,250 wells have been energized creating an additional irrigation potential of about 36,000 Ha.
- Construction of small check dams and bunds in major and minor nalas to check flow, especially for the regions like Bundelkhand is considered to be an effective way for conservation of rainwater and to recharge the ground water aquifers. Bundelkhand package has led to the construction of 900 check dams in Uttar Pradesh and about 350 stop dams in Madhya Pradesh.
- In Uttar Pradesh, on an average 400 hand pumps have been installed in every district. Tube-well schemes have been implemented to provide drinking water at household level under this package, and helped beneficiaries to save on time to fetch water from distant sources.

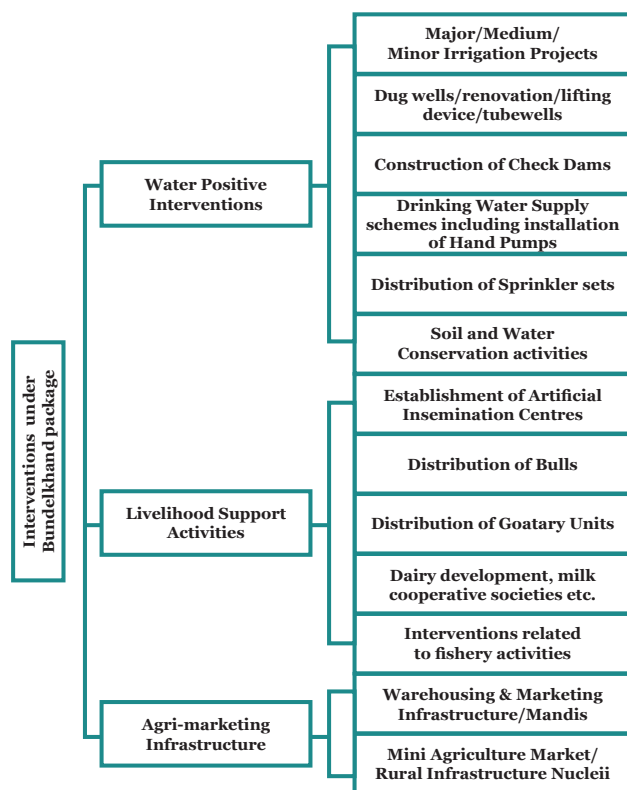


Diagram: Domain of interventions under Bundelkhand Package

Livelihood Support Activities

- To improve the progeny of cattle population in the region, 230 Artificial Insemination (AI) centres

have been set up in 13 districts of Bundelkhand region from the package with 120 centres in Uttar Pradesh and 110 centres in Madhya Pradesh. These centres have performed almost 6.5 lakh AIs in the region with an average success rate of 45%. This has resulted in the birth of almost 2.5 lakh improved progeny of calves in the region.

- Also, to improve the locally available breed of cattle, artificially improved Murrah Buffalo bulls were distributed to selected beneficiaries under the Bundelkhand Package, for providing natural breeding services to the farmers in the village. A total of 340 Murrah Buffalo Bulls in Uttar Pradesh and 2403 in Madhya Pradesh have been distributed to the villagers. Murrah bull has been given to selected beneficiaries on the basis of demand and those who already are in the business of breeding buffaloes. The beneficiaries of breed improvement activities have reported an improvement in milk production and quality as well as an earlier maturation of the progeny.
- Close to 7,000 goat units, each consisting of 10 female goats and one ram of age ranging between 6 months to 18 months has also been distributed among villagers of Bundelkhand region. These goat units provided additional livelihood opportunity to otherwise unemployed villagers, who were able to generate income through selling of goat milk or meat.
- For the improving in household income through dairy sector, a number of key structural interventions were made under the package in both Uttar Pradesh and Madhya Pradesh, through Dairy Development departments. These interventions included the organisation of milk producers into milk cooperative societies, establishment of Dairy plant, Milk Coolers, and Milk Chilling centres in almost all the districts of the region. More than 1000 milk societies have been established in the Bundelkhand region to create common platform and provide wider market for milk producers. Milk procurement by cooperative societies has helped farmers and local communities in generating additional income, while preventing them from the irrational pricing by the private vendors.

Agri-Marketing Infrastructure

- Creation of efficient Marketing and storage facilities for agricultural produce were given a strong impetus under the Bundelkhand package to ensure proper price realization of crops to the farmers.

Key Examples of Socio-economic Impacts due to Bundelkhand Package

- Extension of irrigation facilities under the Bundelkhand package has led to a major shift in cropping pattern among farmers from the cultivation of Masoor, Jowar and other coarse millets to Wheat. Triennial ending average area under wheat cultivation in Bundelkhand districts of Uttar Pradesh and Madhya Pradesh indicates an increase of about 30% and 42% in 2015-16 as compared to 2008-09, respectively.
- Similar to area under wheat cultivation, its production has also increased during the implementation of Bundelkhand package. Triennial ending average production of wheat in Bundelkhand has increased from 20 Lakh ton in 2008-09 to almost 31 Lakh ton in 2015-16.
- Bundelkhand package also created opportunity for self - employment of about 13,000 people and contractual employment of 3,600 people in different schemes related to livelihood support activities. While activities related to Goatry and Bull Induction provided self-employment, dairy and horticulture activities generated contractual employment. Also, piped drinking water schemes have contracted pump operators being paid by Water Users Associations (WUA).
- A number of infrastructures have been built under the Bundelkhand Package. Besides Major, Medium and Minor irrigation projects, approximately 1,250 check dams and more than 15,000 dugwell have been constructed. Bundelkhand Package also led to construction of about 250 big or small mandis as marketing infrastructure for agricultural produce. Majority of these construction activities have been done through allotment of projects to contractors following the prescribed bidding procedures. Contractors who executed the construction process, employed labour from local area who were paid according to the minimum wage rates. It is estimated that Bundelkhand package was able to generate about 8.56 Crore Man-days employment in Uttar Pradesh and Madhya Pradesh.

Marketing facilities and post-harvest structures were envisaged for the expected increase in production of agricultural crops consequent upon creation of additional irrigation potentials and improved soil moisture regime in the Bundelkhand region. Under this intervention market yards, local mandis and warehouses have been created. These infrastructures were also expected to help farmers in saving time and cost of transportation to larger mandis which are far off and also ensure timely storage to reduce grain damage.

- Uttar Pradesh has undertaken construction of 7 Specialized Mandi Yards, 1 in each district, and 133 Rural Infrastructure Nucleii (RINs). Similarly, Madhya Pradesh has established 94 such warehousing and marketing infrastructure facilities under the package. It has also established separate Mini Agriculture market, Agriculture Input Centres and Seed Godown and Processing Units.
- Total grain storage capacity of 7.44 Lakh MT has been created under the Bundelkhand package in the region, as a result of Agri-marketing infrastructure establishment activities.

Issues and Challenges

An assessment of policies and plans built upon the Disaster Management Act, 2005 indicate that country

is making sincere efforts to achieve perfection in formulation of policies and designing of programmes. Different set of documents released by DACFW and other associated institutions present an exhaustive list of guidelines for drought preparedness, prevention, mitigation as well as risk reduction. However, these plans and policies, released recently, still have to pass through the actual implementation stage on the ground, under severe drought scenarios. Also, their effectiveness in drought risk reduction is pending to be tested.

Simultaneous to an effective planning framework, drought proofing of the country will also require its successful implementation which is dependent on availability of adequate funds, appropriate policy framework, and effective delivery mechanism to optimally utilise funds and achieve sustainable growth. Other associated factors which have the potential to affect the success of drought proofing programmes are a transparent system of accountability, participation, feedback mechanism, monitoring and evaluation.

Manual for Drought Management recognises the need for establishing sync between drought mitigation measures and the regular development programmes of the Centre and State Governments. Some of the most significant current national programmes identified for the purpose are Pradhan Mantri Krishi

Sinchayee Yojna, National Rainfed Area Development Programme, and National Rural Drinking Water Programme etc. Many of these programmes have the potential to make significant reduction in likely impacts due to occurrence of drought. However, the actual mechanism which may ensure an effective convergence is still required to be elaborated.

Bundelkhand Drought Mitigation Package presents a striking example of successful implementation of a drought proofing plan. The plan had all the necessary elements related to effective governance and implementation of the package. While the package was formulated and implemented before the preparation of Drought Management Plan by DACFW and other related guiding framework, it has played a significant role in extending irrigation facilities, providing alternate employment opportunities as well as building up important infrastructure facilitating the drought proofing of Bundelkhand region. However, the plan also faced challenges related to convergence of drought proofing measures with the ongoing government programmes in the region.

DMP and DACPs provide an elaborative mechanism for release of funds subsequent to declaration of drought by the local authorities. However, the plans are almost silent about the financial appropriation for drought risk reduction in the regions. On practical grounds, while it may not be possible to provide a drought mitigation package for individual drought prone regions in the country, it is required to identify appropriate financial resources and convergence mechanism with the ongoing development schemes to synchronize the drought proofing measures into normal development process of these regions.

Recommendations

While design and implementation of Bundelkhand package could be case study of success of a large scale government programme, a closer scrutiny of the entire process and the results accrued indicate a space for further improvement in order to provide sustainability to socio-economic impacts caused by the package. For the purpose, below recommendations are being proposed which shall be incorporated during the implementation of Drought Management Plan and District Agriculture Contingency Plans along with the experiences gained during the implementation of Bundelkhand package by different government agencies:

1. Watershed Based Planning

Plans with such a large magnitude with reference to both resources as well as scale of implementation should adopt 'Watershed based approach' for development of individual water positive interventions. Watershed based planning is different from the planning for watershed management, as it considers the development of structures considering the water availability and carrying capacity of the watershed. Development based on watershed approach does not limit for the development of that particular watershed but an integrated development considering the upstream as well as downstream watersheds.

Schemes related to minor irrigation, construction of dugwells or check dams should have the overall water availability analysis as the fundamental component, before finalizing the number of projects to be implemented. Each micro-watershed has specific potential to support these structures and can have negative impact on downstream micro-watershed due to heavy concentration of these structures in an area. Rainwater harvesting and water conservation activities shall be promoted. More such structures planned scientifically shall be constructed giving due consideration to the hydrological potential of the watershed.

2. Evidence Based Planning

Evidence based planning refers to the development of plans based on quantitative data/information supporting the requirement of plans. It is necessary to establish baseline information about the socio-economic status of the likely beneficiaries. Such a baseline information should cover the various aspects like income, employment, area under cultivation, production etc. Baseline information will also help in measuring the success achieved not only towards the end of the project but also during the intervening stages.

3. Balance Sheet of project beneficiaries

District level line departments should develop and maintain a detailed profile of villages in the command area of all the irrigation projects but especially with reference to minor irrigation and check dam projects. Such a profile should have the details about farmers and should be maintained in the form of standard accounting systems, with updates crediting or debiting the beneficiaries based on new entrants or an earlier beneficiary slipping out of the scheme due to various

possible reasons. This balance sheet of beneficiaries will help in keeping track of the sustainability of the impacts created under a project.

4. Establishment of result oriented Monitoring and Evaluation (M&E) systems

Release of funds for new financial year from the NITI Aayog and state planning departments is based primarily on level of expenditure for the already allocated funds. However, an indicator based monitoring and evaluation system should be institutionalised and made result oriented. Such a system shall be based upon the pre-emptive positive/negative impacts as envisaged by the planners/implementation authorities at the time of allocation. Annual release of funds shall be based on the progress achieved on indicators proposed previous year, and the likely progress proposed for the new financial year. The baselines shall also be integrated in the Programme Monitoring and Evaluation system that have been developed at the time of start of the project. This can significantly improve the result oriented planning of the institutions.

5. Institutionalize the systemic monitoring of implementation

A strong monitoring mechanism has the potential to remove implementation deficiencies; however, frequent random visits of the monitoring teams and officials can hamper the speed and focus of implementation. The institutional mechanism for monitoring was much decentralised working at Central, State and District level. The National Rainfed Area Authority worked as nodal agency for monitoring and implementation of the package at national level. The monitoring teams visited the districts to keep a vigil on the implementation of the package. This ensured the achievement of physical targets in a time bound manner. However, it also put pressure on the officials and cut their productive time which otherwise would have been put to assess and re-evaluate their plans of implementation. Hence, a structured system of monitoring with larger use of technology and little of human interface could be more beneficial.

6. Accountability, Participation and training

A system of fixing accountability beyond the responsibility of ensuring the 100% utilization of allocated budget and achievement of physical targets should be put in place. The accountability should be

linked with recognition and rewards to performance rather than viewed as tool for punishing the officials. This will ensure an active participation of district officials in the implementation of programme rather than being passive recipients of directives from higher authorities of the state or centre.

The appreciation about the drought mitigation and climate change induced weather aberrations is low at the middle level of the governance in the districts. Though some capacity building provisions were built in the later part of the package period, it could have been mainstreamed from the beginning. A capacity building of middle and lower level officials on latest techniques of water resources management, as well as adaptation to climate change impacts is extremely necessary. Also, district level officials need to be trained on indices developed for determination and declaration of drought by DACFW in its Manual on Drought Management.

7. Strengthen feedback mechanism

Role of officers at the district level should not be limited as implementation agent/ department only. However, they should be provided with a more active role in terms of taking their feedback on existing policies. These feedbacks should come from the officers in charge at the lowest tier of district and sub-district administration. An online system should be institutionalised as feedback channel so that the challenges faced are brainstormed by those involved in policy formulation and implementation, and the learnings can be incorporated in the policies to make them more effective.

8. District Level Inter-departmental Convergence and Coordination

During the initial stage, the package relied heavily on convergence with MGNREGA and other centrally sponsored schemes, which failed miserably. The future efforts for drought proofing must evolve a strong mechanism for convergence of different programmes of various departments for a given sector or natural resource. The typical convergence matrix for a drought prone area should be a hydrological unit - watershed. A district level coordination committee consisting of Executive Engineer level members from different departments dealing with water resources shall be constituted. The committee shall meet regularly to appraise other departments about their department's plans, activities and progress related to

development of water resources and other drought proofing measures.

9. Allocation to Livelihood Support Activities

Livelihood Support activities aimed to provide benefits directly to the villagers. An exemplary response was received from the beneficiaries about the impact of these projects on their life and livelihood. Active milk cooperative societies have augmented the additional income to the farmers, while AI centres and Bull Induction programmes led to improvement of cattle breed, apart from generating self-employment for the beneficiaries. However, it was found that these initiatives faced financial crunch at some point of time in both the States. The most appropriate way would have been ensuring convergence of the package efforts with ongoing Central and State programmes of livelihood support, which was missing largely.

During extended drought period, additional income generating activities as well as diversification of sources of income are the only option to sustain the livelihood of local communities. Hence, it is strongly recommended that the allocation under these activities should be enhanced and should include additional activities which may generate self-employment opportunities for the locals. Local handicraft based activities should be promoted under the drought proofing programmes.

10. Creation of Water Help Groups

Water users association (WUA) is a common feature, especially in Madhya Pradesh, in relation to drinking water schemes. However, the concept of WUAs should be evolved further into Water Help Groups (WHGs), with members trained to take care of water conservation activities at the local level. With the capacity to build rainwater harvesting and groundwater recharge structures at the local level, these groups can be helpful in managing the seasonal water stress.

11. Water management/ inter-basin river transfer

Water is a resource which can neither be created nor produced, but can only be managed efficiently. As the region often receives less rainfall, the water storage structures will only be useful if all the excess water of the rainy season is stored in the well-lined water storage structures and used judiciously post-rainy season. Very good network of tanks exists in many drought affected districts. However, the capacity of these tanks has reduced over years. Most of such tanks are in need of de-siltation, repair and rehabilitation. Such tanks may be de-silted on a Mission Mode approach, as has been done by Telangana state under its Mission Kakatiya.

Within Bundelkhand region, the rainfall increases from 700 mm in UP to 1200 mm in MP. Some of the districts receive much better rain and are well connected with the canal network while some are chronically affected by drought. While National Water Grid is a distant dream, a regional water grid by transporting the water from water surplus districts/ subdistricts to distress or scarce water regions should be explored. Interlinking of river projects at various stages of construction shall be completed expeditiously. The drinking water projects should be linked with perennial source of surface water rather than relying only on the groundwater resources.

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