

Study of Impact of Special Package for Drought Mitigation Implemented in Bundelkhand Region

This study was conducted with support from
NITI Aayog, Government of India



Study was conducted by
The Energy and Resources Institute, New Delhi

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Disclaimer: The Energy and Resources Institute (TERI), New Delhi received the grant from NITI Aayog, Government of India to conduct this study and produce this report. However, NITI Aayog shall not be held responsible for findings or opinions expressed in this report. This responsibility rests with The Energy and Resources Institute (TERI), New Delhi.

Suggested format for citation

TERI. 2018
Study of Impact of Special Package for Drought Mitigation Implemented in
Bundelkhand Region
New Delhi: The Energy and Resources Institute.
[Project Report No. 2017HE02]

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Executive Summary

Bundelkhand region has in total 13 districts, 7 from the state of Uttar Pradesh and 6 from the state of Madhya Pradesh. These 13 districts of the region feature in India's 200 most backward districts' list. The region is water scarce because of hard rock area, which limits groundwater availability. Moreover, due to lack of infrastructure, improved technology and other factors, the region has not been able to develop at par with the regions adjoining it. Given the context, government implemented the Special Package for drought mitigation in the Bundelkhand region since 2009-10. As part of the package, total outlay was Rs. 7,466 Crore during the first phase, and subsequently, under the Backward Regions Grant Fund (BRGF), an additional amount of Rs. 4,400 Crore was provided for the region during the 12th plan period (2012-2017).

For the impact evaluation study, TERI has undertaken literature review and field surveys. Literature review has been conducted to understand the other existing case studies of drought mitigation interventions. Field survey was conducted through two approaches – survey of individual beneficiaries and consultation with group beneficiaries, depending on the nature of impact of the interventions. As part of the survey, on site visits were conducted to selected infrastructures created by various department and associated stakeholders were consulted to understand the impacts generated due to different interventions under the Bundelkhand package. For a more effective evaluation and interpretation, different set of interventions were classified into 3 groups: 1. Water Positive Interventions; 2. Livelihood Support Activities; 3. Agri-marketing Infrastructure.

Water Positive Interventions (WPI)

These are the interventions which were aimed at improving water availability in the Bundelkhand region. Madhya Pradesh spent about 73% of total ACA allocation under BKD package on the WPI while Uttar Pradesh spent 66% on WPI activities. Different WPI activities included interventions related to major, medium and minor irrigation projects; construction and renovation of dugwells; provision of lifting device, tubewell and energization of existing wells; construction of check dams and stop dams; provisions for availability of drinking water through piped water supply system, etc.; providing sprinkler set and HDPE pipes; and activities related to soil and water conservation in the region.

Major and Medium Irrigation Projects

- Madhya Pradesh spent about 22.5% of total ACA allocation under BKD for major and medium irrigation projects. Almost 1/3rd of this was spent in the development of Rajghat Project Command Area Development, 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 of the Datia district. This year a significant increase in rabi crop production has been reported by the farmers as compared to previous years.
 - Medium irrigation projects in Madhya Pradesh involved creation of new dams as well as strengthening of some existing dam infrastructure. 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 against the target of 1,04,112 ha, which is an achievement of 55% as on March 2017. Below target achievement has been mainly due to constraints related to completion of work on Panchamnagar, Sonpur and Pawai medium irrigation projects.

- Uttar Pradesh spent about 17.1% of total ACA allocation under BKD for major and medium irrigation projects. Major portion of this amount has been spent on 41 works related to restoration capacities of canals, 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.
- Under phase II, an amount of Rs. 50.46 Cr. has been allocated by Uttar Pradesh towards construction of Chillimal Pump canal. This project is still under construction; however, it is expected to increase the irrigation capacity in the region.

Socio-economic Impacts

- 60% of the surveyed upstream farmers feel that they are better able to irrigate their land due to change in water availability as well as number of irrigation being provided to them.
- 70% of the upstream and 57% of the tail-end farmers responded that they have switched from the less water demanding crops to more water intensive crops.
- Almost 90% of the farmers in Datia district, who have changed the type of crop being grown, responded that earlier they used to grow crops like urad, sarson and millets, but after the canal extension or water in canals, they have started growing wheat.
- At least 53% of the upstream farmers reported a change of more than 200% in the total crop production and almost 25% reported an increase in the range of 100-200%.
- While 30% of the upstream farmers reported an increase of Rs. >50,000/- in their income, at least 47% had an increase in the range of Rs. 25,000-50,000/-. Among tail-end farmers, only 18% farmers had an increase of more than Rs. 50,000/-, 32% had an increase between Rs. 25,000-Rs. 50,000/- and 35% farmers had a marginal increase of lesser than Rs. 25,000/-.

Minor Irrigation Projects

- Madhya Pradesh spent about 26.5% of total ACA allocation under BKD for minor irrigation projects. These schemes included completion of works under 49 ongoing minor irrigation projects, construction of 118 new minor projects and repair and renovation of ponds/ tanks related to 3 schemes. Physical achievement of 100% target is reported by the state government from schemes under phase I, however, schemes under phase II are under construction and physical achievement is limited to 43% only.
- Uttar Pradesh spent merely 2.6% of ACA on minor irrigation schemes which included repair and renovation of ponds/ tanks and reconstruction of water distribution network. Instead of creating new infrastructure, focus was laid on repair and renovation of existing structures. But it was difficult to ascertain the benefits accrued due to these interventions.

Socio-economic Impacts

- A big number of upstream farmers (about 83%) reported that they have been able to extend the irrigation for more than half of their land or they are receiving atleast half the number of irrigation required for cultivating the crop, from minor irrigation project. Towards the tail-end, about 50% of the farmers reported a similar increase.
- 50% of the upstream farmers feel that their crop production has increased by more than 2 times after the construction of project and since they have switched to new crop cultivation. Similarly, 33% farmers felt that increase is between 100-200% and only 17% feel that increase is less than 100% of the earlier production. Among the tail-end farmers, 67% feel the increase is between 100-200%, 25% feel it to be more than 200%.
- 16% of the upstream farmers reported that their income has increased by more than Rs. 50000/- while 42% reported the increase to be between Rs. 25000-50000/-.

Dug Wells/ Renovation/ Lifting Device/ Tubewells

- Uttar Pradesh spent a major portion of its ACA on digging of dugwells/ tubewells, renovation and recharging of existing wells/tanks/ponds as well as installation of lifting devices/ energization of tubewells. Total amount of 18% of ACA was allocated for the purpose. This was almost equivalent to 27% of total amount for water positive interventions. A total of 7,793 new dugwells have been constructed at a per capita cost of Rs. 1,97,000/- in 4 districts of UP-Bundelkhand. This has been reported to have created additional irrigation facility at the rate of about 1 Ha per dugwell. All these wells are being provided with lifting devices/ pumpsets to draw water from the wells at a per capita cost of about 35000/- and HDPE pipes at a per capita cost of Rs. 20,000/-. While achievement for all these schemes have been reported to be below target, as on date, energization of private wells has been 115% with 7248 tubewells having been energized at a per capita cost of about Rs. 1,37,500/-.
- Another major activity under this head had been deepening of existing wells and recharge of wells. A total of 6942 wells located in 4 districts of UP-Bundelkhand have been deepened, and another 6931 wells distributed in all 7 districts have been recharged. An average cost of Rs. 32000/- can be estimated for deepening and recharge activities. These beneficiaries are also likely to be provided with the HDPE pipes as per the reported target for the same.
- However, only beneficiaries of the well construction/deepening activities were 4 districts namely- Jhansi, Lalitpur, Mahoba and Chitrakoot. Close to 5000 wells each, have either been constructed/ deepened in Jhansi and Lalitpur districts itself, out of 15000 beneficiary wells under Bundelkhand package. There was no clarity on the rationale for focussing well construction/ deepening activities within these 4 districts only. Also, there was no hydrogeological assessment available to support the location of different wells within district or its block. Considering the regular deviation of rainfall from its normal in these districts and groundwater development already being 60% in Jhansi, Lalitpur and Chitrakoot districts and 110% in Mahoba, sustainability of these wells for long term operations is questionable. During site visits also, it was found that while some wells were being used by the beneficiaries, some were dried and many other wells had below average water level. Distribution of HDPE pipes and lifting devices is still under process.

- Both Jhansi and Lalitpur are reported to be witnessing higher level of nitrate than the permissible limits. Also, two blocks in Jhansi have very high level of hardness. These groundwater quality concerns have also not been considered while planning for construction/ deepening of wells in these districts.
- Similarly, about 1000 wells each have been energized in Jhansi and Lalitpur districts, and 2400 wells in Jalaun district, while this number is only 86 in Jalaun. Again, within the available information it was not possible to ascertain the rationale for such an unequal distribution. A number of beneficiaries of dugwells asked for energization of tubewells due to increasing cost and inconvenient availability of diesel in nearby areas. Hence, a convergence of energization of wells constructed under the package should be explored.

Socio-economic Impacts

- About 72% of the wells had sufficient water and were being used by the farmers for irrigating their crop. Remaining 28% of the wells were not being used, out of which 16% were dried and 12% did not have enough water for irrigation.
- 58% of the farmers reported that dugwell has helped them in irrigating their land. Atleast 23% of the farmers were not having any irrigation source previously, but are now able to irrigate their field sufficiently. These farmers have also been provided with the pump sets and HDPE pipes, which has been like a boon for them.
- As much as 94% of the farmers reported that they have changed the type of crop being grown earlier. Actually, majority of these farmers were either not growing any crops or working as labours or were dependent on water purchased from other well owners in the adjoining region.

Stop Dams/ Check Dams

- Both Uttar Pradesh (10%) and Madhya Pradesh (7%) have spent significant amount of their ACA allocation in construction of stop dam/ check dams. This amounts to 15% and 10% of their ACA expenditure for Water Positive Initiatives, respectively. This has led to construction of 900 check dams in Uttar Pradesh and about 350 stop dams in Madhya Pradesh. In Uttar Pradesh, 3 departments namely Forest, Minor Irrigation and Agriculture departments were involved in construction of check dams, while in Madhya Pradesh, only Rural Development Department was involved.
- 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. As such, expenditure on construction of check dams is a sustainable intervention for augmenting water resources in the drought prone regions.
- These structures helped farmers when it rained. Water level in these check dams was sufficient to benefit farmers through crop irrigation. Farmers reported that it led to improvement in crop productivity and water availability. Farmers were able to assure irrigation for their crops and benefits were significant for the rabi season.
- An important aspect noted during field visits was that a cascade of check dams are being built on the same nalas through conversion of other state sponsored schemes and linking with the previously existing dams, and a fully developed system of check dams will get developed.

- However, almost half of the structures were found to be dried up due to scanty or no rainfall over past 2-3 years. As a result, farmers were still dependent on limited water available through borewells/ dugwells. Also, the quality of construction at many of the dams visited was below standard with broken walls, fractured plasters etc. in many dams. Most of these dams in Madhya Pradesh have already been built during phase I, while Uttar Pradesh started construction of check dams in phase II only. As most of the phase II duration has faced scanty rainfall, these dams have been mostly useless for local residents. In districts like Chatarpur and Tikamgarh, all the visited check dams were completely dry.
- Also, it was found that maintenance of these check dams is poor with dried structures filled with broken trees at some places.

Socio-economic Impacts

- Due to scanty rainfall over the past 2-3 years, majority of check dams visited during the field survey were found to be dried or not having sufficient water for withdrawal.
- 26% of the farmers around wet check dams reported that earlier they did not have any irrigation facility and were dependent on their dugwell or purchased water. However, now with the improvement in water availability they can irrigate their land.
- Contrary to the beneficiaries of Major or minor irrigation projects, most of the beneficiaries of check dam have not opted for any change in the type of crop being grown by them. This is mainly because farmers are not very confident that sufficient water will be available to them on a regular basis, due to construction of check dam.
- 47% of the farmers reported that they have experience an increase of more than 200% in the crop production, while another 37% reported an increase between 100-200%.
- 26% farmers mentioned an increase of more than Rs. 25000/-. These are mainly those farmers who shifted to cultivation of wheat instead of dry crops or rainfed crops being grown earlier. 53% of the farmers reported an increase ranging between Rs. 10000-25000/- and 21% reported an increase but lesser than Rs. 10000/-.

Drinking Water

- Besides these irrigation water interventions, schemes for drinking water were also implemented in all the districts. An amount of 11-12% of their ACA has been spent by both the states for the provision of drinking water. This is equivalent of 19% for Uttar Pradesh and 15% for Madhya Pradesh of the expenditure for WPIs.
- In Uttar Pradesh, on an average 400 hand pumps have been installed in every district. Additionally, piped water supply projects - 12 in phase I and 49 in phase II, have been implemented.
- In Madhya Pradesh, total 1287 projects were envisaged and 94% had been completed by March 2017. Among these, 1168 projects are based on tubewells and 119 projects are based on wells.
- 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. But, due to fixed allocation this scheme could only partially cover the households of a village and those at tail ends didn't get much benefit of this scheme.

- Some village level schemes in remote villages were found to be non-operational as the tube wells have already dried up. Also, the overall structure of village level schemes was not found to be appropriate. For example, the scheme had the provision of pipe line extension of only 100 m from the tubewell. As a result, in some villages the pipeline remained short of many households, and the people living close to the tubewell were only connected to the system.

Socio-economic Impacts

- 44% of the respondents mentioned that they received the water connection at their door step and were able to extend it inside their home. However, rest of the 56% respondents still have to go outside their home to collect water from the terminal end/ community tap, which is located at variable distance in different villages.
- Whether the farmers received tap connection at their doorstep or they have to travel some distance to collect water, all the respondents reported significant change in the distance travelled to collect water than they used to before the scheme implementation.
- While 35% of the respondents reported a regular water supply throughout the year, for a specified time of the day, 40% said that the supply was intermittent.
- Among the Hand Pump beneficiaries, almost 98% of the villagers reported that they have to travel less than 100 m from their house to collect water after installation of hand pump. Among these 40% are travelling 50-100 m and 51% have to travel 25-50 to collect drinking water.
- 56% of the respondents feel that the water availability through hand pump is regular, while 44% feel that water from hand pump is available is sufficient amount only in some seasons.

Sprinkler Set Distribution

- Agriculture department of Uttar Pradesh has distributed sprinkler sets to farmers. With sprinkler systems 2 to 3 times more area can be irrigated with the water available. Thus, the system is very useful for the water stressed regions like Bundelkhand. However, sprinkler systems are useful only if assured and continuous water supply is available to create water pressure in the sprinkler system.
- Several farmers reported that the system purchased on subsidy from the department, are not being used and are lying in their storage.
- Farmers in some districts also reported that while the pipes and nozzles have been distributed, cistern has not been given.

Socio-economic Impacts

- Majority of the farmers reported that the system purchased on subsidy from the department, are not being used and are lying in their storage.
- Among the users of sprinkler set, 67% reported as there being no change in the area of land being irrigated. Also, majority of these farmers reported that there is no change in the crop production or in their income, due to usage of sprinkler set. Only

22% reported a change in the crop production and 33% reported change in their income, but that being only marginal.

Soil and Water Conservation

- 4-6% of total ACA has been spent by both the states on activities related to soil and water conservation. Forest department of both the states were involved in the implementation this activity. A number of soil and moisture conservation activities like plantation, watershed management in forests land and construction of check dams have been taken up. As per the officials of forest department, the beneficiary of their interventions is forests of the region, and as such the impacts could not be ascertained.

Recommendations

Technological/ Scientific- Immediate/ Short Term Basis

- A thorough investigation of hydrological and hydrogeological characteristics of the Bundelkhand region should be conducted using different modelling tools.
- Water Demand Modelling for the region and for the individual districts should be conducted to understand the current as well as future demand patterns.
- Water Stress Analysis of the region should be conducted, considering the gap between water availability and its demand, and the districts should be classified into safe zone, high stress and critical zones. These zones should follow the micro-watersheds delineated within the Bundelkhand region.
- Mapping of all the water positive interventions- both existing as well as created under the BKD project should be conducted. This geo-tagging should be done for all the dugwells, tubewells, checkdams, drinking water schemes, major, medium and minor irrigation projects etc.
- A mapping of all the water resources – both natural as well as artificial should be prepared using geographic information system (GIS).
- Land use-land cover analysis of the Bundelkhand region should be conducted to understand the changes in land use pattern, and the level of urbanization.
- Groundwater quality analysis and the development of groundwater quality scenarios shall be conducted for the purpose of sustainable groundwater management plan.
- Any new activity related to water positive interventions should be sanctioned based on the outcomes of the above analysis.

Institutional/ Policy Level

Immediate/ Short-term Perspectives

- 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.

- Watershed as a hydrological unit shall be the centre of planning activities, while district administration is the implementation unit. Departments shall implement planned activities adopting micro-watershed specific approach, as delineated through hydrological investigations.

Medium and Long-term Perspectives

- **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 shall 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.
- Schemes which are large in nature with respect to cost/ area/ expected benefits should involve much wider consultation with district administration/ local stakeholders of the area where project is being implemented. They should be properly informed and trained about the need for such a scheme.
- Training programmes for middle and lower level officials engaged in implementation activities shall be organised. A capacity building of these officials on latest techniques of water resources management, as well as adaptation to climate change impacts shall be done.
- 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.
- Water is a resource which can neither be created nor produced, but can only be managed efficiently. As the region is naturally a water deficit region, water resources structures will not be useful unless it experiences normal average rainfall. Considering this, surplus water from other adjoining region need to be transported to the Bundelkhand region. Interlinking of river projects at various stages of construction in the region shall be completed expeditiously.
- Feasibility of water transport through pipeline system from outside the region shall be explored.

Livelihood Support Activities

Observations

- Both Uttar Pradesh and Madhya Pradesh spent 2.8% and 5.2% of their ACA on livelihood support activities, respectively. These activities were mainly related to dairy development and animal husbandry. However, Madhya Pradesh spent some amount to support fisheries activities also, in the Bundelkhand region.
- Interventions related to dairy development, focussed on organisation of milk cooperative societies, distribution of supporting equipment/ cattle feed to societies, establishment of milk processing/ chilling centres/ coolers. For Animal Husbandry, activities focussed on distribution of bulls, goatary units and establishment of

Artificial Insemination centres. In fisheries, Madhya Pradesh focussed primarily on establishment of wholesale/ retail markets.

- All these activities have directly helped in supporting livelihood and had a significant impact on ground. 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.

Socio-economic Impacts

Dairy

- Among the beneficiaries, 20% stated that they are extremely satisfied with the change in income due to milk cooperative society, 35% feel satisfied, and 20% members feel that their income increased on a seasonal basis only because they are not able to maintain quality and quantity of milk production for whole year.
- The beneficiaries of the milk cooperative societies are quite pleased with the regularity of income and 55% are extremely satisfied while 45% are satisfied.
- Almost all the beneficiaries expressed their satisfaction and reported beneficial impacts due to interventions in the dairy sector

Goatary

- Every person interviewed has reported increase in their income from the goatry unit either due to sale of animals or their milk. 28% of the respondents reported that they have earned more than Rs. 50000/- while income for 51% of the respondents range between R. 25000 and 50000/-.
- 30% of the respondents have indicated the current size of their unit being more than 11. However, a significant number (43%) of respondent have indicated the reduction in size of their unit due to dying animals, and the breed provided not being suitable to the local climate.
- 73% of the total respondents expressed satisfaction with the goatry units.

Bull Induction

- The beneficiaries who had received improved Murrah Buffalo for natural breeding services are providing multiple services annually. On an average, 60% of the bull recipients are providing 50-75 bull breeding services to the farmers from the surrounding villages. 17% of beneficiaries have provided more than 75 services, however, the same is not uniform for every year.
- Almost 56% of the beneficiaries reported that they are generating an additional income of Rs. 5000-10000 annually due to the bull services. About 15% of the farmers are generating even more than Rs. 10000/- on annual basis, mainly due to higher demand in their region.
- 84% of the respondents who have used the services from Murrah Buffalo mentioned that the quality of their animals has improved due to insemination from improved Murrah buffalo bull and almost 90% of the service recipients feel satisfied with the service.

AI Centre

- 89% of the villagers interviewed have utilized the services of AI centre, at least once since its operation. Depending on the number of animals owned by the villagers, 29% of the interviewee reported to have used the services more than once.

- 55.8% of the respondent considered the new progeny as a result of AI as very good, and 25.3% respondents considered them as good.
- While 37% of the farmers reported significant change in the income due to new animals, about 44% reported slight change as compared with income from earlier animals.

Challenges/Issues

- It was found that more than 70% of milk co-operative societies formed under the package are non-functional, and no milk is being procured in these societies.
- Milk processing/ chilling centres established under the package have limited opportunities to increase their income. For example, these centres do not have facilities for processing milk to produce other milk products like butter etc. These centres are mainly packaging the milk and have to send extra milk to far away centres of other companies like Amul, for creating value added products.
- A number of farmers have mentioned about the delay in payment for their milk. An average of 3 weeks' time is noted for the payment from centres to the societies.
- Milk procurement prices from dairy board are higher than the prevailing prices by the private vendors. Still majority of farmers prefer to sell their produce to private vendors, and not to society.
- Forced selling of animal feed and other related products through societies is also observed, wherein villagers have to compulsorily take these animal feeds from the society, and its price gets deducted from the overall payment to them.
- Majority of farmers associated with functional societies are small to marginal, and have limited number of animals with them. They sell the milk left from their household consumption only, and average milk per farmer to the society was less than 5 L.
- A number of goatary unit beneficiaries reported that the breed provided to them was not suitable for climatic conditions of Bundelkhand. As a result, a number of them died in their early age itself. Also, the unit of 10 goats did not consisted of all goats of same age group and health.
- In Uttar Pradesh, additional activities of strengthening infrastructure of existing veterinary hospitals as well as organizing awareness camps against the Anna Pratha were also taken up. However, the visited veterinary hospitals were not in good conditions, and were missing even the basic facilities. Under the BKD package, an animal ambulance has been purchased, which was also not in good condition.
- Bull induction programme under the package has been helpful in generating additional income for the beneficiary, and also in facilitating natural breeding services to the farmers.
- The artificial insemination centres have performed very satisfactorily in improving the progeny from local animals. The improved varieties are attaining maturity in almost half of the time taken by the local breed. Staffs at BAIF centres are working very diligently inspite of being on a contractual service agreement.

Recommendations

Interventions related to livelihood support were found to be more impactful and have been helpful in generating additional income for the farmers. It is highly recommended that these activities should be further intensified. Per capita impact of this money was noted to be much higher as compared to the money spent on other two activities.

Immediate/ Short-term perspective

- Allocation under livelihood support activities should be enhanced significantly, to intensify the interventions.
- Advanced milk processing centres, one each in Uttar Pradesh and Madhya Pradesh regions of Bundelkhand shall be established equipped with facilities to create various processed products like milk powder, cheese, butter, etc. to make these milk processing units in the region self-reliant.
- As most of the milk pourers are small and marginal, who need cash more frequently to meet their daily requirements, time lag of payment to cooperative societies and subsequently to pourers should be reduced to a maximum of a week which is currently more than 03 weeks at present.
- Defunct milk cooperative societies should be revived and an analysis of reasons for their being defunct should be conducted.
- AI centres constituted under the package have been highly successful in improving the breed of local dairy animals. However, the facilities provided to these centres are minimal and not upto the mark. People employed in AI centres are working on a contractual basis, and have difficulty in continuing with the same profession. This raises a challenge of these AI centres getting defunct in the long term. Hence, a system of providing additional benefits to the people employed at AI centres shall be constituted while providing other facilities like computer, internet, vehicle etc. to these centres.
- As several beneficiaries reported that the goatary units provided to them were not suitable for living conditions in Bundelkhand region. Hence, the animals died within a short life span. The people should be provided with goatary units consisting of local breeds like graded Jamnapari. Cost per unit of goatary unit could also be increased, to ensure young and healthy animals being provided to the beneficiaries.
- Horticulture department has distributed seeds for different vegetable crops. These seeds have been useful on the year of distribution, but didn't make any long term impact. With this perspective, any activity related to distribution of seeds should be discontinued and other initiatives like establishment of vegetable garden/ green estates etc. could be further intensified.

Long-term Perspectives

- A system of dairy loan/ bank guarantee through milk cooperative societies could be instituted for the purchase of milching animals to the farmers based on the past records of supplying milk to the society.
- Local handicrafts and activities based on local produce shall be promoted by formation of Self Help Groups, extension of credit facilities, development of market mechanism etc.

Agri-marketing Infrastructure

Observations

- Uttar Pradesh and Madhya Pradesh have spent around 31% and 22% of their ACA under BKD package on creation of infrastructure for agri-marketing facilities. Under this intervention market yards, local mandis and warehouses have been created. This was supposed to help farmers in accessing markets closer to their villages and also help government in storing the grains procured from the farmers. These 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.
- Madhya Pradesh has established 94 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.
- Uttar Pradesh has undertaken construction of 6 Specialized Mandi Yards, 1 in each district. Specialized Mandi Yard at Chitrakoot is under construction, while other 6 are complete. State has also established 132 Rural Infrastructure Nucleii (RINs) while 1 is still under construction.
- In Madhya Pradesh, visited agricultural infrastructure was found to be operational. Warehouses in Chhatarpur, Damoh, Sagar were found to be filled with the grains procured by FCI for distribution not only in Madhya Pradesh, but also in Maharashtra and Chennai. Similarly in Panna, farmers were also present in the mandi complex selling their produce. According to farmers, earlier there was no storage in the district and grain used to get spoil.
- According to the government of Uttar Pradesh records, 492 shops out of 531 in RINs have been allotted to local traders. However, a number of RINs visited during the evaluation exercise were not found to be occupied. According to local farmers/residents, none of those RINs have ever been operational.
- Some of the beneficiaries provided positive feedback about close proximity of operational mandis near their villages. But majority of farmers have indicated no benefits due to Mandis and RINs created under the Bundelkhand Package.

Socio-economic Impacts

- 60% of the respondents from functional mandis reported to be extremely satisfied with the reduction in the distance required to be travelled for selling their produce.
- Around 20% of people felt an increase in quantity they sold in the markets, while 60% respondent noticed no or slight change in the quantity sold.
- Overall, 53% of the 'farmer-responses' indicate satisfaction with the interventions and the Agri-marketing infrastructure created under the Bundelkhand package.

Challenges/ Issues

- With reference to Uttar Pradesh, major issues for the low occupancy of mandis and RINs as highlighted by the local traders are listed below:

- Cost of new shops is exorbitantly high. For example, shops have been classified into three categories in Lalitpur mandi, each having different prices. These prices are very high as compared to the cost being paid by the traders currently.
- Size of shops is very small. Design of shops is not convenient for trading as well as storage of procured grains.
- Location not suitable. New mandi as well as RINs are located far away from the city limits/ from the old mandi area. No transport facility is available as of now. This limits the availability of labour and other facilities, and will be an additional cost burden for the traders.
- Safety issues as per the traders. To procure the grains from RINs, traders will have to travel to remote village areas along with cash money, which will be risky for their safety.
- Survey not conducted prior to initiation of mandi construction, no consultation has been taken with the mandi parishad prior to construction. As a result, traders are not happy.
- Traders are also not happy with the overall approach towards the auction process. As a result, several rounds of auctions have gone without a single bid being submitted by traders.
- Trading platforms are not connected with shops

Recommendations

There is an urgent need to address the issues related to non-occupancy of RINs as well as mandis. In the purview of expenditure 'already' incurred in the construction activities, below mentioned points are being proposed for implementation:

Specialized Market Yards

- Shops at Specialized Mandi Yards may be allotted at a discounted price, lower than the current formula being used for ascertaining the ceiling for shop price. This should be done with the condition of vacating the shops in old mandi by the traders. The price of land in old mandi, which are closer to city limit is likely to be much higher as compared to the cost incurred in constructing the new mandi. Alternative usage/ selling of land in old mandi can recover the discount provided to traders.
- Proper transport facility should be arranged from the city to new mandi complexes.

Rural Infrastructure Nucleii

- For an effective utilization of RINs in rural areas, it is necessary that government assisted procurement programme be implemented. Private traders may not be interested to procure from the distant areas. Also, it is doubtful that the purpose of timely procurement closer to villages as well as at an appropriate price will be met due to disinterested attitude of private traders. In such a case, it will be useful that district administration itself take the initiative to procure from RINs and transport to the city.

- RINs may be handed over to the panchayat samitis, for their maintenance as well as utilization. These panchayat samitis may be provided with the necessary resources/ training for the procurement and transport from RINs.
- As the trading activity, if it starts at RINs, will remain limited to a few weeks of a year, it will be good to explore alternate uses of RINs. They can be used by Panchayat Samitis/ Gram Panchayats for community activities.
- RINs could be used for trading activities related to other agricultural produce also, like vegetables.

Governance and Implementation Mechanism

Successful implementation of large scale development programmes requires adequate funds, appropriate policy framework, and effective delivery mechanism. Other important factors necessary for achieving the success of government programmes are a transparent system of accountability, participation, feedback mechanism, monitoring and evaluation.

While all these factors were found to be present in the governance and implementation mechanism of the Bundelkhand package, below recommendations are made which can improve the level of socio-economic impacts on communities.

Recommendations

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 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 Division 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 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 reevaluate 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 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 in the later part of the package period, it could have been mainstreamed from the beginning. The middle and lower level officials engaged in implementation activities should have been the target. A capacity building of these 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 through the 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 feedback on existing policies which should come from the officers in charge at the lowest tier of development administration, that is, either the block development officer or a district-level officer in charge of development 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 however, these efforts 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 implementation of package activities.

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 converging 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 package.

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 shall 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 be created or 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. Within Bundelkhand region, some of the districts receive much better rain and 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 in Bundelkhand is the immediate need. Interlinking of river projects at various stages of construction in the region 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.

CHAPTER 1

INTRODUCTION

1. Introduction

Background

Bundelkhand region situated in the central part of India consists of districts in the states of Uttar Pradesh and Madhya Pradesh. It covers total 13 districts, 7 from the state of Uttar Pradesh and 6 from the state of Madhya Pradesh with the total area of about 70 thousand km². The Region lies in Yamuna river basin where Betwa, Ken, Pahuja and Bhagain drain the region. Most of the major rivers in the area are perennial but some of the rivers depend heavily on rainfall. People in the region commonly depend on river water for agriculture and other livelihood activity but due to semi-arid climatic conditions, region experiences low amount of rainfall which affects the surface water availability. The total population of the 13 districts of the region as per the census of India 2011 is 18.3 million with the population density ranging from 200-300 persons per sq.km. Most of the population lives in rural area and main occupation is agriculture and animal husbandry.

Water Resources in Bundelkhand Region

In Bundelkhand region, north flowing tributaries of River Yamuna - Betwa, Ken, Pahuja, Baghain, and Paisuni form the major drainage network. Moreover, several second order tributaries of the Yamuna such as the Dhasan, Jamni, Birma, Sonar, Katne, Bewas, and Kopra drain the area. Also, Chambal and Sindh rivers flow in the west and Narmada in the south of Bundelkhand region. The region of Malwa and Udaipur Gwalior forms the southern section of Bundelkhand.

The River Ken and Betwa flows through both the states of Uttar Pradesh and Madhya Pradesh where Betwa contributes around 50% of the water available in Bundelkhand followed by ken 25%. Agriculture in the region mostly depends on these rivers. However, their seasonal fluctuations are very large as average annual discharge of river Ken is around 800 cusecs, but it reduces to around 300 cusecs in winter and in peak summer months it decreases drastically to almost zero. Under such circumstances of uncertain water availability in rivers, man-made tanks and other surface water bodies become very important which help farmers to sustain their agriculture and ensure the water and food security to them. There are several tanks already constructed in Bundelkhand region, including the Pahuja reservoir, Barwasagar, Barwarlake, Aiaori Lake, Pachawara Lake, Dakwan and Parichha reservoirs. Mahoba and Tikamgarh are famous for their smaller tanks and ponds (tals) such as the Madansagar, Nandwara, Birsagar and Arjan lakes. In Chhatarpur district the important tanks include the Jagatsagar, Goratal, Gangau reservoirs and the post-independence period tanks such as Matatila, Lalitpur and Saprar reservoirs.

Climate

Bundelkhand falls in the hot and semi-arid climatic zone, and is marked by extremes of temperature, crossing 40 degrees centigrade. In winters, temperature drops to as low as 1 degree centigrade. May to June are the hottest months, the temperature is moderate from October, and then drops to its lowest in December and January, and starts rising again from February. During the summer months, hot breezes are common. The rainfall distribution pattern is uneven, and approximately 90 percent of the rain falls during the monsoon months, between June to October, within 50-60 days. Average rainfall per year is 800-900

mm but most of the rain is lost to runoff. July and August are months with the maximum rainfall, while November and April are the driest months of the year. There is some rainfall during the winter months due to westerly disturbance which provides water for the rabi crop.

Natural Resources

Semi-arid type flora found especially in the districts of Banda, Hamirpur and Datia form specific characteristic of the region. Several varieties of flora specific to Bundelkhand region are *Acacia nilotica*, *Acacia catechu*, *Buteamonosperma*, *Zizyphus varieties*, *Diospyros melanoxylon*, *Mahua Indica*, *Salmaliamalabarica*. The people who live in hilly area of the region use forest product like Mahua flowers, fruits and seeds, Tendu leaves and firewood as the main source of livelihood. Tendu and Mahua trees are a key part of tribal life and supply seasonal revenue to people living in and around forests.

Demography and Urbanization

According to the Census 2011, the total population of the Bundelkhand region is 18.3 million in which 9.6 million live in Uttar Pradesh followed by 8.6 million in Madhya Pradesh. The sex ratio of the region is lower than national average of 940 which is 877 in UP and 930 in MP. The average density of population in the 7 UP Bundelkhand districts is 277 per square km, much lower than the state average of 828 persons / sq km; and density in MP Bundelkhand districts is 233 persons /sq km more or less equal to the state average of 236 for MP. Panna, Sagar and Damoh districts have lower density as compared to other Bundelkhand districts.

Around 80% of total population lives in rural villages due to low level of urbanization in the region. Few districts like Jhansi with 42% urban population are highly urbanized, while in Chitrakoot, less than 10% of the population reside in urban areas. The population growth rate over the last decade 2001-2011 was close to 20% in both UP and MP, higher than the national average of 17.64%. The literacy rate in the region is also lower than the national and state average. Almost 60% of the region's workforce is engaged in agricultural sector as cultivators or agricultural labourers. The region is diverse with a large Scheduled Caste population, a number of Scheduled Tribes, and a large backward community.

Drought Scenarios in the regions

Low rainfall due to semi-arid climatic condition in the region affects the surface water availability and the hard rocky terrain limits the groundwater availability. Bundelkhand region experienced recurring drought every 16 years during the 18th and 19th centuries, which has increased by three times during the period 1968 to 1992 (Samra, 2008)¹.

Due to the recurrent drought situation, the region has become one of the poorest parts of the country and features in the Planning Commission of India's 200 most backward districts' list. Moreover, lack of infrastructure, improved technology and other factors, the region has not been able to solve its problems.

¹ Foreword in Report On Drought mitigation strategy for Bundelkhand region of Uttar Pradesh and Madhya Pradesh. By Inter-ministerial Central Team

The most recent and continued period of poor rainfall recorded in Bundelkhand was in 2004-10, when below average and erratic rain was reported in most part of the region throughout the year. Drought affected all districts of UP Bundelkhand during 2004 and 2007. Similarly, over the three years period 2005-2007, hydrological drought or diminishing availability of water supply was evident from the situation of surface water reservoirs – the proportion of reservoirs remaining unfilled increased sharply from 15% to 47% in Madhya Pradesh and from 28% to 64% in Uttar Pradesh, indicating tripling in the inadequacy of water supply. Around 70% of tanks, ponds and dug-wells dried up as a result of the steep fall in surface and ground water table. Drought affected all six districts of MP Bundelkhand and five districts of UP Bundelkhand during 2009 (Drought Management Division, Ministry of Agriculture, 2009).

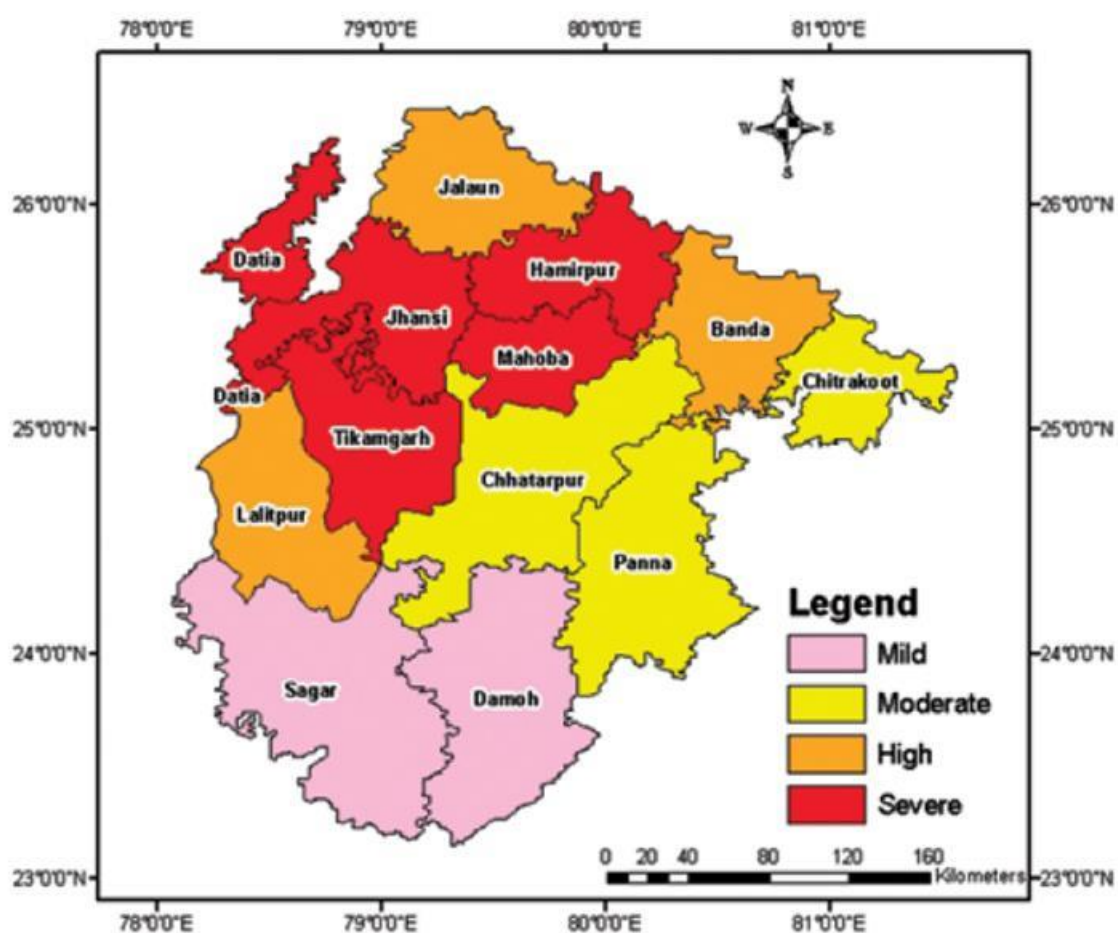


Figure 1.1 Composite Drought Hazard Map of Bundelkhand regions ²

Bundelkhand Drought Mitigation Package

Given the context, Government of India implemented the Bundelkhand Special Package for drought mitigation (BKD Package), starting 2009-10. The package involved multi-sectoral approach giving primary focus on water positive activities and projects, marketing and warehousing infrastructure and livelihood support interventions.

² Gupta, A. K., Nair, S.S., Ghosh, O., Singh, A. and Dey, S. (2014). Bundelkhand Drought: Retrospective Analysis and Way Ahead. National Institute of Disaster Management, New Delhi, Page 148.

The total outlay of the program was Rs 7,266 crore initially and then after another Rs 200 crore was provided subsequently. Government of India approved the continuation of the Bundelkhand special package during the 12th plan period (2012-2017) under the Backward Regions Grant Fund (BRGF) with the financial outlay of RS 4,400 crore.

Objectives

To carry out a comprehensive assessment to evaluate the Impact of the Special package for Drought Mitigation and suggest measures for Integrated Development of the Bundelkhand region all the key sectors with particular focus on household income, employment opportunities, governance issue related to groundwater and surface water resources.

As per the Terms of Reference, the evaluation study had following specific objectives:

- To analyse the existing governance models related to groundwater management and augmentation of Uttar Pradesh and Madhya Pradesh and suggest improvements
- To assess the outcome of special package in terms of its impact on production, income employment, net value addition and net permanent asset creation in the districts of the Bundelkhand region
- To study the procedures for project formulations and conceptualisation and role of various agencies, approval procedures to identify problems in the implementation of the programme and to suggest remedial measures
- To study the effectiveness of scale of various interventions of special package and its effectiveness on the beneficiaries in different sectors
- To study the effect of package incentives and extension activities on agriculture/improvement technology to increase crop productivity, diversification in cropping pattern, cropping intensity, net area irrigation, employment, marketing, price realization and consequently raising the income of the farmers
- To study the effect of the package on favourable/adverse on the neighbouring districts of Uttar Pradesh and Madhya Pradesh had any states

Literature Review

For the impact evaluation study, TERI has undertaken literature review and field surveys. Literature review has been conducted to understand the other existing case studies of drought mitigation interventions.

Drought is defined as “A period of abnormally dry weather long enough to cause a serious hydrological imbalance.”

Bundelkhand region is constantly under the grip of drought conditions. Because of severe drought conditions, farmers in the region are under great stress and there is high rate of migration and suicide cases in the region. In the past years, because of recurrent droughts, cultivable lands have shrunk and production of major crops has fallen down.

Given the plight of the region, government of India started the drought mitigation program, which implemented various interventions related to water resources, agricultural improvement, and alternate livelihood options etc.

There have been other drought mitigation program in the country and the following table discusses these various programs and respective interventions undertaken.

Table 1.1 Drought mitigation program in the country and respective interventions undertaken

S. No	Area	Draught mitigation program	Interventions undertaken	Year	Reference
1	Andhra Pradesh: Chittoor, Anantapur, Kurnool, Kadapa and Prakasam	Andhra Pradesh: Drought Mitigation Project, IFAD	Climate resilient production systems Improved crop production systems Improved livestock production systems Strengthened farmer organisations Drought proofing through NRM and water governance Water governance Water monitoring and conservation Regeneration of common property rangeland Management and Lesson Learning	2016	Andhra Pradesh: Drought Mitigation Project, IFAD
2	Marathwada areas of Amalner, Aurangabad, Beed, Dhule, Jalna and Latur	CSR Activity, Shrimad Ramchandra Foundation	De-silting of a river, 2 channels and 3 ponds Setting up 20 bore-wells with electric motors in 20 villages Setting up permanent water tanks in 10 villages Widening and deepening of nullahs to enhance ground water recharge		http://www.shrimadrajchandrarnission.org/news-media/seva-activities/drought-relief-initiatives-2016-3643.htm
3	Maharashtra	Drought Impacts and Adaptation Strategies for Agriculture and Rural Livelihood in the Maharashtra State of India	Ridge farming tillage (RFT), no tillage (NT), and stubble mulch farming tillage (SMFT) proved superior over conventional tillage (CT) so as to improve and stabilise the crop yields conserve moisture and reverse land degradation process modern micro-irrigation	2014	Drought Impacts and Adaptation Strategies for Agriculture and Rural Livelihood in the Maharashtra

S. No	Area	Draught mitigation program	Interventions undertaken	Year	Reference
			technologies such as sprinkler and drip irrigation to cope up with drought Cultivation of less water intensive and drought tolerant crops, and intercropping.		a State of India
4	Rajasthan and Gujarat	UN's Rapid Response to Drought in Rajasthan and Gujarat	Immediate measures for restoring water supply facilities; support for environmental sanitation and personal hygiene; sustaining and improving primary health care facilities and preventing dehydration. Support for improving household water security - sustaining community drinking water sources through rain water harvesting and rain water rooftop collection. Long term measures for monitoring and drought proofing. The latter will include water harvesting structures through intensification of "check dam" construction with community participation to recharge depleted aquifers.	2000	https://reliefweb.int/report/india/uns-rapid-response-drought-rajasthan-and-gujarat
5	Rajasthan	State Level Analysis of Drought Policies and Impacts in Rajasthan, India	Institutions for drought management: Task force & committees controlled by state government Drought monitoring & early warning – Weather Watch Group: Based on Rainfall data, water levels in reservoirs & crop prospects. Drought Mitigation Programmes: Rural development Programme – Infrastructure, new crop, watershed National Watershed	2005	Rathore, M. S. 2005. State level analysis of drought policies and impacts in Rajasthan, India. Colombo, Sri Lanka: IWMI. 40p. (Working paper 93 :

S. No	Area	Draught mitigation program	Interventions undertaken	Year	Reference
			Development Programme for Rainfed Areas (NWDPRRA) and Integrated Watershed Development Programme (IWDP) Drought Prone Area Development Programme (DPAP) Desert Development Programme (DDP) Employment Generation Programme (E G P) Rural Poverty Alleviation Programmes – Food assistance		Drought Series Paper No. 6)

Also, some of the countries in the world are also under the drought situations. Kenya is one of the dry countries constantly facing the drought but has developed a comprehensive management plan. Sector wise interventions undertaken are described in the table below.

Table 1.2 Sector wise interventions

Area of Intervention	Normal	Alert	Emergency	Recovery
Water	Promotion of water harvesting and storage, training water user associations, planning for new water sources, deepening wells, disilting pans, planning future interventions	Strategic needs assessment, protection of strategic wells, repairing poorly working boreholes	Implementing contingency plans including water supply (tankering), keeping strategic watering points functional, monitoring water availability	Improve water pans and develop new ones through food for work or cash for work
Food Security and Nutrition	Promote animal production & drought resistant crops, improve extension services, develop strategic cereal banks, capacity building	Stock strategic reserves, data sources used to warn and alert donors & government, provide food to most affected	Food relief, activate rapid response teams, diversify income, improved activity for health and nutrition	Replacing assets, providing tools and seeds, strengthen community management structures, cash-for work, food-for-work
Livestock production	With enough pasture & water,	Selecting animals for sale,	Increased sale of animals or	Review damage & document

Area of Intervention	Normal	Alert	Emergency	Recovery
	building up the herd, capacity building, strengthen social networks, develop livestock markets, conserve & protect pasture using traditional rules & range management approaches	herd separation & splitting, drying and smoking meat for later use, supplementary feeding, feed storage, alert donors and negotiate grants, control breeding,	barter, migration in search of pasture, stop breeding, provide emergency water & feed esp. for lactating & breeding animals, work-for food/assets,	lessons, restocking traditionally, buying or through assistance, build pasture & water resources, strengthen animal health services, capacity building, vaccinate, deworm, alternative livelihoods
Animal Health	Establish common approach to disease control, vaccinate, deworm, maintain cattle dips	Mass vaccination, deworming, equip drug stores, carry out cross border disease monitoring	Emergency disease control, target drought prone animals (calves, lactating, sick) for special treatment	Document and evaluate lessons learnt, re-stock drug stores, vaccinate and deworm, use feed supplements until animals regain their health, capacity building
Crops	Identify drought resistant, early maturing crops & indigenous plants that require little water. Capacity building, promote agro-forestry for fruits, fuel, fodder & medicine. Pest and disease control	Promote small scale irrigation, prepare kitchen gardens by drip irrigation, extension services,	Irrigation where possible, food relief,	Prepare land for planting, provide tools, seed and other inputs, improve soil fertility, repair irrigation facilities, planting of short term crops soon as it rains, capacity building.

CHAPTER 2

APPROACH, METHODOLOGY, SAMPLING AND RESEARCH TOOLS

2. Approach, Methodology, Sampling and Research Tools

Approach

For a more effective evaluation and interpretation, different set of interventions were classified into 3 groups: 1. Water Positive Interventions; 2. Livelihood Support Activities; 3. Agri-marketing Infrastructure.

Water Positive Interventions (WPI)

These are the interventions which were aimed at improving water availability in the Bundelkhand region. A number of departments like Irrigation, minor irrigation, Rural Development, Forest and Agriculture in Uttar Pradesh; and Water Resources, Rural Development, Public Health and Engineering and Forest departments in Madhya Pradesh took several interventions to improve the water availability in the region, either through augmenting the water resources and its access or through their conservation.

Major activities covered under this type of interventions were:

1. Major and medium irrigation projects
2. Minor irrigation projects
3. Dug wells/ renovation/ lifting device/ tubewells
4. Construction of Stop dams/ Check Dams to store rainfall
5. Drinking Water Supply schemes including installation of Hand Pumps
6. Distribution of Sprinkler sets for improving irrigation efficiency
7. Soil and Water Conservation activities primarily taken up by forest departments

Livelihood Support Activities

These are the interventions which were aimed at providing direct support to livelihood activities of the communities, thereby generating additional income and improving the livestock breed in the region. Activities covered under this set of interventions included:

1. Establishment of Artificial Insemination Centres
2. Distribution of Bulls
3. Distribution of Goatary Units
4. Interventions related to dairy development, focussing on organisation of milk cooperative societies, distribution of supporting equipment/ cattle feed to societies, establishment of milk processing/ chilling centres/ coolers.
5. Interventions related to fishery activities in Madhya Pradesh

Agri-marketing Infrastructure

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.

Key activities under this set of interventions included:

1. Warehousing & Marketing Infrastructure including Mini Agriculture Market
2. Establishment of Rural Infrastructure Nucleii
3. Establishment of Specialized Marketing Yards/ Mandis
4. Agriculture Input Centres in Madhya Pradesh
5. Seed Godown and Processing Center in Madhya Pradesh

Methodology

The study is based on the primary and secondary data. The primary data were obtained through sample survey across all the 13 districts of Bundelkhand Regions covering beneficiaries of different set of interventions under the Bundelkhand package. In addition to sample survey Focused Group Discussion were held with the beneficiaries of drinking water schemes, Secretary of Dairy Cooperative Societies, nodal officers of all line departments implementing the projects and Chief Development Officers/Collectors/ Commissions of districts/ division to understand their experience on implementation of different activities under the package. A stakeholder workshop was also organized in Jhansi, Uttar Pradesh with different officials of the line departments in Bundelkhand districts of the state.

The secondary information was collected from the State Planning Commissions of Uttar Pradesh and Madhya Pradesh. Also, the data was collected from all district level line departments of 13 districts and official websites of each district as per the availability. The secondary information mostly encapsulated Financial Allocations, sanction, release and expenditure, activities, targets, achievement status and monitoring mechanism.

For field survey the interventions were further categorized as set of individual beneficiaries and set of group beneficiaries. This categorization was done based on the reach of benefits of interventions. If intervention was provided at individual level, like provision of water supply at household level, then the beneficiary was categorized as individual and if the intervention was provided at the community level and benefitted more than one person then it is categorized as group beneficiary. The example of group beneficiary is construction of check dam in a village which impacted group of users. The following figure presents the approach adopted for field work.

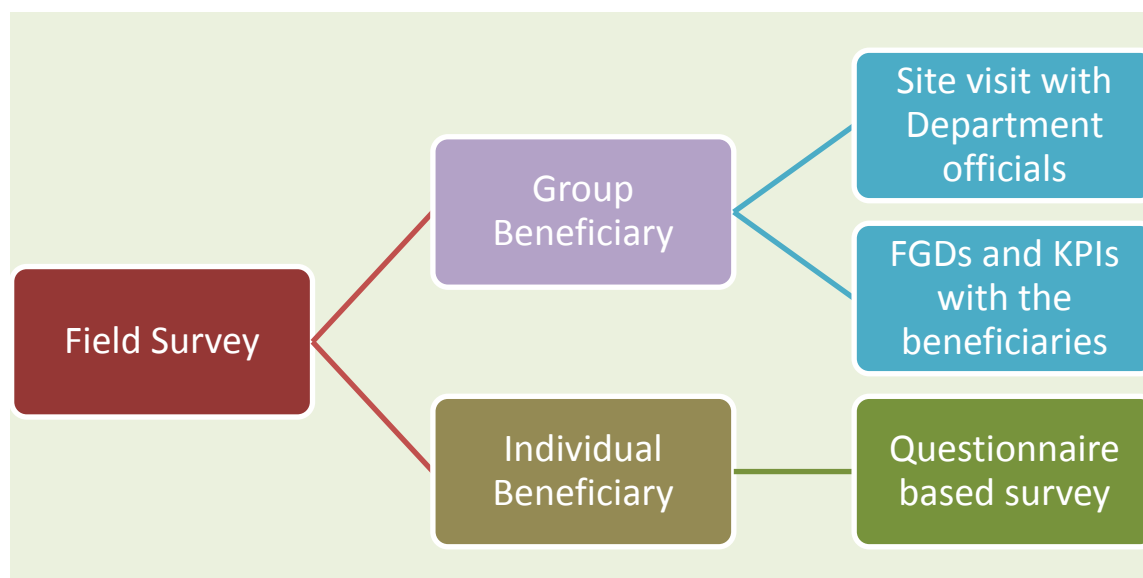


Figure 2.1 Approach adopted for field work

The individual beneficiary survey was carried out with the set of defined questionnaire and the respondents were selected based on random selection for each of the intervention. While for group beneficiary, site visits were undertaken after consultation with the concerned department in the district and during the site visit, random beneficiaries were interviewed either in the group or individually. The key person of the project site like village pradhan or members of Water Users Association, etc. were interviewed individually.

The consultation also included gauging and documenting responses of officials of various departments involved in the implementation of package interventions.

Sample

Random sampling method was employed for the beneficiaries of each set of interventions. While adopting random sampling, below criteria were also taken into consideration:

- Irrigation projects were selected based on size and category of projects (major, medium and minor). The projects were selected randomly on the criteria based on Highest Financial Allocations.
- The farm households residing in the project catchment villages of Major, Medium and Minor Irrigation Projects were selected randomly for sample survey. For both the Major and Medium irrigation projects as well as minor irrigation projects, beneficiaries from both the head and tail end of the projects were selected.
- All the 07 Specialised Marketing Yards/ Mandis in Uttar Pradesh were visited. 12 RINs from 7 districts of UP were also visited and the beneficiaries in the adjoining villages were interviewed. In Madhya Pradesh also, 12 Agriculture Market Yard Projects were selected to cover all the districts of the state and the category of project (Warehouses, Haat Bazar).
- 2-4 functional Milk Cooperative societies in every district of Bundelkhand were selected randomly. 1 major dairy infrastructure established/ strengthened under the Bundelkhand project was also selected from each district.

- The beneficiaries of goatry, bull induction, new dug wells, deepening of dug wells, recharge pits, pump set, and HDPE pipes were selected randomly from the list of beneficiaries provided by the implementing department. Stress was laid to cover all the districts and all the interventions from both the states.

Sample Distribution

Table below presents the sample distribution across activities undertaken in Bundelkhand Special Package in MP and UP.

Table 2.1 Sample distribution of Madhya Pradesh

Sectors/ Activities	No. of Beneficiaries	Name/ District Covered
Water Positive Interventions		
Major and Medium Irrigation Project	120	Rajghat CAD, Beriyarpur & Singpur Barrage, Urmil, Kunti (Datia, Chhatarpur)
Ongoing and New Minor Irrigation Projects	130	15 minor irrigation projects: Sagar, Tikamgarh, Chhatarpur, Damoh & Panna
Stop Dams	80	19 check dam projects in Sagar, Panna, Chhatarpur, Damoh & Tikamgarh
Cistern based pipe line system	140	11 schemes in Sagar, Chhatarpur, Damoh & Panna
Agriculture Marketing Infrastructure		
Agriculture Market Yards	12	Sagar, Chhatarpur, Tikamgarh, Damoh, Datia & Panna
Livelihood Support Activities		
<i>Dairy Development</i>		
Milk Cooperative Societies	12	Tikamgarh, Sagar, Datia, Damoh and Chhatarpur
Milk Chilling Centre/ Processing Plant/BMC	04	Sagar, Chhatarpur, & Damoh
<i>Animal Husbandry</i>		
Goatry Units	40	Sagar, Tikamgarh, Chhatarpur, Panna, Damoh
Bull Induction	45	Sagar, Tikamgarh, Chhatarpur, Panna
AI Centres	41	Sagar, Damoh, Chhatarpur, Panna & Tikamgarh
Fodder Bank	03	Sagar, Tikamgarh & Panna

Table 2.2 Sample distribution of Uttar Pradesh

Sectors/ Activities	No. of Beneficiaries	Name/ District Covered
Water Positive Interventions		
Major and Medium Irrigation Project	180	Upper Rajghat, Lower Rajghat, JPC, Badwar, Pachwara, Arjara, Pathrai, Cipri canal etc. (Lalitpur, Jhansi, Jalaun); Maudaha, Jaywanti Tank, Urmil and Kabrai canal system (Mahoba, Chitrako, Hamirpur)
Check Dam projects	80	26 projects in Jhansi, Jalaun, Lalitpur, Chitrakoot, Mahoba, Banda and Hamirpur
New Dug Wells/ Deepening/ Lifting device	31	Jhansi, Lalitpur, Chitrakoot, Jalaun and Mahoba
Cistern based pipe line system	22	Jhansi, Lalitpur and Mahoba
Handpumps	57	16 projects in Chitrakoot, Jhansi, Mahoba
Sprinkler Set	70	Jhansi, Lalitpur, Tikamgarh
Agriculture Marketing Infrastructure		
Agriculture Market Yards	7	Jhansi, Jalaun, Lalitpur, Chitrakoot, Mahoba, Banda and Hamirpur
RIN	12	Jhansi, Jalaun, Lalitpur, Chitrakoot, Mahoba, Banda and Hamirpur
Livelihood Support Activities		
<i>Dairy Development</i>		
Milk Cooperative Societies	08	Jhansi, Lalitpur, Hamirpur
Milk Chilling Centre/ Processing Plant/BMC	07	Jhansi, Jalaun, Lalitpur, Chitrakoot, Mahoba, Banda and Hamirpur
<i>Animal Husbandry</i>		
Goatry Units	35	Jhansi, Jalaun, Lalitpur, Chitrakoot, Mahoba, Banda and Hamirpur
Bull Induction	30	Jhansi, Jalaun, Lalitpur, Chitrakoot, Mahoba, Banda and Hamirpur
AI Centres	70	Total 14 BAIF centres in Jhansi, Jalaun, Lalitpur, Chitrakoot, Mahoba, Banda and Hamirpur

Research Tools

Structured questionnaire was developed including questions related to all the individual activities. This questionnaire was designed to obtain information on physical and financial progress, types of infrastructure and status of progress, implementation constraints, institutional mechanism, overall perception of beneficiaries on impact variables and overall comments of the technical staff. This questionnaire after administering with department officials was verified in the actual site and discussions were held with beneficiaries.

The questionnaire was administered by technical staffs during site inspection covering major and medium irrigation, minor irrigation, stop dams, Water User Associations, AI Centres, Fodder Banks, Dairy Cooperative Societies, BMC / Chilling Plants and Drinking Water Schemes. Averages, percentages, frequency distribution and other simple statistical tools are used deriving the results.

CHAPTER 3

WATER POSITIVE INTERVENTIONS

3. Water Positive Interventions (WPI)

These are the interventions which were aimed at improving water availability in the Bundelkhand region. A number of departments like Irrigation, minor irrigation, Rural Development, Forest and Agriculture in Uttar Pradesh; and Water Resources, Rural Development, Public Health and Engineering and Forest departments in Madhya Pradesh took several interventions to improve the water availability in the region, either through augmenting the water resources and its access or through their conservation.

Madhya Pradesh spent about 73% of total ACA allocation under BKD package on the WPI while Uttar Pradesh spent 66% on WPI activities. Different WPI activities included interventions related to major, medium and minor irrigation projects; construction and renovation of dugwells; provision of lifting device, tubewell and energization of existing wells; construction of check dams and stop dams; provisions for availability of drinking water through piped water supply system, etc.; providing sprinkler set and HDPE pipes; and activities related to soil and water conservation in the region.

Table 3.1 Different WPI activities

WPI Schemes ACA	Uttar Pradesh <i>Fund Allocation</i>	Madhya Pradesh <i>Fund Allocation</i>
Major and medium irrigation projects	375.31	723.47
Minor irrigation projects	56.31	857.53
Dug wells/ renovation/ lifting device/ tubewells	390.7	
Stop dams/ Check Dams	212.4	235
Drinking Water	272.91	352.48
Sprinkler set/ HDPE pipes	43.81	
Soil and Water Conservation	94.31	187
	1445.75	2355.48

Major and Medium Irrigation Projects

- Madhya Pradesh spent about 22.5% of total ACA allocation under Bundelkhand Package for major and medium irrigation projects. Almost 1/3rd of this was spent in the development of Rajghat Project Command Area, which included correction of system deficiency as well as Command Area Development works. Medium irrigation projects in Madhya Pradesh involved creation of new dams as well as strengthening of some existing dam infrastructure. 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 against the target of 1,04,112 ha, which is an achievement of 55% as on March 2017. Below target achievement has been mainly due to constraints related to completion of work on Panchamnagar, Sonpur and Pawai medium irrigation projects. This was also surprising to note that more than 100% of the ACA has been spent on these projects, but the physical target achievement is lesser.
- Uttar Pradesh spent about 17.1% of total ACA allocation under BKD package for major and medium irrigation projects. Major portion of this amount has been spent

on 41 works related to restoration capacities of canals, 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 have been claimed to be mainly due to reduction in seepage losses of water and resultant increase in reach of water to distant areas.

- Under phase II, an amount of Rs. 50.46 Cr. has been allocated by Uttar Pradesh towards construction of Chillimal Pump canal. This project is still under construction; however, it is expected to increase the irrigation capacity in the region.



Socio-economic Impact Assessment

To understand the socio-economic impacts due to Major and medium irrigation projects, survey teams met with a number of beneficiaries, to understand the level of improvement in irrigation facilities and consequential impact on their agriculture and crop production. For the purpose, beneficiary villages in the command area were distributed into upstream villages and the tail-end villages. Teams met with the farmers who cultivate within the command area and extract water from the reservoir/ canals from the project. The primary objective of the survey was to collect information about the below indicators:

1. **Change in area under irrigation/ irrigation intensity after the completion of projects:** Major and medium irrigation projects are expected to enhance the irrigation coverage in the region, by increasing the availability of water and by increasing the number of irrigation water available, to the farmers who could not be connected through canal water irrigation system. Accordingly, the responses from farmers were coded into 4 groups:
 - a. **75-100%:** If any irrigation facility was not available earlier or not available through community sources, and almost entire field of farmer can now be irrigated. Also, if the farmers were able to irrigate the requisite number of times, as required for the crop grown.
 - b. **50-75%:** If new irrigation water available is sufficient to cover only half the field or number of irrigation water is half of the requisite number
 - c. **25-50%:** If the change in availability of irrigation water or number of irrigation water is sufficient for less than half of the field
 - d. **0-25%:** If only a marginal improvement in irrigation water availability or if the farmers are still continuing with the previous sources
2. **Change in type of crop/ cropping pattern:** With the extension of irrigation coverage, farmers are likely to change their crop type to a more valuable crop. Accordingly, the responses were coded in yes or no.
3. Change in crop production due to change in availability of irrigation water
4. Change in income due to change in crop production

Madhya Pradesh

Completed major and medium irrigation projects in Madhya Pradesh have extended the irrigation facility in two districts of the state, namely – Datia and Chhatarpur. Accordingly, the survey among the beneficiaries of major and medium irrigation projects focussed on these two districts of Madhya Pradesh, only.

Table 3.2 Number of major and medium irrigation survey beneficiaries and their responses for different indicators (Upstream beneficiaries in Madhya Pradesh)

	75-100%	50-75%	25-50%	<25%
Change in Irrigated Land/ intensity	12	36	8	4
	>200%	100-200%	<100%	
Change in Crop Production	32	15	13	
	>50000	25000-50000	<25000	No Change
Change in Income	18	28	14	0

Table 3.3 Number of major and medium irrigation survey beneficiaries and their responses for different indicators (Tail-end beneficiaries in Madhya Pradesh)

	75-100%	50-75%	25-50%	<25%
Change in Irrigated Land/ intensity	33	20	7	0
	>200%	100-200%	<100%	
Change in Crop Production	9	18	33	
	>50000	25000-50000	<25000	No Change
Change in Income	11	19	21	9

Survey Results

Change in Irrigated Land/ Intensity: Farmers from upstream and tail-end regions of the catchment area have different perceptions as well as impacts due to extension of irrigation facility. 60% of the upstream farmers feel that they are better able to irrigate their land due to change in water availability as well as number of irrigation being provided to them. At least 20% of upstream farmers mentioned that they received irrigation water for more than 4 times during rabi season, especially in Datia district. However, 7% of the farmers feel that there is no change in the water availability and they were able to irrigate their entire field earlier as well due to their own irrigation source. On the contrary, 55% of the tail-end farmers are not able to irrigate their field completely with sufficient number of irrigations, especially during the rabi season.

Change in Type of crops: Better availability of water has encouraged farmers to change the type of crop they have been growing usually. 70% of the upstream and 57% of the tail-end farmers responded that they have switched from the less water demanding crops to more water intensive crops. These water intensive crops are high value crops like wheat and rice. Almost 90% of the farmers in Datia district, who have changed the type of crop being grown, responded that earlier they used to grow crops like urad, sarson and millets, but after the canal extension or water in canals, they have started growing wheat. Some farmers have also started growing highly water intensive crops like sugarcane. Some farmers have even started growing garlic, which requires strict irrigation scheduling.

Change in Irrigated Land/ Intensity

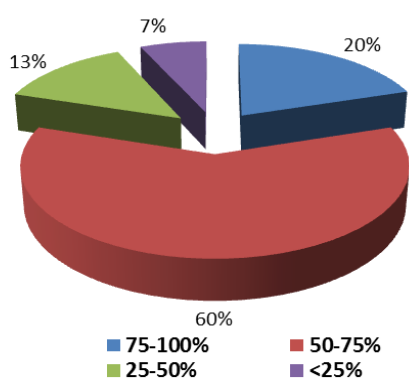


Figure 3.1 Change in irrigated land/ intensity among upstream farmers in MP due to Major and medium irrigation projects

Change in Irrigated Land/ Intensity

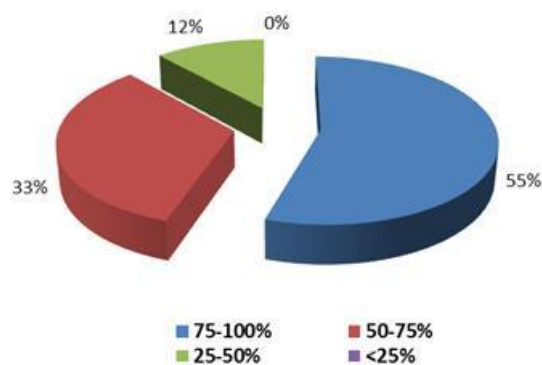


Figure 3.2 Change in irrigated land/ intensity among tail-end farmers in MP due to Major and medium irrigation projects

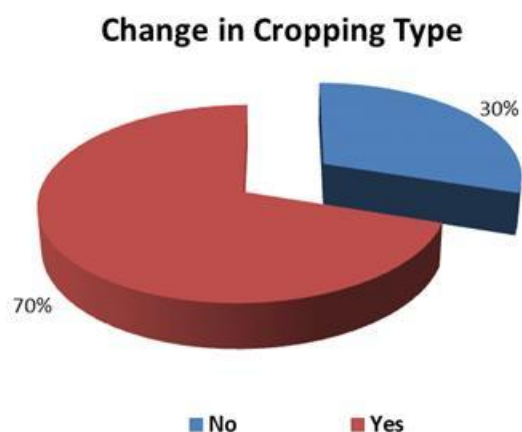


Figure 3.3 Change in type of crop among upstream farmers in Madhya Pradesh due to Major and medium irrigation projects

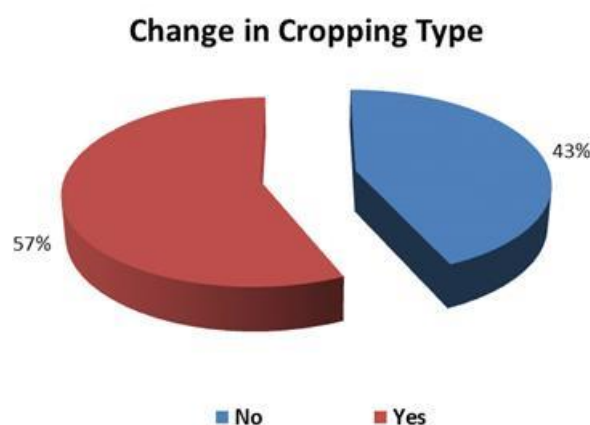


Figure 3.4 Change in type of crop among tail-end farmers in Madhya Pradesh due to Major and medium irrigation projects

Change in crop production due to change in availability of irrigation water: Change in availability of irrigation water and better timing of irrigation water has also resulted in increase in production for the farmers. At least 53% of the upstream farmers reported a change of more than 200% in the total crop production and almost 25% reported an increase in the range of 100-200%. Among the tail-end farmers, while change in type of crop grown is higher and also response about the increase in area under irrigation is higher, only 15% farmers reported about the increase in production being more than 200% and 55% of farmers feel that crop production has doubled recently.

This contrasting response from the tail-end farmers is mainly due to lower than expected amount of water available for irrigation. So, while they are able to irrigate entire land only during some of the times when water is discharged in canals, but not always. They also reported that farmers in the upstream region often obstruct the flow of water and divert them to their field. Also, the broken canal bunds were found at several places.

Change in income due to change in crop production: Crop diversification as well as change in crop production has led to increase in farmer's income, however, the same is highly uneven not only between upstream and tail-end farmers, but also among farmers of the same region. While 30% of the upstream farmers reported an increase of Rs. >50000/- in their income, at least 47% had an increase in the range of Rs. 25000-50000/-. Among tail-end farmers, only 18% farmers had an increase of more than Rs. 50000/-, 32% had an increase between Rs. 25000-Rs. 50000/- and 35% farmers had a marginal increase of lesser than Rs. 25000/-. Also, about 15% of the tail-end farmers reported no change in their income, inspite of crop diversification, mainly due to irregularity in water availability.

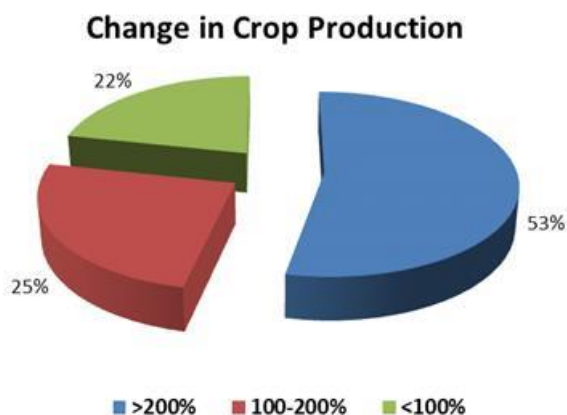


Figure 3.5 Change in crop production among upstream farmers in Madhya Pradesh due to Major and medium irrigation projects

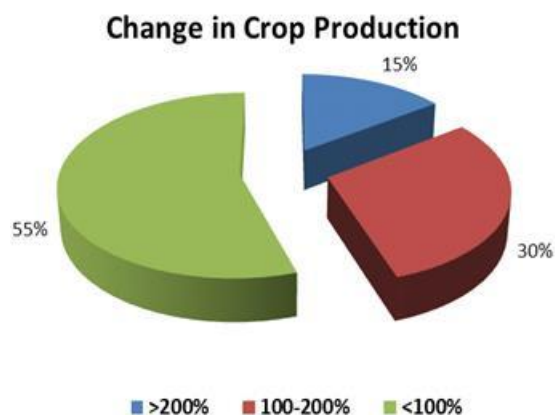


Figure 3.6 Change in crop production among tail-end farmers in Madhya Pradesh due to Major and medium irrigation projects

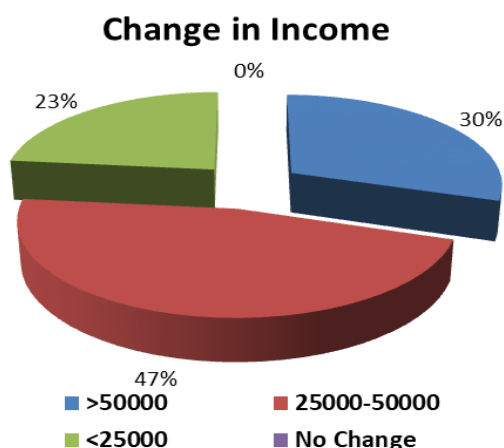


Figure 3.7 Change in income among upstream farmers in Madhya Pradesh due to Major and medium irrigation projects

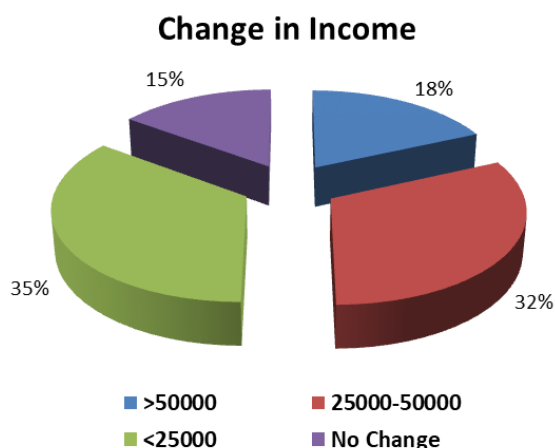


Figure 3.8 Change in income among tail-end farmers in Madhya Pradesh due to Major and medium irrigation projects

Uttar Pradesh

Completed major and medium irrigation projects in Uttar Pradesh have extended the irrigation facility in three districts of the state, namely – Jhansi, Lalitpur and Jalaun. Accordingly, the survey among the beneficiaries of major and medium irrigation projects focused on these three districts of Uttar Pradesh, only.

Table 3.4 Number of major and medium irrigation survey beneficiaries and their responses for different indicators (Upstream beneficiaries in Uttar Pradesh)

	75-100%	50-75%	25-50%	<25%
Change in Irrigated Land/ intensity	25	41	24	0
	>200%	100-200%	<100%	
Change in Crop Production	23	42	25	
	>50000	25000-50000	<25000	No Change
Change in Income	16	45	26	3

Table 3.5 Number of major and medium irrigation survey beneficiaries and their responses for different indicators (Tail-end beneficiaries in Uttar Pradesh)

	75-100%	50-75%	25-50%	<25%
Change in Irrigated Land/ intensity	36	38	16	0
	>200%	100-200%	<100%	
Change in Crop Production	15	35	40	
	>50000	25000-50000	<25000	No Change
Change in Income	11	27	39	13

Survey Results

Change in Irrigated Land/ Intensity: In Uttar Pradesh, majority of farmers from both the upstream and tail-end regions reported a similar response in terms of change in land under irrigation. About 45% and 42% farmers of upstream and tail-end region reported an increase between 50-100% of land as compared to earlier. About 40% of tail-end farmers of Uttar Pradesh had no irrigation facility earlier and were growing rainfed crops only. In both the regions, none of the farmers reported a marginal increase in the land under irrigation facility.

Change in Type of crops: Almost 76% of the upstream farmers and 72% of the tail-end farmers reported that they have change the crop they were growing earlier. Similar to Madhya Pradesh, these farmers have switched from the less water demanding crops to more water intensive crops. These water intensive crops are high value crops like wheat and rice. Earlier these farmers have been growing crops like urad, sarson and millets.

Change in Irrigated Land/ Intensity

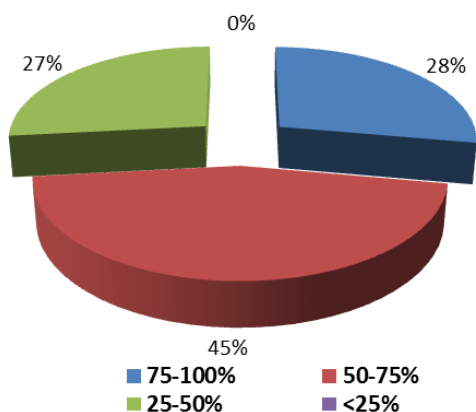


Figure 3.9 Change in irrigated land/ intensity among upstream farmers in Uttar Pradesh due to Major and medium irrigation projects

Change in Irrigated Land/ Intensity

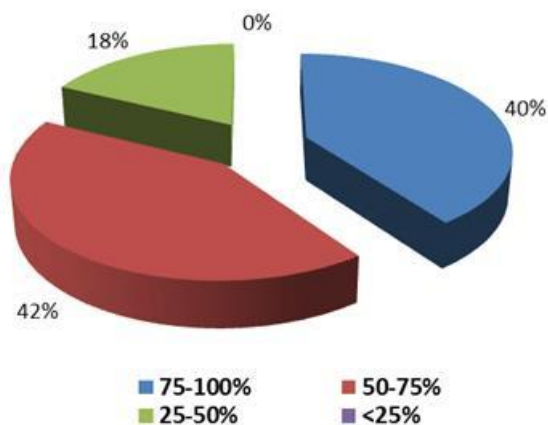


Figure 3.10 Change in irrigated land/ intensity among tail-end farmers in Uttar Pradesh due to Major and medium irrigation projects

Change in Cropping Type

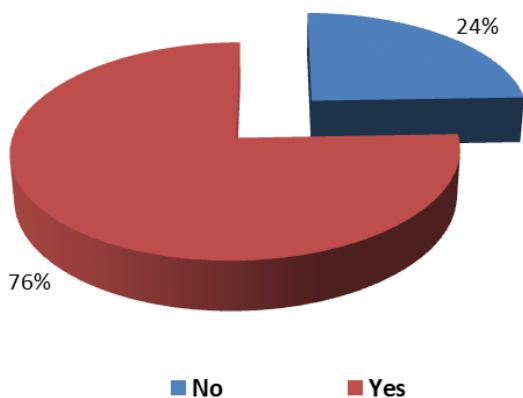


Figure 3.11 Change in type of crop among upstream farmers in Uttar Pradesh due to Major and medium irrigation projects

Change in Cropping Type

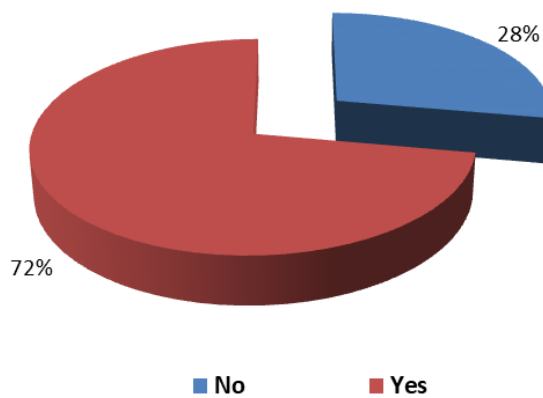


Figure 3.12 Change in type of crop among tail-end farmers in Uttar Pradesh due to Major and medium irrigation projects

Change in Crop Production: 47% of upstream farmers reported an increase between 100-200% in their total crop production, while 39% farmers from tail-end regions also reported the same. More than double increase in crop production is also reported by the farmers, owing to better availability of water in the canals making it easier to extract and irrigate their field. Majority of tail end farmers reported the increase in crop production being less than 100%. However, several upstream farmers also reported that lining of canals has reduced the water level in their tubewells, and has resulted in lower water availability for irrigation.

Change in Income: Lining of canals and better reach of water to the farmers coupled with diversification in agriculture has resulted in increase in income for the farmers. Almost 50% of the upstream farmers feel that their income has increased between Rs 25000-50000/- due to major and medium irrigation projects under the Bundelkhand project. Also, 18% of the upstream farmers reported more than Rs. 50000/- increase in their annual income, mainly due to better market price of wheat.

Among the tail end farmers, 43% farmers reported the increase being less than Rs. 25000/- while 12% report it to be more than Rs. 50000/-.

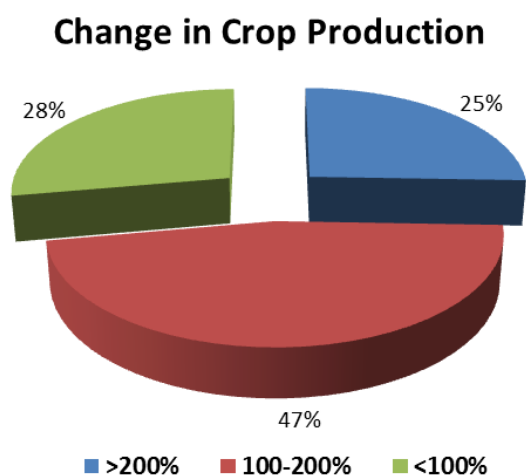


Figure 3.13 Change in crop production among upstream farmers in Uttar Pradesh due to Major and medium irrigation projects

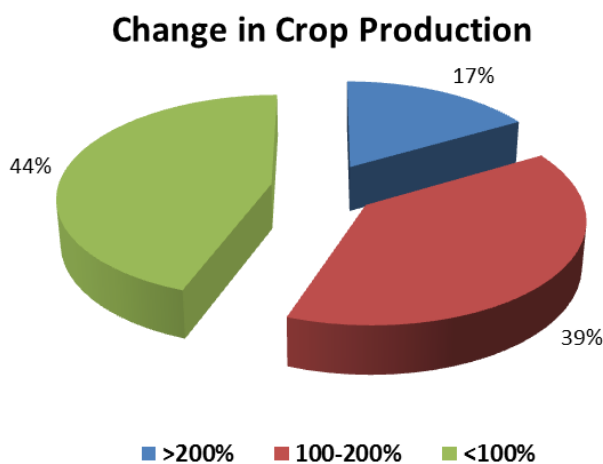


Figure 3.14 Change in crop production among tail-end farmers in Uttar Pradesh due to Major and medium irrigation projects

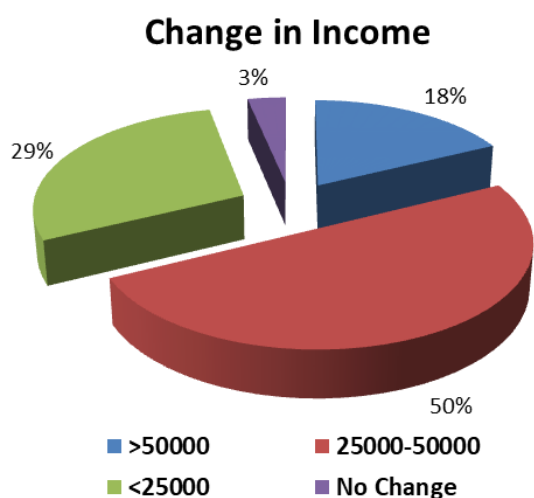


Figure 3.15 Change in income among upstream farmers in Uttar Pradesh due to Major and medium irrigation projects

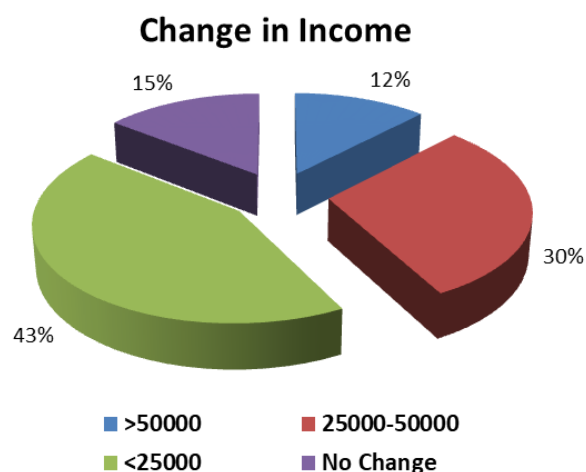


Figure 3.16 Change in income among tail-end farmers in Uttar Pradesh due to Major and medium irrigation projects

The project has led to extension of irrigation facilities to the otherwise unirrigated areas, and also an increase in the number of irrigation water. This year a significant increase in the rabi crop production has been reported by the farmers as compared to previous years.

Minor Irrigation Projects

- Madhya Pradesh spent about 26.5% of total ACA allocation under Bundelkhand package for minor irrigation projects. These schemes included completion of works under 49 ongoing minor irrigation projects, construction of 118 new minor projects and repair and renovation of ponds/ tanks related to 3 schemes. Physical achievement of 100% target is reported by the state government from schemes under phase I, however, schemes under phase II are under construction and physical achievement is limited to 43% only.
- Uttar Pradesh spent merely 2.6% of its ACA on minor irrigation schemes which included repair and renovation of ponds/ tanks and reconstruction of water distribution network. Instead of creating new infrastructure, focus was laid on repair and renovation of existing structures. Uttar Pradesh took 17,569 projects of reconstruction at a cost of 39.98 crore.
- A total of 15 minor irrigation projects in 5 districts of Madhya Pradesh were visited and associated beneficiaries were surveyed for both the upstream and tail-end regions of the project command area.

Socio-economic Impact Assessment

To understand the socio-economic impacts due to minor irrigation projects, especially in Madhya Pradesh, survey teams met a number of beneficiaries, to understand the level of improvement in irrigation facilities and consequential impact on their agriculture and crop production. For the purpose, beneficiary villages in the command area were distributed into upstream villages and the tail-end villages. Teams met with the farmers who cultivate within the command area and extract water from the reservoir/ canals from the project. Similar to Major and medium irrigation projects, the primary objective of the survey was to collect information about the below indicators:

1. **Change in area under irrigation/ irrigation intensity after the completion of projects:** Minor irrigation schemes are expected to enhance the irrigation coverage in the region, by increasing the availability of water and by increasing the number of irrigation water available, to the farmers who are connected through canal water irrigation system. Accordingly, the responses from farmers were coded into 4 groups:
 - a. **75-100%:** If any irrigation facility was not available earlier or not available through community sources, and almost entire field of farmer can now be irrigated. Also, if the farmers were able to irrigate the requisite number of times, as required for the crop grown.
 - b. **50-75%:** If new irrigation water available is sufficient to cover only half the field or number of irrigation water is half of the requisite number
 - c. **25-50%:** If the change in availability of irrigation water or number of irrigation water is sufficient for less than half of the field

- d. **0-25%:** If only a marginal improvement in irrigation water availability or if the farmers are still continuing with the previous sources
2. **Change in type of crop/ cropping pattern:** With the extension of irrigation coverage, farmers are likely to change their crop type to a more valuable crop. Accordingly, the responses were coded in yes or no.
 3. Change in crop production due to change in availability of irrigation water
 4. Change in income due to change in crop production

Sample Details

- Total Minor Irrigation projects covered – 15
- Total upstream beneficiaries covered - 60
- Total downstream beneficiaries covered - 70

Table 3.6 Number of minor irrigation survey beneficiaries and their responses for different indicators (Upstream beneficiaries)

	75-100%	50-75%	25-50%	<25%
Change in Irrigated Land/ intensity	7	34	18	1
	>200%	100-200%	<100%	
Change in Crop Production	26	27	7	
	>50000	25000-50000	<25000	No Change
Change in Income	12	24	24	0

Table 3.7 Number of minor irrigation survey beneficiaries and their responses for different indicators (Tail-end beneficiaries)

	75-100%	50-75%	25-50%	<25%
Change in Irrigated Land/ intensity	21	35	14	0
	>200%	100-200%	<100%	
Change in Crop Production	19	47	4	
	>50000	25000-50000	<25000	No Change
Change in Income	0	26	28	16

Survey Results

Change in area under irrigation/ irrigation intensity after the completion of projects:

Socio-economic impacts due to major and medium irrigation projects and due to minor irrigation projects are extremely different from each other. None of the beneficiaries of minor irrigation projects in the upstream region reported a 100% increase mainly as they already had some source of water available for irrigation. For them the change has been only in terms of switching from private tubewell to the canal water for irrigation. However, a big number of upstream farmers (about 83%) reported that they have been able to extend the irrigation for more than half of their land or they are receiving atleast half the number of irrigation required for cultivating the crop, from minor irrigation project. Towards the tail-end, about 50% of the farmers reported a similar increase. Also, towards the tail-end region,

there are atleast 33% farmers who were not having access to any type of irrigation facility, earlier to construction/ renovation of project.

Change in Type of Crop: At least 80% of the upstream farmers have changed their cropping pattern. Due to construction of new minor irrigation project, plenty of water is available to them for irrigation and they have switched to crops like wheat during the rabi season. A good number of farmers also mentioned that they grew rice also, during the kharif season. On the contrary, only 47% of the tail-end farmers have switched their crop cultivation, and majority are still continuing with the same crop they used to grow earlier.

Change in Irrigated Land/ Intensity

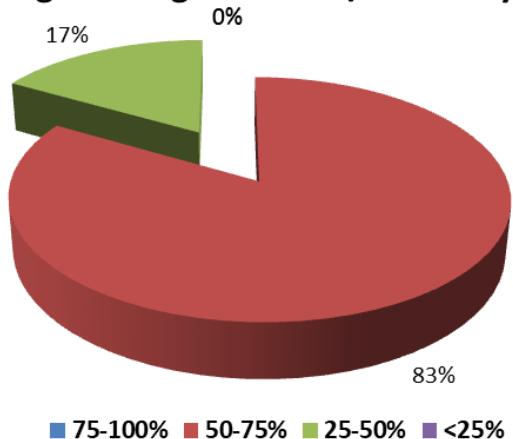


Figure 3.17 Change in irrigated land/ intensity among upstream farmers due to minor irrigation projects

Change in Irrigated Land/ Intensity

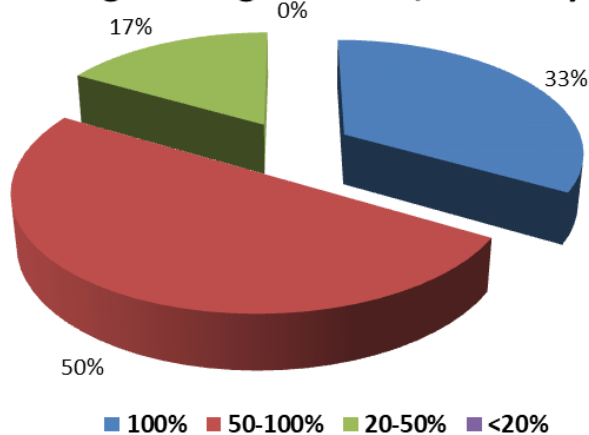


Figure 3.18 Change in irrigated land/ intensity among tail-end farmers due to minor irrigation projects

Change in Cropping Type

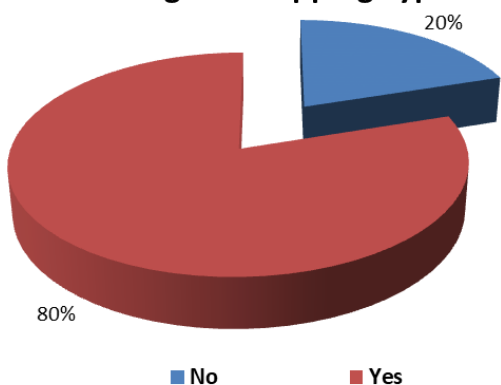


Figure 3.19 Change in type of crop among upstream farmers due to minor irrigation projects

Change in Cropping Type

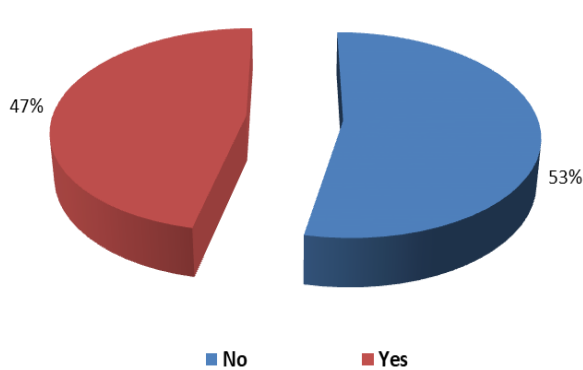


Figure 3.20 Change in type of crop among tail-end farmers due to minor irrigation projects

Change in Crop Production: 50% of the upstream farmers feel that their crop production has increased by more than 2 times after the construction of project and since they have switched to new crop cultivation. Similarly, 33% farmers felt that increase is between 100-200% and only 17% feel that increase is less than 100% of the earlier production. Among the tail-end farmers, 67% feel the increase is between 100-200%, 25% feel it to be more than 200%. Thus, while the construction of minor irrigation project has increased the water availability for tail-end farmers, and they have switched to higher value crops, still the increase in production is not as expected mainly due to irregular number of irrigation water available to them.

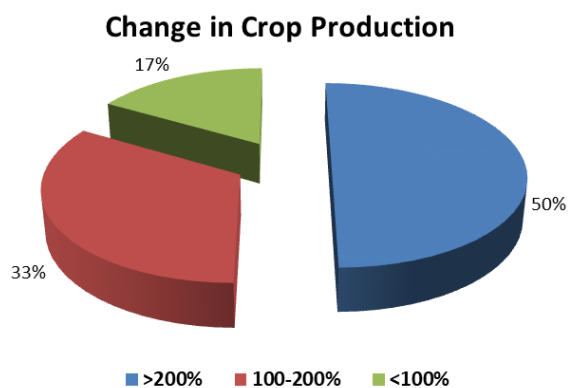


Figure 3.21 Change in crop production among upstream farmers due to minor irrigation projects

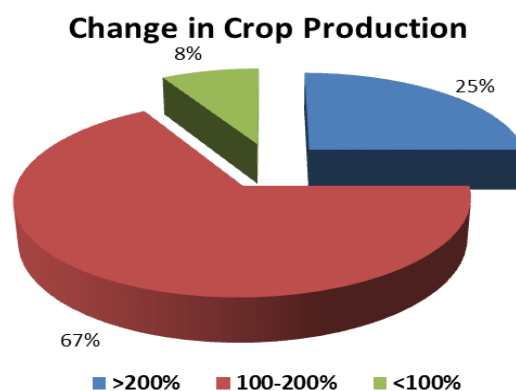


Figure 3.22 Change in crop production among tail-end farmers due to minor irrigation projects

Change in Income: Change in production of crop doesn't seem to directly getting translated into increase in the income of farmers. 16% of the upstream farmers reported that their income has increased by more than Rs. 50000/- while 42% reported the increase to be between Rs. 25000-50000/-. An equivalent number of farmers feel only a marginal increase in their total income, post project implementation.

Among the tail-end farmers, while 25% reported as no increase in their income, none of the farmers had an increase of more than Rs. 50000/- in their income. Similar to upstream farmers, 42% of the farmers reported only a marginal increase in their income after the implementation of minor irrigation project in their district. This seems to be in contrast to the change in production as reported by tail end farmers. While 92% of them reported an increase of more than 100% in the crop production, change in income is less than Rs. 50000/- for all of them.

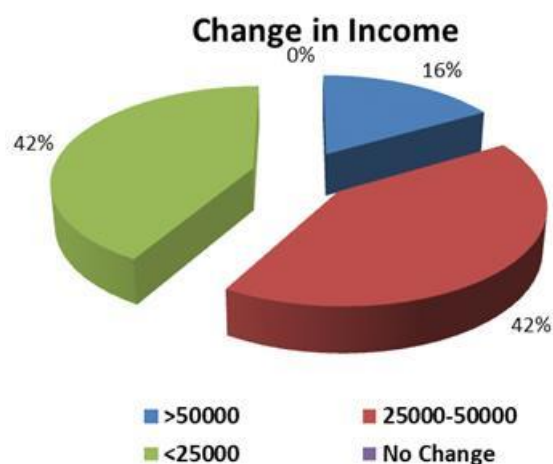


Figure 3.23 Change in income among upstream farmers due to minor irrigation projects

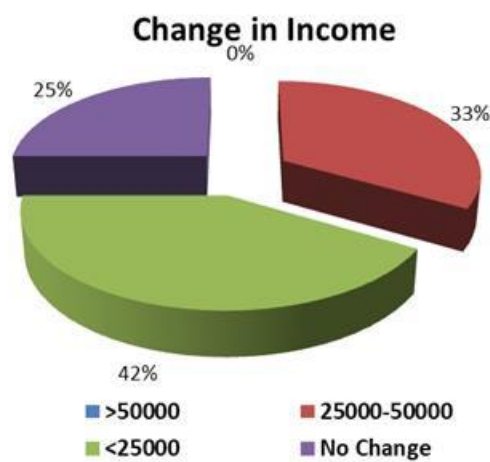


Figure 3.24 Change in income among tail-end farmers due to minor irrigation projects

Dug Wells/ Renovation/ Lifting Device/ Tubewells

- Uttar Pradesh spent a major portion of its ACA on digging of dugwells/ tubewells, renovation and recharging of existing wells/tanks/ponds as well as installation of lifting devices/ energization of tubewells. Total amount of 18% of ACA was allocated for the purpose. This was almost equivalent to 27% of total amount for water positive interventions. A total of 7793 new dugwells have been constructed at a per capita cost of Rs. 1,97,000/- in 4 districts of UP-Bundelkhand. This has been reported to have created additional irrigation facility at the rate of about 1 Ha per dugwell. All these wells are being provided with lifting devices/ pumpsets to draw water from the wells at a per capita cost of about 35000/- and HDPE pipes at a per capita cost of Rs. 20,000/-. Thus, the total cost per dugwell has been around Rs. 2,50,000/-. While achievement for all these schemes have been reported to be below target, as on date, energization of private wells has been 115% with 7248 tubewells having been energized at a per capita cost of about Rs. 1,37,500/-.
- Another major activity under this head had been deepening of existing wells and recharge of wells. A total of 6942 wells located in 4 districts of UP-Bundelkhand have been deepened, and another 6931 wells distributed in all 7 districts have been recharged. An average cost of Rs. 32000/- can be estimated for deepening and recharge activities. These beneficiaries are also likely to be provided with the HDPE pipes as per the reported target for the same.
- However, only beneficiaries of the well construction/deepening activities were 4 districts namely- Jhansi, Lalitpur, Mahoba and Chitrakoot. Close to 5000 wells each, have either been constructed/ deepened in Jhansi and Lalitpur districts itself, out of 15000 beneficiary wells under Bundelkhand package. There was no clarity on the rationale for focussing well construction/deepening activities within these 4 districts only. Also, there was no hydrogeological assessment available to support the location of different wells within district or its block. Considering the regular deviation of rainfall from its normal in these districts, and in major parts especially in Jhansi and Chitrakoot, groundwater development is already 60% in Jhansi, Lalitpur and Chitrakoot districts and 110% in Mahoba. Also, falling water level has been

reported in majority of blocks in Jhansi and Chitrakoot from 2006-2016. As such, sustainability of these wells for long term operations is questionable.

- Both Jhansi and Lalitpur are reported to be witnessing higher level of nitrate than the permissible limits. Also, two blocks in Jhansi have very high level of hardness. These groundwater quality concerns have also not been considered while planning for construction/ deepening of wells in these districts.
- Similarly, about 1000 wells each have been energized in Jhansi and Lalitpur districts, and 2400 wells in Jalaun district, while this number is only 86 in Jalaun. Again, within the available information it was not possible to ascertain the rational for such an unequal distribution. A number of beneficiaries of dugwells asked for energization of tubewells due to increasing cost and inconvenient availability of diesel in nearby areas. Hence, a convergence of energization of wells constructed under the package should be explored.

Socio-economic Impact Assessment

To understand the socio-economic impacts due to Dug Wells/ Renovation/ Lifting Device/ Tubewells projects, especially in Uttar Pradesh, survey teams met with a number of beneficiaries, to understand the level of improvement in irrigation facilities and consequential impact on their agriculture and crop production. For the purpose, beneficiary villages in the command area were distributed into upstream villages and the tail-end villages. Teams met with the farmers who cultivate within the command area and extract water from the reservoir/ canals from the project. Similar to Major and medium irrigation projects, the primary objective of the survey was to collect information about the below indicators:

1. **Dried/ Wet:** To understand if the sufficient water was available in the well, responses/ observations were noted as 'dried – if the well had no water', 'wet – if the well had sufficient water for withdrawal and being used for irrigation', and 'almost dried – if the well had water but not enough for withdrawal'.
2. **Change in area under irrigation/ irrigation intensity after the completion of projects:** Dugwells/ tubewells are expected to enhance the irrigation coverage in the region, by increasing the availability of water and by increasing the number of irrigation water available, to the farmers who could not be connected through canal water irrigation system. Accordingly, the responses from farmers were coded into 4 groups:
 - a. **75-100%:** If any irrigation facility was not available earlier or not available through community sources, and almost entire field of farmer can now be irrigated. Also, if the farmers were able to irrigate the requisite number of times, as required for the crop grown.
 - b. **50-75%:** If new irrigation water available is sufficient to cover only half the field or number of irrigation water is half of the requisite number
 - c. **25-50%:** If the change in availability of irrigation water or number of irrigation water is sufficient for less than half of the field
 - d. **0-25%:** If only a marginal improvement in irrigation water availability or if the farmers are still continuing with the previous sources

- e. **Change in type of crop/ cropping pattern:** With the extension of irrigation coverage, farmers are likely to change their crop type to a more valuable crop. Accordingly, the responses were coded in yes or no.
- f. Change in crop production due to change in availability of irrigation water
- g. Change in income due to change in crop production

Table 3.8 Number of dugwell survey beneficiaries and their responses for different indicators

	75-100%	50-75%	25-50%	<25%
Change in Irrigated Land/ intensity	7	18	6	0
	>200%	100-200%	<100%	
Change in Crop Production	13	16	2	
	>50000	25000-50000	<25000	No Change
Change in Income	5	17	6	3

Survey Results

Wet/ Dried

During the site visits, it was found that while some wells were dried and some wells had below average water level, many other wells were being used by the beneficiaries. Distribution of HDPE pipes and lifting devices is still under process. During the survey, we visited a number of wells in different districts of Bundelkhand. About 72% of the wells had sufficient water and were being used by the farmers for irrigating their crop. Remaining 28% of the wells were not being used, out of which 16% were dried and 12% did not have enough water for irrigation. However, these wells were used by the farmers for atleast two consecutive years after their construction.

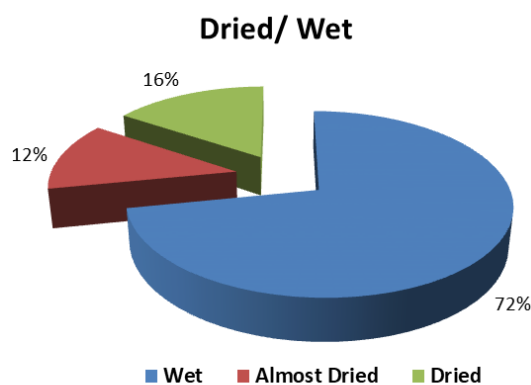


Figure 3.25 Percentage of surveyed wells as dried, almost dried or wet

Change in Irrigated Land: Most of the beneficiaries of dugwells and tubewells are small and marginal farmers, having limited land occupancy. Majority of the farmers surveyed are vegetable growers, which they sell in local market for their sustenance. 58% of the farmers reported that dugwell has helped them in irrigating their land. At least 23% of the farmers were not having any irrigation source previously, but are now able to irrigate their field sufficiently. These farmers have also been provided with the pump sets and HDPE pipes, which has been like a boon for them. However, 58% dugwell beneficiary reported as being able to irrigate 50-75% of their land than previously. Majority of these farmers are waiting for the allotment of pumpsets, and subsequently it will improve the water availability.

Change in Type of Crop: As much as 94% of the farmers reported that they have changed the type of crop being grown earlier. Actually, majority of these farmers were either not growing any crops or working as labours or were dependent on water purchased from other well owners in the adjoining region. Good crops of vegetables like ladyfinger and tomatoes were observed during the field visits.

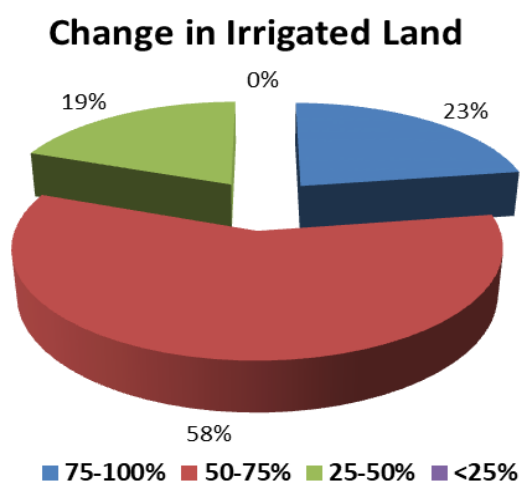


Figure 3.26 Change in irrigated land/intensity among the beneficiaries of wells

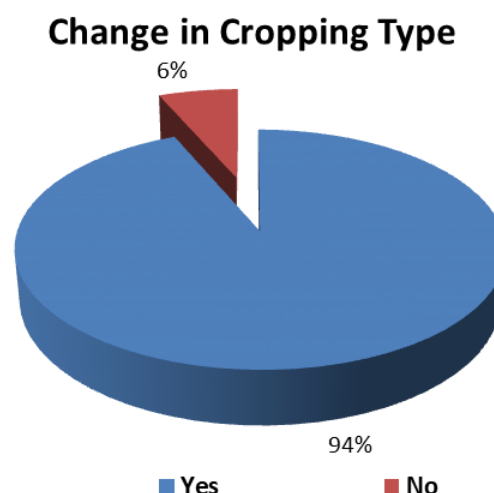


Figure 3.27 Change in type of crop among the beneficiaries of wells

Change in Crop Production: As majority of these farmers are new into irrigated agriculture, significant change in crop production has been reported by them. At least 42% of the respondent mentioned about the change in production being more than 200% than earlier. Another, 52% farmers observed it to range between 100-200% than previously. Thus, the dugwells having sufficient water availability have been extremely helpful for the small and marginal farmers of the Bundelkhand region.

Change in Income: In correspondence with the change in irrigation water availability and the change in crop production, farmers reported a positive change in their income. At least 16% feel that their income has grown by more than Rs. 25,000 annually, while majority of 55% interviewed farmers reported an increase within the range of Rs. 10,000-25,000. While this marginal increase in income for well beneficiaries is not sufficient for their annual expenditure, farmers mentioned a positive change in their livelihood.

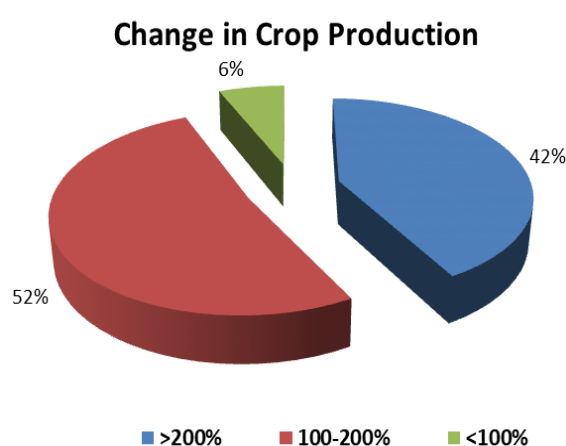


Figure 3.28 Change in crop production among the beneficiaries of wells

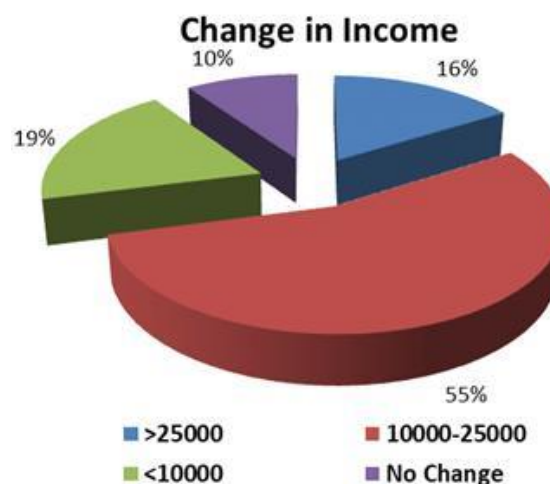


Figure 3.29 Change in income among the beneficiaries of wells

Stop Dams/ Check Dams

- 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. As such, expenditure on construction of check dams is a sustainable intervention for augmenting water resources in the drought prone regions.
- Both Uttar Pradesh (10%) and Madhya Pradesh (7%) have spent significant amount of their ACA allocation in construction of stop dam/ check dams. This amounts to 15% and 10% of their ACA expenditure for Water Positive Initiatives, respectively. This has led to construction of 900 check dams in Uttar Pradesh and about 350 stop dams in Madhya Pradesh. In Uttar Pradesh, 3 departments namely Forest, Minor Irrigation and Agriculture departments were involved in construction of check dams, while in Madhya Pradesh, only Rural Development Department was involved.
- These structures helped farmers when it rained. Water level in these check dams was sufficient to benefit farmers through crop irrigation. Farmers reported that it led to improvement in crop productivity and water availability. Farmers were able to assure irrigation for their crops and benefits were significant for the rabi season. An important aspect noted during field visits was that a cascade of check dams are being built on the same nalas through conversion of other state sponsored schemes and linking with the previously existing dams, and a fully developed system of check dams will get developed.



Socio-economic Impact Assessment

To understand the socio-economic impacts due to check dams, survey teams met a number of beneficiaries, to understand the level of improvement in irrigation facilities and consequential impact on their agriculture and crop production. Teams met with the farmers who cultivate within the command area and extract water from the dam constructed under the project. The focus of survey was to collect information about the below indicators:

1. **Dried/ Wet:** To understand if the sufficient water was available in the check dam, responses/ observations were noted as 'dried – if dam had no water or if the dam had water but not enough for withdrawal', 'wet – if the dam had sufficient water for withdrawal and is being used for irrigation'.
2. **Change in area under irrigation/ irrigation intensity after the completion of project:** Check dams are expected to enhance the irrigation coverage in the region, by increasing the availability of water and by increasing the number of irrigation water available, to the farmers who could not be connected through canal water irrigation system. Accordingly, the responses from farmers were coded into 4 groups:
 - e. **75-100%:** If any irrigation facility was not available earlier or not available through community sources, and almost entire field of farmer can now be

irrigated. Also, if the farmers were able to irrigate the requisite number of times, as required for the crop grown.

- f. **50-75%:** If new irrigation water available is sufficient to cover only half the field or number of irrigation water is half of the requisite number
 - g. **25-50%:** If the change in availability of irrigation water or number of irrigation water is sufficient for less than half of the field
 - h. **0-25%:** If only a marginal improvement in irrigation water availability or if the farmers are still continuing with the previous sources
3. **Change in type of crop/ cropping pattern:** With the extension of irrigation coverage, farmers are likely to change their crop type to a more valuable crop. Accordingly, the responses were coded in yes or no.
 4. Change in crop production due to change in availability of irrigation water
 5. Change in income due to change in crop production

Table 3.9 Number of wet check dams surveyed and average response of beneficiaries for different indicators around these check dams

	75-100%	50-75%	25-50%	<25%
Change in Irrigated Land/ intensity	5	10	2	2
	>200%	100-200%	<100%	
Change in Crop Production	9	7	3	
	>50000	25000-50000	<25000	No Change
Change in Income	5	10	4	0

Survey Results

Wet/ Dried: Due to scanty rainfall over the past 2-3 years, majority of check dams visited during the field survey were found to be dried or not having sufficient water for withdrawal. While some of these recently constructed check dams have never been used by the farmers, some had been used in the past when water was available in them. Some of the farmers in the field adjoining to check dams have been selected for distribution of HDPE pipes also, which will be an additional assistance for the farmers to lift water and carry it to their field.

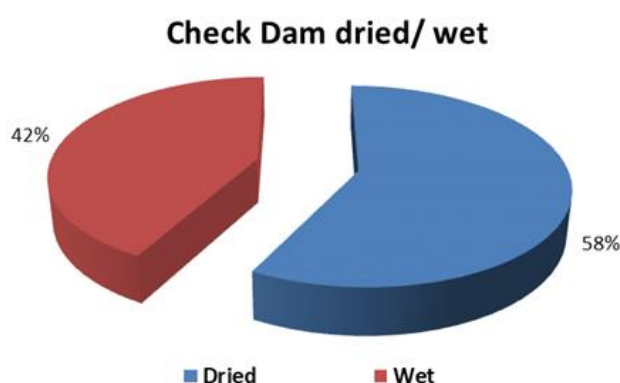


Figure 3.30 Percentage of surveyed chek dams as dried or wet

Change in irrigated land: 26% of the farmers around wet check dams reported that earlier they did not have any irrigation facility and were dependent on their dugwell or purchased water. However, now with the improvement in water availability they can irrigate their land. 53% of the farmers are able to irrigate atleast half of their land or half the number of times requisite to grow the crop. Around 11% of the farmers also mentioned about check dam though having water, is not beneficial for them, due to their field being located at some distance from the source.

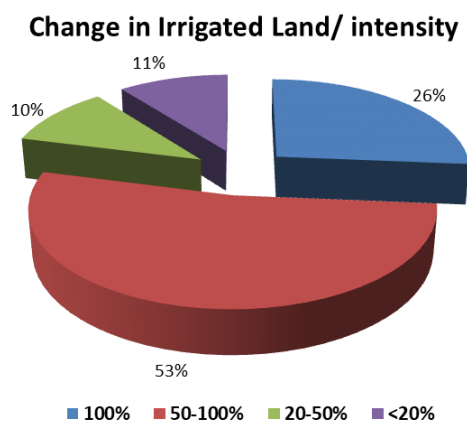


Figure 3.31 Change in irrigated land/ intensity among the beneficiaries of check dams

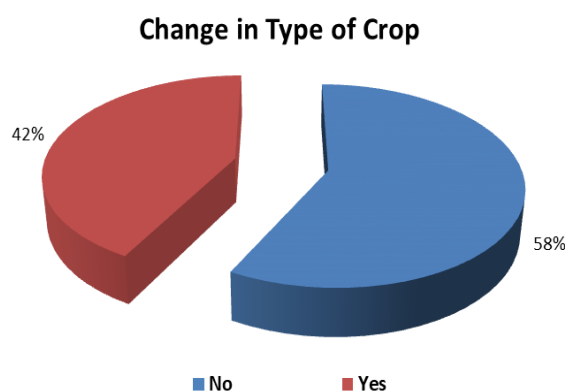


Figure 3.32 Change in type of crop among the beneficiaries of check dams

Change in type of crop: Contrary to the beneficiaries of Major or minor irrigation projects, most of the beneficiaries of check dam have not opted for any change in the type of crop being grown by them. This is mainly because farmers are not very confident that sufficient water will be available to them on a regular basis, due to construction of check dam.

Change in Crop Production: 47% of the farmers reported that they have experience an increase of more than 200% in the crop production, while another 37% reported an increase between 100-200%. This increase in production is mainly due to shift of farmers from rainfed to irrigated agriculture.

Change in Income: Almost all the farmers reported an increase in their income, in consonance with the increase in irrigation facility as well as increase in crop production. 26% farmers mentioned an increase of more than Rs. 25000/-. These are mainly those farmers who shifted to cultivation of wheat instead of dry crops or rainfed crops being grown earlier. 53% of the farmers reported an increase ranging between Rs. 10000-25000/- and 21% reported an increase but lesser than Rs. 10000/-. These are basically the cultivators at the tail end of the check dam's command area or vegetable growers.

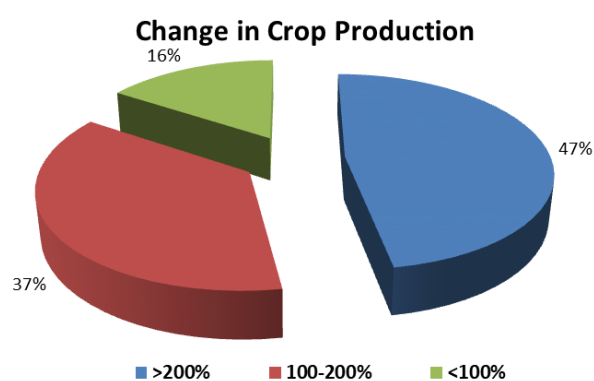


Figure 3.33 Change in crop production among the beneficiaries of check dams

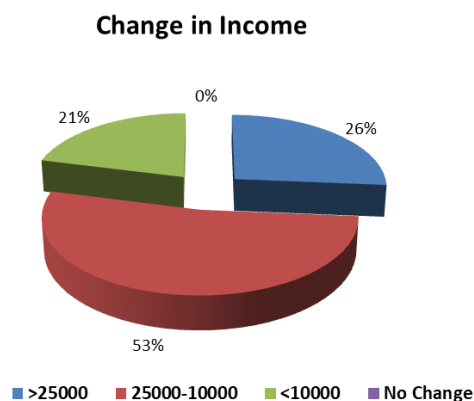


Figure 3.34 Change in income among the beneficiaries of check dams

- However, during field visit most of the structures were dried up due to scanty or no rainfall over past 2-3 years. As a result, farmers were still dependent on limited water available through borewells/ dugwells. Also, the quality of construction at many of the dams visited was below standard with broken walls, fractured plasters etc. in many dams. Most of these dams in Madhya Pradesh have already been built during phase I, while Uttar Pradesh started construction of check dams in phase II only. As most of the phase II duration has faced scanty rainfall, these dams have been mostly useless for local residents. In districts like Chatarpur and Tikamgarh, all the visited check dams were completely dry.
- Also, it was found that maintenance of these check dams is poor, with dried structures filled with broken trees at some places. Being dry, these infrastructures are not being used by the intended beneficiaries.

Drinking Water

- Besides these irrigation water interventions, schemes for drinking water were also implemented in all the districts. An amount of 11-12% of their ACA has been spent by both the states for the provision of drinking water. This is equivalent of 19% for Uttar Pradesh and 15% for Madhya Pradesh of the expenditure for WPIs.
- In Uttar Pradesh, on an average 400 hand pumps have been installed in every district. Additionally, piped water supply projects - 12 in phase I and 49 in phase II, have been implemented.
- In Madhya Pradesh, total 1287 projects were envisaged and 94% had been completed by March 2017. Among these, 1168 projects are based on tubewells and 119 projects are based on wells.
- 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.

Socio-economic Impact Assessment

To understand the socio-economic impacts due to drinking water schemes, survey teams met with a number of beneficiaries, to understand the level of improvement in drinking water availability and consequential impact on their life. Teams met with the families, especially lady members, to understand their impression/ concerns if any, related to water supply. Primary focus of the survey was to collect information about the below indicators:

1. Distance of New Drinking Water Supply Source: Primarily the focus of drinking water schemes was to provide drinking water supply at the doorstep of villagers. However, for some families while the water supply is now available close to their house, they still have to travel some distance to collect water. Accordingly, the response were captured into 4 sub codes:
 - a. Supply of water at more than 100 m from the house
 - b. Supply of water between 50-100 m from the house
 - c. Supply of water between 25-50 m from the house
 - d. Supply of water within 0-25 m or at the doorstep
2. Change in distance travelled to collect drinking water: As the villagers had to travel to some distant pond/ lake/ well to collect water, a change in distance travelled for collection of water was an important indicator to understand the socio-economic impact due to drinking water supply scheme. Accordingly, response were captured into 3 sub-codes:
 - a. Change in distance by more than 100% than the distance being travelled now
 - b. Change in distance between 50-100%
 - c. Change in distance less than 50%
3. Regularity of water being supplied through the schemes: To record the regularity of water being supplied to the beneficiaries, 3 sub responses were noted:
 - a. Regular: If the water supply is regular throughout the year
 - b. Intermittent: If the water supply is intermittent and there are breaks in the regularity of water being supplied
 - c. Seasonal: If water supply is more regular during some seasons only and there is long continuous break afterwards
4. Sufficiency of water being supplied to fulfil family needs: Responses with reference to sufficiency of water being supplied to fulfil needs of the family were recorded with reference to the level of satisfaction of the households. 4 sub-responses were:
 - a. Extremely Satisfied
 - b. Satisfied
 - c. Somewhat Satisfied
 - d. No change

Table 3.10 Number of surveyed drinking water scheme beneficiaries and their responses for different indicators

	>100 m	50-100	25-50	0-25
Distance of Water Supply	15	55	21	71
	>100%	50-100%	<50%	
Change in distance travelled	88	58	16	
	Regular	Intermittent	Seasonal	
Regularity of Water Supply	56	65	41	
	Extremely Satisfied	Satisfied	Somewhat Satisfied	No Change
Sufficiency of water supply	20	75	60	7

Survey Results

Drinking Water 'Scheme' Beneficiaries

Distance of Water Supply: 44% of the respondents mentioned that they received the water connection at their door step and were able to extend it inside their home. However, rest of the 56% respondents still have to go outside their home to collect water from the terminal end/ community tap, which is located at variable distance in different villages. While 34% of the villagers have to travel 50-100 m from their house, around 9% have to walk more than 100m to collect daily requirement of water.

Change in Distance travelled: Whether the farmers received tap connection at their doorstep or they have to travel some distance to collect water, all the respondents reported significant change in the distance travelled to collect water than they used to before the scheme implementation. More than half of the beneficiaries reported a reduction in their travel distance by more than 100%. In fact, some beneficiaries had to travel a few kilometres to collect water from the nearest pond/ lake, but now the distance has reduced very significantly.

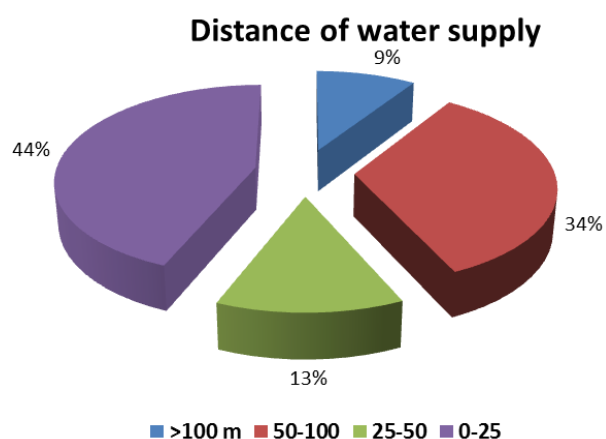


Figure 3.35 Distance from the current water supply source

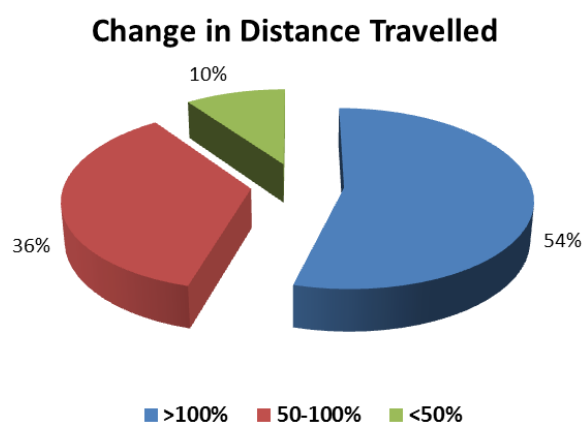


Figure 3.36 Percentage change in the distance required to travel now as compared to before scheme period

Regularity of Water Supply: With reference to regularity of water supply, responses from the beneficiaries were not as positive as they were for the change in distance travelled to collect water. While 35% of the respondents reported a regular water supply throughout the year, for a specified time of the day, 40% said that the supply was intermittent. There is more than once breakdown of the water pump etc. and it takes several weeks for the same to get repaired. As the supply system has been handed over either to the local panchayat or the water users association, follow up action takes time. At places where the chairman of water users association is responsive, the actions are more frequent. However, 25% of the beneficiaries also reported that the supply is regular only during the lean season, and during the peak season there is no or very intermittent water supply.

Sufficiency of Water Supply: All the beneficiaries were satisfied with the drinking water supply scheme. But the level of satisfaction varied among different respondents. While only 13% reported to be extremely satisfied, 46% were satisfied and another 37% were somewhat satisfied. Such a response from the villagers was mainly due to variations in regularity of water supply and many a times lower than requisite water supply.

Regularity of Water Supply

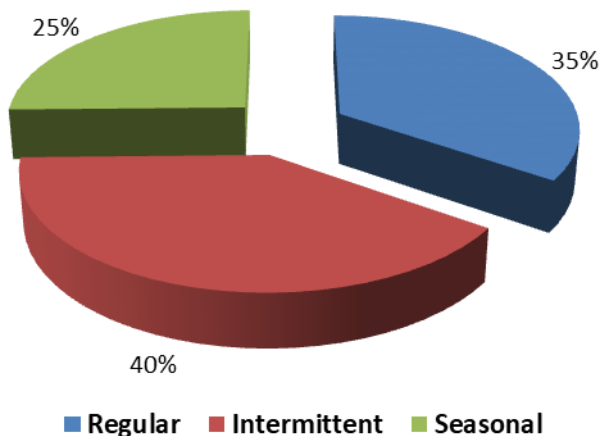


Figure 3.37 Response on regularity of water supply among beneficiaries of drinking water schemes

Sufficiency of water supply

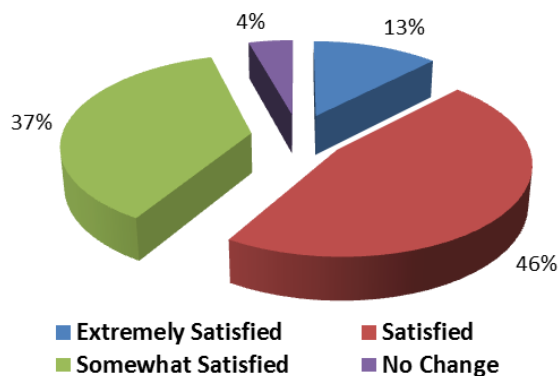


Figure 3.38 Response on sufficiency of water supply among beneficiaries of drinking water schemes

Handpump Beneficiaries

Distance of Water Supply and change in distance travelled: Almost 98% of the villagers reported that they have to travel less than 100 m from their house to collect water after installation of hand pump. Among these 40% are travelling 50-100 m and 51% have to travel 25-50 to collect drinking water.

All the beneficiaries reported positively about the change in distance travelled now as compared to earlier to collect water.

Distance of water supply

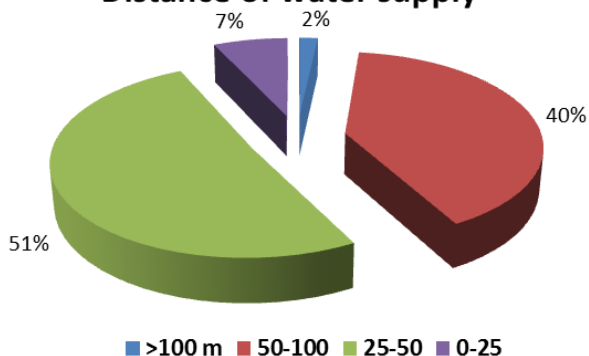


Figure 3.39 Response on distance to travel for collection of water among beneficiaries of handpumps

Change in Distance Travelled

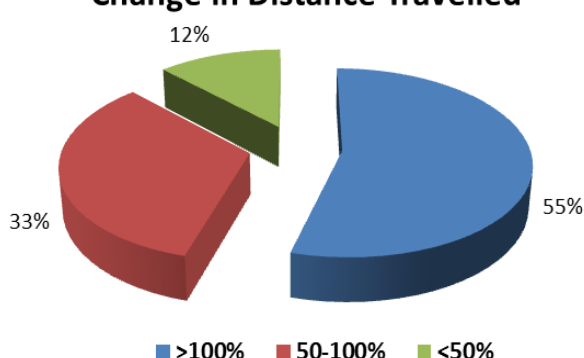


Figure 3.40 Response on change in distance travelled for water collection among beneficiaries of handpumps

Table 3.11 Number of surveyed hand pump beneficiaries and their responses for different indicators

	>100 m	50-100	25-50	0-25
Distance of Water Supply	1	23	29	4
Change in distance travelled	>100%	50-100%	<50%	
	31	19	7	
Regularity of Water Supply	Regular	Intermittent	Seasonal	
	32	25	0	
Sufficiency of water supply	Extremely Satisfied	Satisfied	Somewhat Satisfied	No Change
	6	37	10	4

Regularity and Sufficiency of Water Availability: 56% of the respondents feel that the water availability through hand pump is regular, while 44% feel that water from hand pump is available in sufficient amount only in some seasons. During the summer season, the water from hand pump is either not sufficient or not usable for drinking purpose.

In accordance with the regularity of water supply, extreme level of satisfaction was not found among most of the beneficiaries. While they are happy with the installation of hand pump in their village, some feel that the siting of hand pump is not perfect. Some respondents also reported that the drilling for the hand pump is not upto the mark.

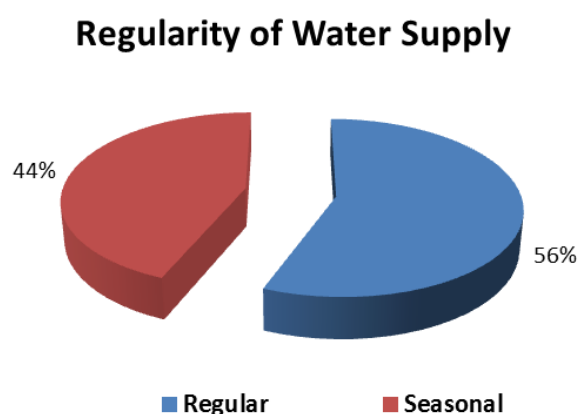
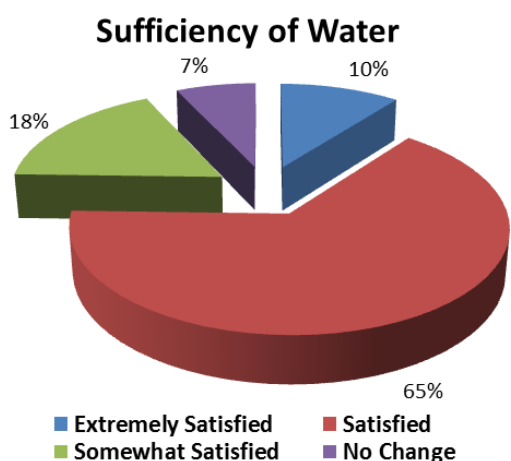


Figure 3.41 Response on satisfaction with the sufficiency of water among beneficiaries of handpumps

Figure 3.42 Response on regularity of water availability among beneficiaries of handpumps

General Observations/ Challenges

- Due to fixed allocation, this scheme could only partially cover the households of a village and those at tail ends didn't get benefit of this scheme.

- Village level schemes in remote villages were found to be non-operational as the tube wells have already dried up. Also, the overall structure of village level schemes was not found to be appropriate. For example, the scheme had the provision of pipe line extension of only 100 m from the tubewell. As a result, in some villages the pipeline remained short of many households, and the people living close to the tubewell were only connected to the system.

Sprinkler Set Distribution

- As per the records available, agriculture department of Uttar Pradesh has distributed sprinkler sets to farmers. With sprinkler systems 2 to 3 times more area can be irrigated with the same water available. Thus, the system was considered as very useful for the water stressed regions like Bundelkhand. However, sprinkler systems are useful only if assured and continuous water supply is available to create water pressure in the sprinkler system.
- Majority of the farmers reported that the system purchased on subsidy from the department, are not being used and are lying in their storage.
- Farmers in some districts also reported that while the pipes and nozzles have been distributed, cistern has not been given.

Socio-economic Impacts

To understand the impacts on livelihood of beneficiaries of sprinkler set distribution, following indicators were selected:

- Usage of sprinkler set among the farmers
- Change in irrigated land due to sprinkler set
- Change in production due to sprinkler set
- Change in income due to sprinkler set

To understand the impact due to sprinkler set, 70 beneficiaries were selected from the different districts of Bundelkhand. It was surprising to see that 87% of the farmers are not using the sprinkler set, and it is lying in their storage. Also, among the users of sprinkler set, 67% reported as there being no change in the area of land being irrigated. Also, majority of these farmers reported that there is no change in the crop production nor in their income, due to usage of sprinkler set. Only 22% reported a change in the crop production and 33% reported change in their income, but that being only marginal.

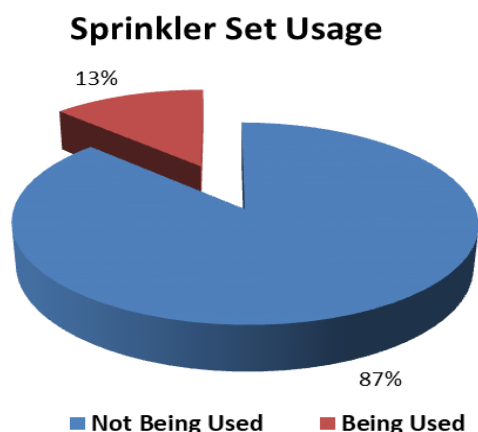


Figure 3.43 Sprinkler set usage among the beneficiaries

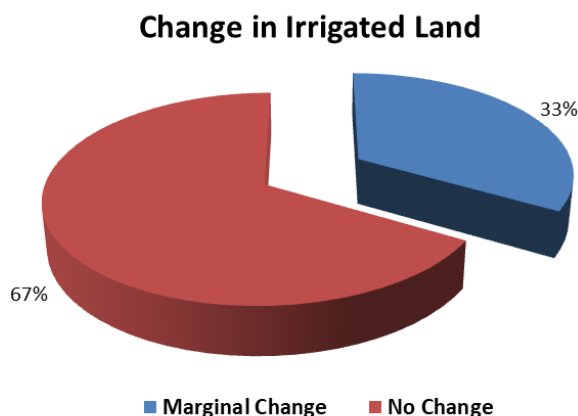


Figure 3.44 Change in irrigated land among the beneficiaries

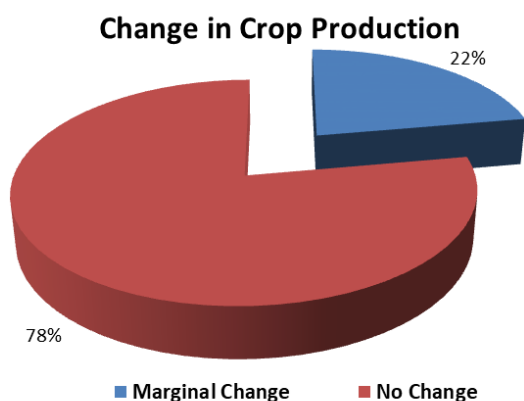


Figure 3.45 Change in crop production among the beneficiaries of sprinkler set distribution

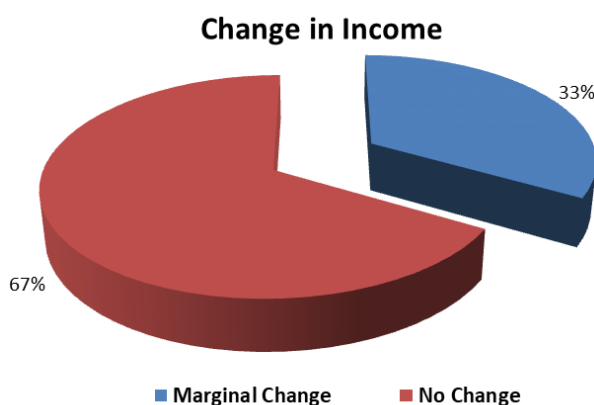


Figure 3.46 Change in income among the beneficiaries of sprinkler set distribution

Soil and Water Conservation

4-6% of total ACA has been spent by both the states on activities related to soil and water conservation. Forest department of both the states were involved in the implementation of this activity. A number of soil and moisture conservation activities like plantation, watershed management in forests land and construction of check dams have been taken up. As per the officials of forest department, the beneficiaries of their interventions are forests of the region, and as such the impacts could not be ascertained. Overall, the attitude of officials of forest department in all the districts of both the states, except Hamirpur, was not supportive and this limited the visit as well as overall assessment of interventions in this sector.

Recommendations

Technological/ Scientific- Immediate/ Short Term Basis

- A thorough investigation of hydrological and hydrogeological characteristics of the Bundelkhand region should be conducted using different modelling tools.
- Water Demand Modelling for the region and for the individual districts should be conducted to understand the current as well as future demand patterns.
- Water Stress Analysis of the region should be conducted, considering the gap between water availability and its demand, and the districts should be classified into safe zone, high stress and critical zones. These zones should follow the micro-watersheds delineated within the Bundelkhand region.
- Mapping of all the water positive interventions- both existing as well as created under the BKD project should be conducted. This geo-tagging should be done for all the dugwells, tubewells, checkdams, drinking water schemes, major, medium and minor irrigation projects etc.
- A mapping of all the water resources – both natural as well as artificial should be prepared using geographic information system (GIS).
- Land use-land cover analysis of the Bundelkhand region should be conducted to understand the changes in land use pattern, and the level of urbanization.
- Groundwater quality analysis and the development of groundwater quality scenarios shall be conducted for the purpose of sustainable groundwater management plan.
- Any new activity related to water positive interventions should be sanctioned based on the outcomes of the above analysis.

A complete watershed level analysis was beyond the scope of this work, however, for the purpose of reference, micro-watersheds zones for the districts of Jhansi and Lalitpur are being presented.

Institutional/ Policy Level

Immediate/ Short-term Perspectives

- 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.
- Watershed as a hydrological unit shall be the centre of planning activities, while district administration is the implementation unit. Departments shall implement planned activities adopting micro-watershed specific approach, as delineated through hydrological investigations.

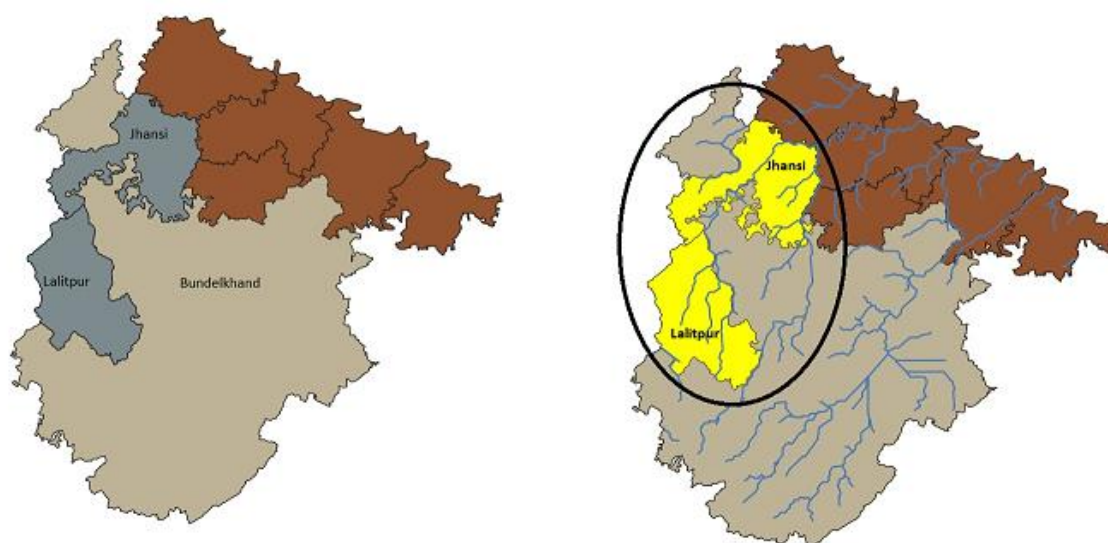
Medium and Long-term Perspectives

- **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 shall 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.

- Schemes which are large in nature with respect to cost/ area/ expected benefits should always be made in consultation with district administration/ local stakeholders of the area where project is being implemented. They should be properly informed and trained about the need for such a scheme.
- Training programmes for middle and lower level officials engaged in implementation activities shall be organised. A capacity building of these officials on latest techniques of water resources management, as well as adaptation to climate change impacts shall be done.
- 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.
- Water is a resource which can neither be created nor produced, but can only be managed efficiently. As the region is naturally a water deficit region, water resources structures will not be useful unless it experiences normal average rainfall. Considering this, surplus water from other adjoining region need to be transported to the Bundelkhand region. Interlinking of river projects at various stages of construction in the region shall be completed expeditiously.
- Feasibility of water transport through pipeline system from outside the region shall be explored.

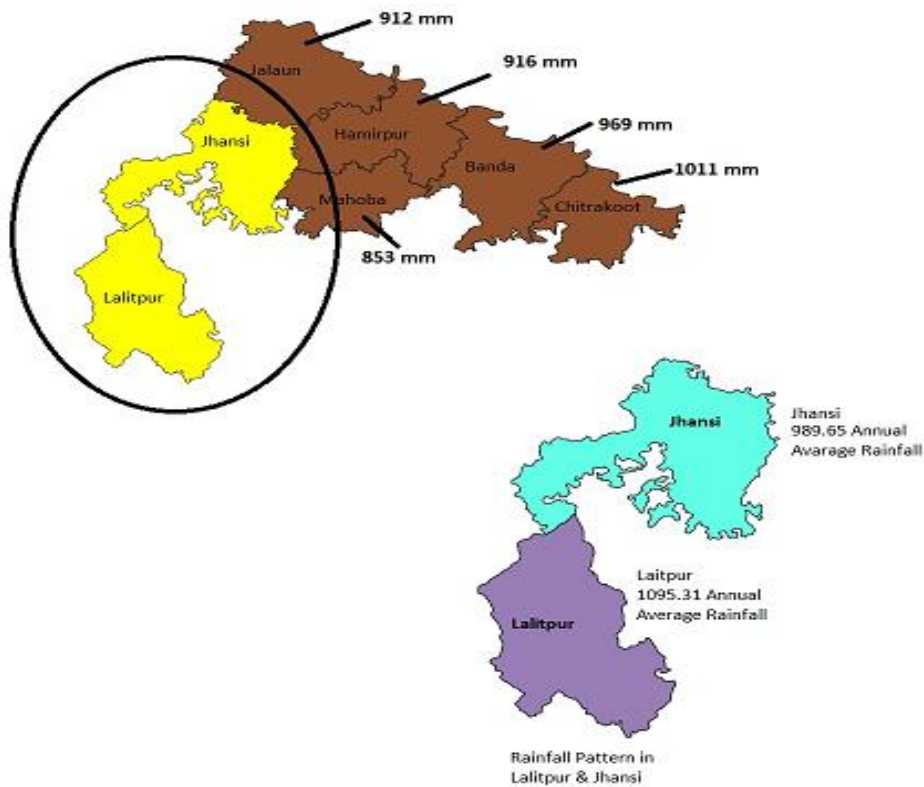
Watershed Mapping of Bundelkhand Region - UP District



Micro-watershed level mapping of Jhansi and Lalitpur



Rainfall Pattern in Bundelkhand Region - UP District



CHAPTER 4

LIVELIHOOD SUPPORT

ACTIVITIES

4. Livelihood Support Activities

- Both Uttar Pradesh and Madhya Pradesh spent 2.8% and 5.2% of their ACA on livelihood support activities, respectively. These activities were mainly related to dairy development and animal husbandry. However, Madhya Pradesh spent some amount to support fisheries activities also, in the Bundelkhand region.
- Interventions related to dairy development, focussed on organisation of milk cooperative societies, distribution of supporting equipment/ cattle feed to societies, establishment of milk processing/ chilling centres/ coolers. For Animal Husbandry, activities focussed on distribution of bulls, goatary units and establishment of Artificial Insemination centres. In fisheries, Madhya Pradesh focussed primarily on establishment of wholesale/ retail markets.
- All these activities have directly helped in supporting livelihood and had a significant impact on ground. 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.

Artificial Insemination (AI) Centres

In order to improve the locally available breed under the Bundelkhand Package artificial insemination centres were set up by BAF Development Research Foundation as reported that through the Livestock Breed Improvement Programme in Bundelkhand region, their project of upgrading nondescript cattle through artificial insemination has benefited more than 15,526 families, while also engaging several local youth in the implementation of the programme. A total of 230 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 1,99,115 AI in UP and 4,23,529 in MP respectively and the confirmed pregnancy was reported to be 45.99 % in UP and 44.27 % in UP. The total number of calves born was found to be 1,38,703 in UP and 62,577 in MP respectively.

Socio-economic Impact Assessment

To understand the socio-economic impacts due to Artificial Insemination Centres, a comprehensive consultation was taken up with the AI centre operators. Teams visited a number of AI centres, and surveyed beneficiaries in the adjoining villages. The primary objective of the survey was to collect information about the below indicators:

1. Number of services received by the beneficiary from the AI centre
 2. Quality of services provided by the AI centres
 3. Level of satisfaction with the new animals produced due to AI
 4. Change in income due to new and improved animals
 5. Overall Satisfaction of the beneficiary with the AI centres
-



Survey Results

Number of services received: 89% of the villagers interviewed have utilized the services of AI centre, at least once since its operation. Depending on the number of animals owned by the villagers, 29% of the interviewee reported to have used the services more than once. However, 11% of the farmers mentioned to have not taken any service from AI centres, either due to non-possession of animals or due to their own perception about the artificial insemination.

Quality of Service provided by the AI centres: AI Centres and their operators are working with due diligence and sincerity. This gets reflected from the response of beneficiaries to the question related to quality of service being provided by the AI centres. 86.3% of the beneficiaries who received the service ranked the AI centres from Good to very good. While 13.7% of the respondents ranked the services to be fair, no one ranked it to be poor.

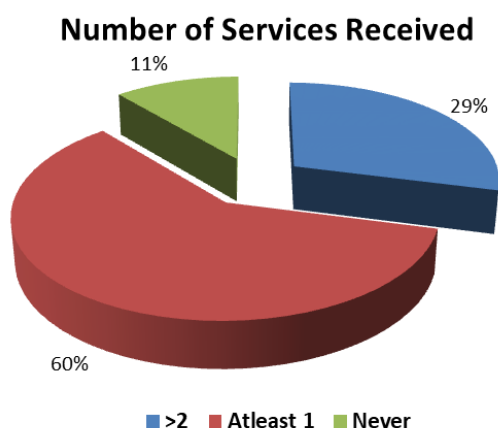


Figure 4.1 Number of services received by the beneficiaries from AI centre in their area



Figure 4.2 Quality of services received by the beneficiaries from AI centre in their area

Satisfaction with New Animals: One of the purposes of AI centres has been to improve the breed of animals with the local villagers. For the purpose, semen from the high yielding breeds is provided to the AI centres, which is used for artificial insemination. 55.8% of the respondent considered the new progeny as a result of AI as very good, and 25.3% respondents considered them as good. About 19% of the people were not very happy with the new breeds and responded their satisfaction as fair.

Change in Income: Animals of a number of beneficiaries have attained the age of maturity. As a result, these animals have started generating income for the farmers. While 37% of the farmers reported significant change in the income due to new animals, about 44% reported slight change as compared with income from earlier animals. Also, about 19% of the respondents have expressed no change in their income which is mainly due to AI service received recently, and the animal not having reached the maturity.

Satisfaction With New Animals

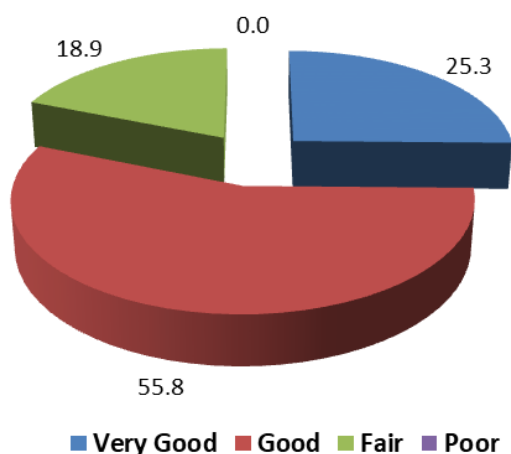


Figure 4.3 Satisfaction among beneficiaries for the new animals born after the services from AI centre in their area

Change in Income

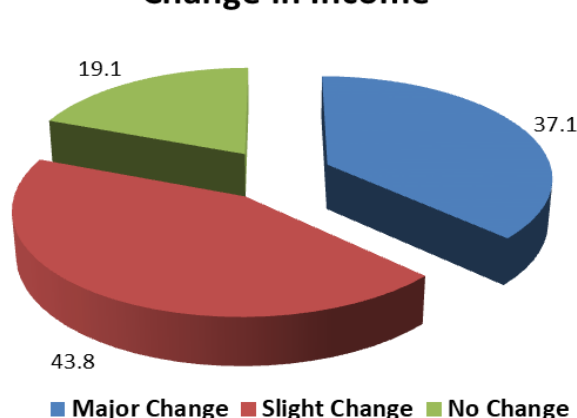


Figure 4.4 Change in income due to new animals born after the services from AI centre in their area

Overall Satisfaction: The beneficiaries of artificial insemination have reported an improvement in milk production and quality as well as an earlier maturation of the progeny. Beneficiaries have also reported better milk production as well as an increase in milk fat content. As such, almost all the respondents felt satisfied with the AI centres and the services being provided through them. However, the level of satisfaction varied among different beneficiaries. While 27.4% beneficiaries are extremely satisfied with the interventions, about 51% people are satisfied. 22% of the beneficiaries do not see any major improvement due to AI centres and feel somewhat satisfied.

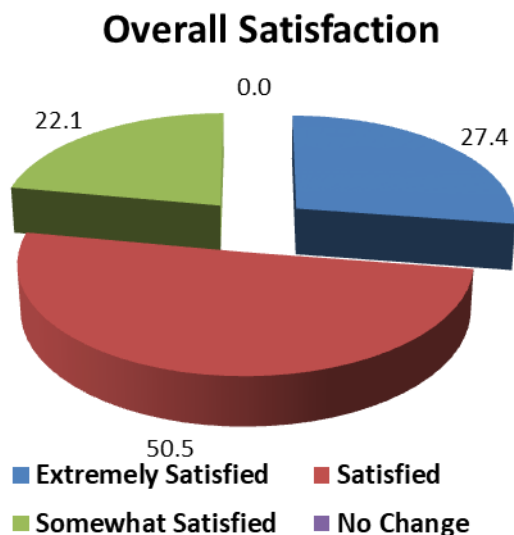


Figure 4.5 Overall Satisfaction among beneficiaries from the services being offered by AI centre in their area

Bull induction

In order 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 either demand or those who already are in the business of breeding buffaloes.

The beneficiaries who had received improved Murrah Buffalo for natural breeding services have informed that they have provided services to people from their village as well as other nearby villages. The beneficiaries of breed improvement activities have reported an improvement in milk production and quality as well as an earlier maturation of the progeny.



Socio-economic Impact Assessment

To understand the socio-economic impacts due to Bull Induction programme, survey teams met with a number of beneficiaries, to understand the level of improvement in their livelihood. Also, teams met with the beneficiaries who have been provided service by the direct recipient of bulls. The primary objective of the survey was to collect information about the below indicators:

Direct Recipients of Bulls:

1. Number of bull breeding services provided
2. Change in income due to bull breeding services

Indirect beneficiaries/ recipients of the bull breeding services

1. Number of services received from the bull induction beneficiary
2. Level of satisfaction with the services provided
3. Level of satisfaction with the new animals produced

Survey Results

Direct Recipients of Bulls

Number of bull breeding services provided: The beneficiaries who had received improved Murrah Buffalo for natural breeding services are providing multiple services annually. On an average, 60% of the bull recipients are providing 50-75 bull breeding services to the farmers from the surrounding villages. 17% of beneficiaries have provided more than 75 services, however, the same is not uniform for every year.

Change in Income: The beneficiaries who had received improved Murrah Buffalo for natural breeding services have charges ranging from 100 to 500 for each service. However, an average of 250 is charged for the bull services by the beneficiaries. This has improved the income levels for them. Almost 56% of the beneficiaries reported that they are generating an additional income of Rs. 5000-10000 annually due to the bull services. About 15% of the farmers are generating even more than Rs. 10000/- on annual basis, mainly due to higher demand in their region.

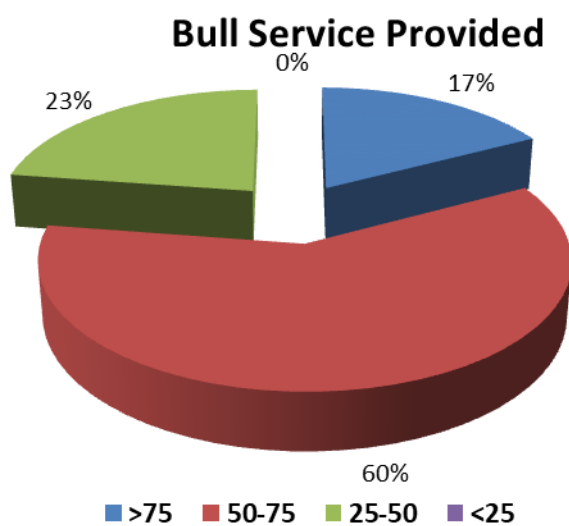


Figure 4.6 Number of Bull Services provided by the beneficiary to the villagers

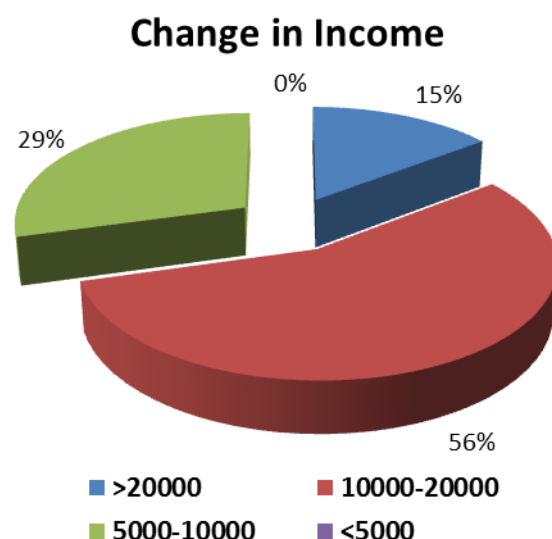


Figure 4.7 Change in income of the direct beneficiary from the bull services provided to villagers

Indirect beneficiaries/ recipients of the bull breeding services

Due to improved variety of Murrah buffalo bull and the reasonable cost, the bull service was found to be very popular among the villagers. Atleast 90% of the villagers interviewed, have used the service atleast once and about 33% have used the service even more than once. 84% of the respondent mentioned that the quality of their animals has improved due to insemination from improved Murrah bufaalo bull and almost 90% of the service recipients feel satisfied with the service.

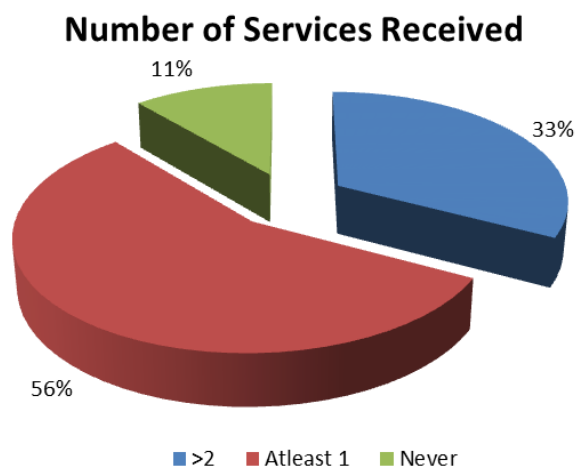


Figure 4.8 Number of services received by the indirect beneficiaries from the bull owner under Bull Induction Programme

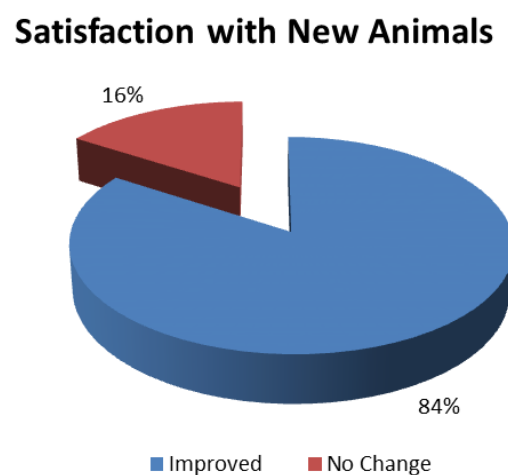


Figure 4.9 Satisfaction of indirect beneficiaries from the new animals born after services from bull owner under Bull Induction Programme



Figure 4.10 Overall Satisfaction among indirect beneficiaries from the services being offered by the bull owner under Bull Induction programme

Goatry

The goat units that were distributed to beneficiaries consisted of 10 female goats and one ram of age ranging between 6 months to 18 months. The Gram Pradhan was consulted prior to the distribution of goat units. The shortlisting of beneficiaries was based on the criteria such as prior experience of rearing goats, Below poverty line (BPL) families, landless, amongst other criteria. In Madhya Pradesh, margin money ranging from 20 to 25% of the cost was collected from the beneficiaries, which has helped ensuring that the right beneficiaries are



selected.

Socio-economic Impact Assessment

To understand the socio-economic impacts due to distribution of Goatry units, a comprehensive consultation was taken up. Teams met a number of Goatry unit beneficiaries, and interviewed them to understand the impact. The primary objective of the survey was to collect information about the below indicators:

1. Change in income due to goatry units
2. Change in number of animals in their unit

3. Post allotment support received for the animals
4. Overall Satisfaction of the beneficiary from goatry unit distribution

Survey Results

1. **Change in income due to goatry units:** Based on the general pattern of income, responses under this indicator were classified into 4 sub-groups: Income more than Rs. 50,000, between Rs 25,000-50,000, less than Rs. 25,000 and if there was no change in the income. The beneficiaries have been able to sell off their goats at a rate ranging from Rs 3500 to Rs 5000 each. Every person interviewed has reported increase in their income from the goatry unit either due to sale of animals or their milk. 28% of the respondents reported that they have earned more than Rs. 50,000/- while income for 51% of the respondents range between R. 25,000 and 50,000/-. Some beneficiaries from time to time have sold some excess milk while some prepare *mawa* (whole dried milk) and other milk products thereby earning additional income. However, 21% of people also reported slight increase in their income, being less than 25,000/-.

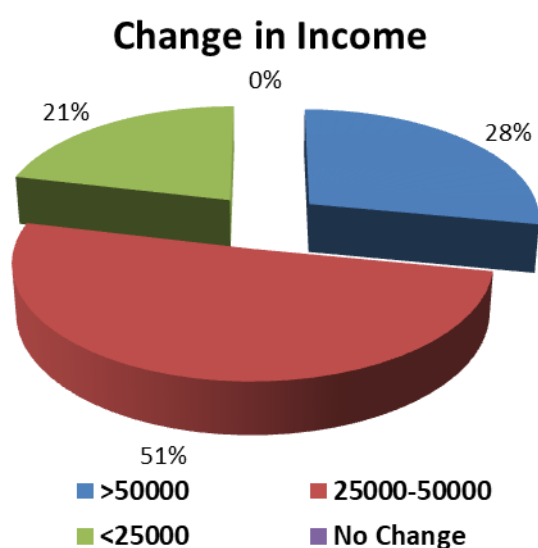


Figure 4.11 Post allotment change in income of goatry unit beneficiaries

2. **Change in number of animals:** Some beneficiaries also reported that the size of their goatry unit has increased over the years due to animal breeding. 30% of the respondents have indicated the current size of their unit being more than 11. However, a significant number (43%) of respondent have indicated the reduction in size of their unit due to dying animals, and the breed provided not being suitable to the local climate.

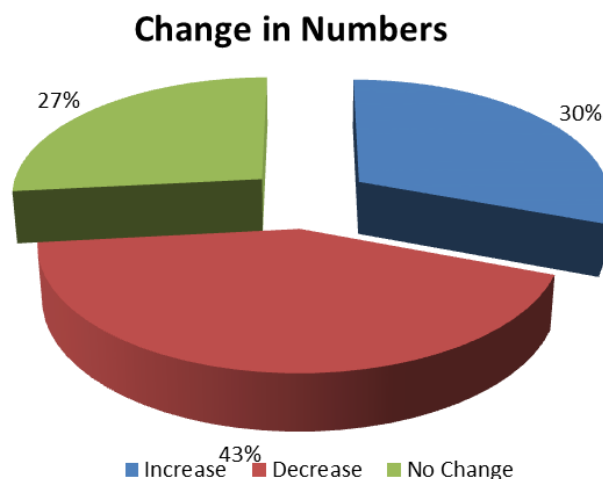


Figure 4.12 Post allotment change in number of animals of goatry unit received by a beneficiary

- 3. Post allotment support:** The Bundelkhand Package has provision for insurance, ration for 03 months, and medicine to the beneficiaries of the goat units. Beneficiaries were also asked about the support received from the department after the allotment of goatry unit. 76% of the respondents reported to not have received any support after the allotment.

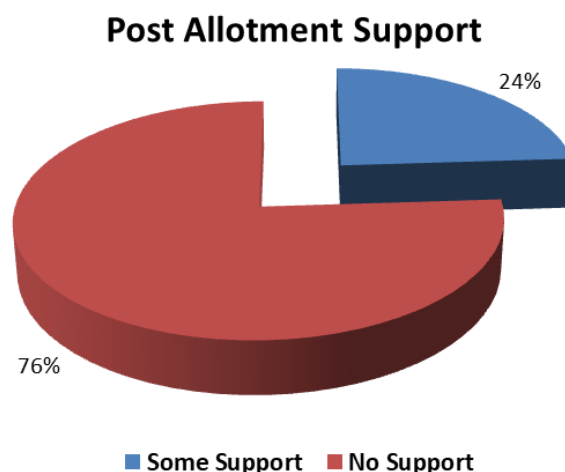


Figure 4.13 Post allotment support received from the department by goatry unit beneficiaries

- 4. Overall Satisfaction:** Overall, the level of satisfaction among the beneficiaries was moderate. 73% of the total respondents expressed satisfaction with the goatry units, but varying level of satisfaction. 40% of the beneficiaries are highly satisfied but 33% respondents reported as somewhat satisfied and 27% felt as there is no change in their socio-economic condition due to goatry unit.

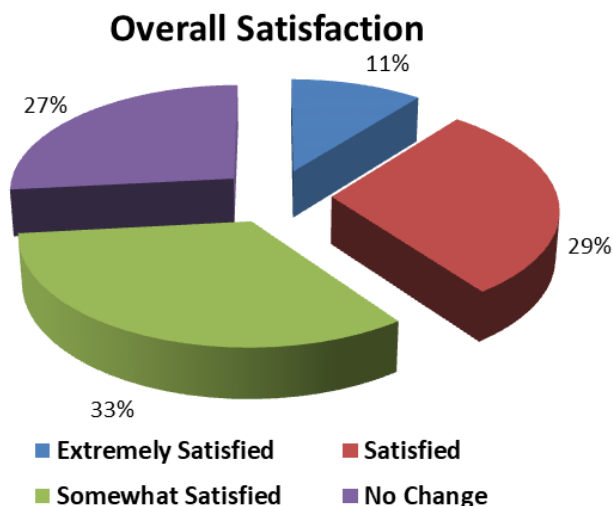


Figure 4.14 Overall satisfaction among the goatry unit beneficiaries

General Observations

- It was observed that some of the goat unit beneficiaries sold their units immediately after receiving them. There needs to be a follow up check wherein beneficiaries are required to report deaths and are not allowed to sell their units until maturation.
- It was seen in some locations that weaker sections of the society who had received the units do not have the financial capability to manage a herd of ten goats and one ram.
- There is a lack of a proper market place for selling goats and hence the prices for the goats are not standardized.
- There is a need for providing immunization to the goat units and their progeny as well as a continued medical support to the beneficiaries. As in most places medical support is available, awareness generation is required to sensitize the beneficiaries.
- Some herders have also suggested that the goats are not suitable for the climate and hence this can be one of the reasons for high mortality rates. It is recommended that the goats for distribution should be selected on the basis of their ability to adapt to the environment.
- There is a lack of a market place for selling goats. It is recommended that such market places could be developed in order to ensure fair prices to the beneficiaries and other herders.
- Even though in some places there are selection criteria for selecting beneficiaries, the government officials from time to time are pressurized by local politicians and other influencers to shortlist beneficiaries. There needs to be common established selection criteria to ensure that the right beneficiaries are selected.

Dairy Sector

For the improvement in household income through dairy sector, a number of key structural interventions were made by the Governments 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 Milk Coolers, Milk Chilling centres as well as setting up the milk processing centres in almost all the districts of the region.

In order to boost the dairy sector, milk cooperative societies were formed under BKD package. The milk cooperative societies help provide a common platform for the milk producers as well as to improve their income level while ensuring that the quality of milk and the livestock is maintained and/or improved. Before the announcement of the package, generally all the milk producers sold their milk in to the private dairies, local market or door to door supply where they face competition in the sector which leads to decreasing rate in price and changes in regular customer. Since the inception of the package, more than 1000 milk societies have been established in the Bundelkhand region to create common platform and provide wide 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.

Socio-economic Impact Assessment

To understand the socio-economic impacts due to interventions in dairy sector, a comprehensive consultation was taken up with the dairy sector officials as well as members of milk cooperative societies, constituted under the Bundelkhand package. Teams visited a number of dairy plants, milk cooperative societies, and surveyed beneficiaries in the adjoining villages. The primary objective of the survey was to collect information about the below indicators:

1. Change in income due to milk cooperative societies
2. Regularity of income from society
3. Change in selling options post formation of society
4. Support for animals from the society/ department
5. Overall Satisfaction of the beneficiary

Sample Details

- Total Milk Societies visited – 20
- Total Beneficiary covered - 100
- Milk Processing Plant/BMC – 11

Table 4.1 Number of surveyed dairy society beneficiaries and their responses for different indicators

	Extremely Satisfied	Satisfied	Somewhat Satisfied	No Change
Change in income of milk pourers by selling milk to the cooperative society	20	35	20	25
Regularity of income by selling milk to the cooperative society	55	45	0	0
Selling option created due to milk cooperative society	30	25	45	0
Support for animals from milk society	20	40	30	10



Survey Results

Change in Income

A total of 20 functional milk cooperative societies were chosen randomly in the entire Bundelkhand region where 160 members have been interviewed to know the actual status of the milk cooperative societies and it was observed that the members of the cooperative society have been able to generate additional income from the dairy activity. Among the beneficiaries, 20% stated that they are extremely satisfied with the change in income due to milk cooperative society, 35% feel satisfied, and 20% members feel that their income increased on a seasonal basis only because they are not able to maintain quality and quantity of milk production for whole year. Rest 20% member mentioned that there is no change in their income.

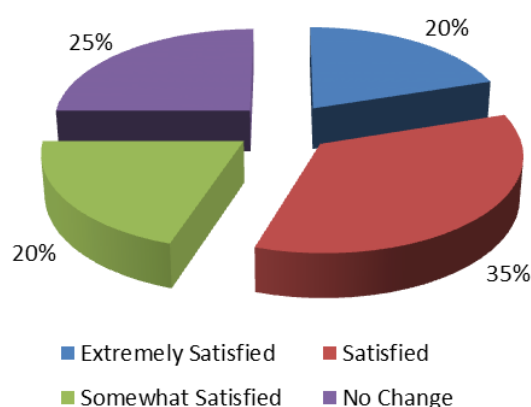


Figure 4.15 Change in income of milk pourers by selling milk to the cooperative society

Regularity of Income

The main objective of the milk cooperative society is to provide additional income to the milk producers on regular basis. This in turn could lead to reduction in unemployment and reduce migration due to the availability of regular income. The beneficiaries of the milk cooperative societies are quite pleased with the regularity of income and 55% are extremely satisfied while 45% are satisfied. This shows that the initiatives taken in the dairy sector are beneficial to the farmers and herders in Bundelkhand.



Figure 4.16 Response from milk pourers with reference to regularity of income by selling milk to the cooperative society

Change in Selling Option

Prior to the package, majority of the milk producers used to sell their milk to private vendors, local market or supplying door to door in nearby urban areas. After the establishment of milk societies, milk producers now have a common platform to sell their milk. This has made milk prices to be more rational due to reduction in competition as well as malpractices adopted by the private vendors. It has also reduced the cost of transportation as well as spoilage of milk. Around 30% of interviewed beneficiaries reported that they are extremely satisfied as they get a permanent platform to sell their milk, while 25% stated that they are satisfied and rest of 45% feels there is no major change in selling option because in summers they have to return back to the private vendors.

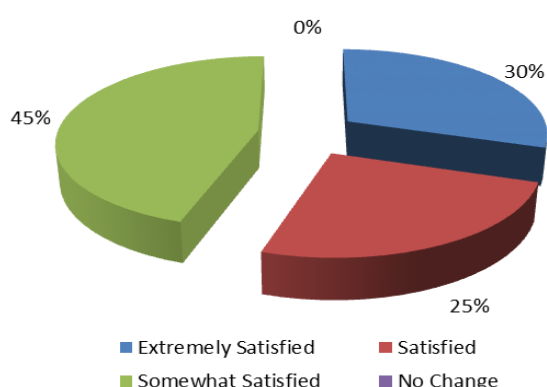


Figure 4.17 Response about satisfaction with the selling option created due to milk cooperative society

Support for Animals

The milk cooperative societies also provide medicine, quality feed for animals, and artificial insemination facilities for dairy animals to the beneficiaries. These societies also help farmers get medical aids for their cattle. 60% of the total interviewed beneficiary stated that they are very satisfied with the additional services provided by milk cooperative societies (medical facility, fodder, etc.) towards maintaining the overall development of the animals. Rest 40%

respondents feel that the facility provided by milk cooperative society are not feasible as the medicine is very costly as per the market rate and sometime there is no availability of medicine and doctor when its required. They also provide nutritional fodder for animals but due to the rates which are higher than the market most of the members cannot afford.

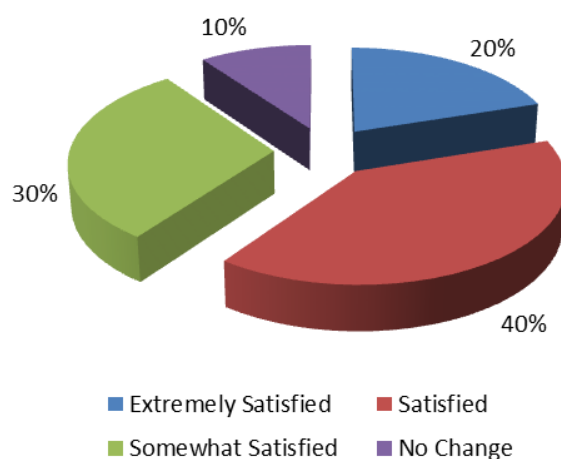


Figure 4.18 Response about satisfaction with the support provided for the animals by milk cooperative society

Overall Satisfaction

Due to the increase in income and its regularity, beneficiaries are quite satisfied with the benefits accrued from the societies and their aspirations have also increased. The beneficiaries are now looking at securing loans to purchase new cattle (*some have even requested for the knowledge on how to secure loans from banks) and improving their stock through breed improvement activities. The respondents have reported that 60% are extremely satisfied while the rest 40% are satisfied.

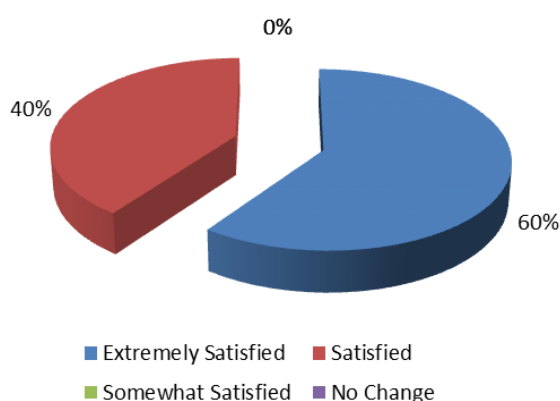


Figure 4.19 Overall satisfaction among beneficiaries from the milk cooperative society

Milk Society Problems

Delay in Payment

Even though the milk cooperative societies usually make payments every 10 days, there have been instances wherein delay in payments have been seen. The survey results showed that 25% of total surveyed beneficiary receive their payments in fewer than 3 weeks, 50% stated that society take at least 3 week to distribute payment while 25% said sometime they have to wait for a month or more to get payment cleared. Delay in payment is most critical issue in the society. In some cases the delay in payments to the farmers have actually forced them to sell their produce to private players, sometimes at a lower rate than what is provided by milk cooperative societies. Private vendors purchase milk in terms of litres and make spot payments. This is attractive for farmers who need money for their daily needs. Irregularity in payment can be considered as a big reason for the disassociation of pourers with the society, leading to their closure.

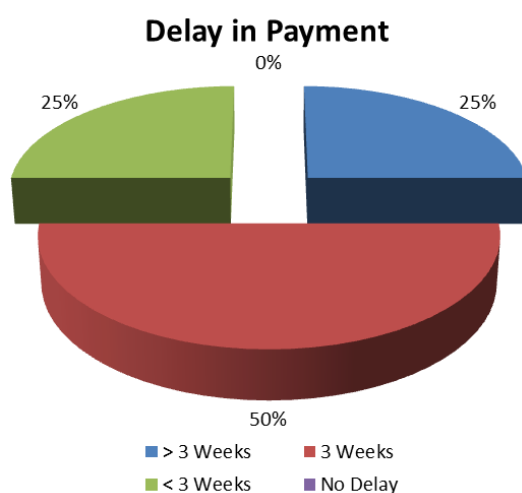


Figure 4.20 Response of beneficiaries for the delay in payment from the milk cooperative society

Variation in income/ procurement during summer season

Milk production during the summer season in Bundelkhand region has been a big problem among the villagers. Due to scarcity of water and high heat, milk production from the animals gets affected, which influence the income of farmers from selling milk. Beneficiaries reported that this is still a problem for them. Among the respondents in the survey, at least 65% reported that this is a big problem for them and the income from milk selling gets affected during summer season.

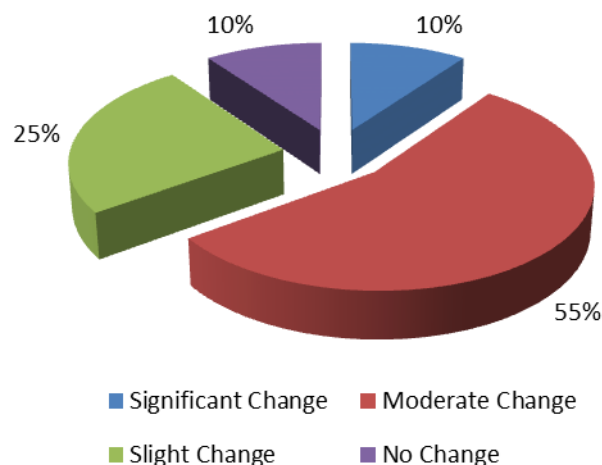


Figure 4.21 Response of beneficiaries about the variation in income/ procurement during summer months

Purchase on the basis of Fat Content

Milk cooperative societies purchase milk based on its fat content. Higher the fat content in the milk, higher the prices received by milk pourers. This helps to ensure that adulteration of milk is deterred and the quality is maintained. While 30% of the respondents state that price based on fat content is not an issue, 70% respondents have stated that it is an issue. According to beneficiaries, fat content of the milk varies with the season and with the age of animals. Being small and marginal farmers, they also need milk for the consumption of their kids and families. So, they are not able to sell enough amount of milk, which could make some significant change in their income.

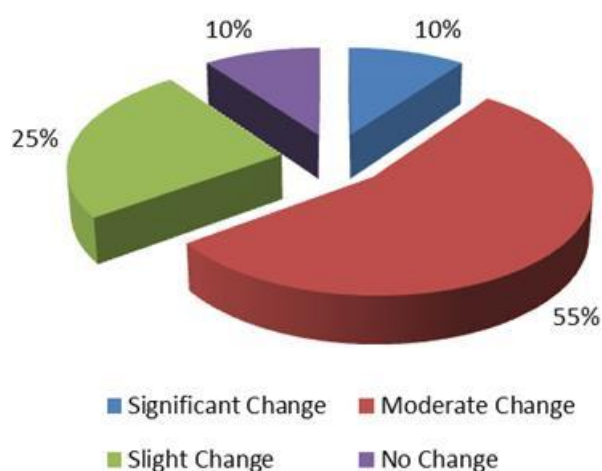


Figure 4.22 Perception of beneficiaries about the purchase of milk on the basis of fat content, by the society

General Observations

- It was observed that in areas where the milk processing units such as dairy plant and BMCs, etc. are far away from the milk cooperative societies, the rate of failure of these societies is much higher.
- It was observed that in some cases the delay in payments to the farmers have actually forced them to sell their produce to private players, sometimes at a lower rate than what is provided by milk cooperative societies. The private dairies purchase milk in terms of litres and provide payments usually on spot. This is attractive for farmers who require money immediately but this also promotes the adulteration of milk as farmers tend to dilute milk with water to make up for the lower prices. However, it is to be noted that wherever the payments by the milk cooperative societies is on time, the farmers usually would sell their milk to them.
- There is a need to analyse the issues in few locations wherein there are delays in payment to beneficiaries. This will help ensure fair prices in the market and reduce the situation of distress sale of produce, thereby improving the income of the beneficiaries.

Recommendations

Interventions related to livelihood support were found to be more impactful and have been helpful in generating additional income for the farmers. It is highly recommended that these activities should be further intensified. Only a meagre amount of ACA has been spent by both Uttar Pradesh and Madhya Pradesh on livelihood support activities. But the per capita impact of this money has been much higher as compared to the money spent on other two activities.

Immediate/ Short-term perspective

- Allocation under livelihood support activities should be enhanced significantly, to intensify the interventions.
- Advanced milk processing centres, one each in Uttar Pradesh and Madhya Pradesh regions of Bundelkhand shall be established equipped with facilities to create various processed products like milk powder, cheese, butter, etc. to make these milk processing units in the region self-reliant.
- As most of the milk pourers are small and marginal, who need cash more frequently to meet their daily requirements, time lag of payment to cooperative societies and subsequently to pourers should be reduced to a maximum of a week which is currently more than 03 weeks at present.
- Where ever the milk cooperative societies are successfully running, a sustainable positive change can be seen. Efforts should be taken to strengthen these societies and prevent them from any possible closure in future.
- Defunct milk cooperative societies should be revived and an analysis of reasons for their being defunct should be conducted.
- In milk cooperative societies where milk production is low, efforts to improve milk yield through breed improvement, proper medical care, improved fodder, assured water, etc. needs to be taken.

- AI centres constituted under the package have been highly successful in improving the breed of local dairy animals. However, the facilities provided to these centres are minimal and not upto the mark. People employed in AI centres are working on a contractual basis, and have difficulty in continuing with the same profession. This raises a challenge of these AI centres getting defunct in the long term. Hence, a system of providing additional benefits to the people employed at AI centres shall be constituted while providing other facilities like computer, internet, vehicle etc. to these centres.
- As several beneficiaries reported that the goatary units provided to them were not suitable for living conditions in Bundelkhand region. Hence, the animals died within a short life span. The people should be provided with goatary units consisting of local breeds like graded Jamnapari. Cost per unit of goatary unit could also be increased, to ensure young and healthy animals being provided to the beneficiaries.
- Horticulture department has distributed seeds for different vegetable crops. These seeds have been useful on the year of distribution, but didn't make any long term impact. With this perspective, any activity related to distribution of seeds should be discontinued and other initiatives like establishment of vegetable garden/ green estates etc. should be further intensified.

Long-term Perspectives

- Beneficiaries who would like to increase number of their livestock through purchase of new animals face problems while availing loans for said purchase. A system of dairy loan/ bank guarantee through milk cooperative societies could be instituted for the purchase of milching animals to the farmers based on the past records of supplying milk to the society.
- Local handicrafts and activities based on local produce shall be promoted by formation of Self Help Groups, extension of credit facilities, development of market mechanism etc.

CHAPTER 5

AGRI-MARKETING INFRASTRUCTURE

5. Agri-Marketing Infrastructure

Efficient Marketing and storage of agricultural produce is a big challenge for the proper price realization of crops. 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.

Uttar Pradesh and Madhya Pradesh have spent around 31% and 22% of their ACA under BKD package on creation of infrastructure for agri-marketing facilities. Under this intervention market yards, local mandis and warehouses have been created. This was supposed to help farmers in accessing markets closer to their villages and also help government in storing the grains procured from the farmers. These 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.

Madhya Pradesh has achieved 100% of its target for building warehousing and marketing infrastructure. It has established 94 such facilities under the package. It has also established separate Mini Agriculture market, Agriculture Input Centres and Seed Godown and Processing Units. However, the target achievement under these three heads is not 100%.

Uttar Pradesh has undertaken construction of 7 Specialized Market Yards, 1 in each district. Specialized Market Yard (SMY) at Chitrakoot is under construction, while other 6 are complete. State has also established 132 Rural Infrastructure Nucleii (RINs) while 1 is still under construction.

Thus, BKD package aimed to create useful infrastructures to help farmers.

Table 5.1 Number of infrastructures built under the BKD package

	Uttar Pradesh		Madhya Pradesh	
	Rural Infrastructure Nucleii (RINs)	Special Market Yard (Mandis)	Warehouse and marketing facility	Mini Markets
Jhansi	24	1	Chattarpur	18
Jalaun	19	1	Damoh	15
Lalitpur	23	1	Datia	11
Mahoba	10	1	Sagar	23
Hamirpur	23	1	Tikamgarh	17
Chitrakoot	15	1	Panna	10
Banda	19	1		
	133	6	94	12

Socio-economic Impact Assessment

To understand the socio-economic impacts due to agri-infrastructure creation, a comprehensive consultation was taken up with the district officials of the marketing and warehousing boards. Teams visited a number of mandis, both operational as well as non-operational and had consultation with the traders as well as presidents of trader's unions. A survey was conducted among the farmers present in mandis as well as in the adjoining

villages. The primary objective of the survey was to collect information about the below indicators:

1. Change in the distance travelled by the farmers to sell their produce
2. Change in the quantity of produce sold before and after the construction of mandis
3. Change in the level of price realization to the farmers due to construction of mandis

As the farmers were not able to provide accurate information about the distances travelled and change in price realization, their responses about each of the above indicators relating the impacts due to mandis were coded and marked into below 4 parametres:

Highly satisfied	4
Satisfied	3
Somewhat Satisfied	2
No change	1

Table 5.2 Name of special market yards/ storage projects/ RINs visited and surveyed
(RIN/ SMY in bold were non-operational)

Uttar Pradesh		Madhya Pradesh		
	RIN	SMY		
Banda		Yes	Chhatarpur	Naugaon, Ganj and Basari
Chitrakoot	Pahadi, Bargrh, Bhauri	Yes	Damoh	Tendukheda, Damoh
Hamirpur	Pauthia	Yes	Datia	Datia, Basai
Jalaun	Kusmiliya, Bhend	Yes	Panna	Badagaon
Jhansi	Sakrar	Yes	Sagar	Sagar, Rahatgarh, Sihora
Lalitpur	Lakhanpur, Targuwan, Marawara	Yes	Tikamgarh	Badoraghat
Mahoba	Supa, Pajpera	Yes		

Survey Observations

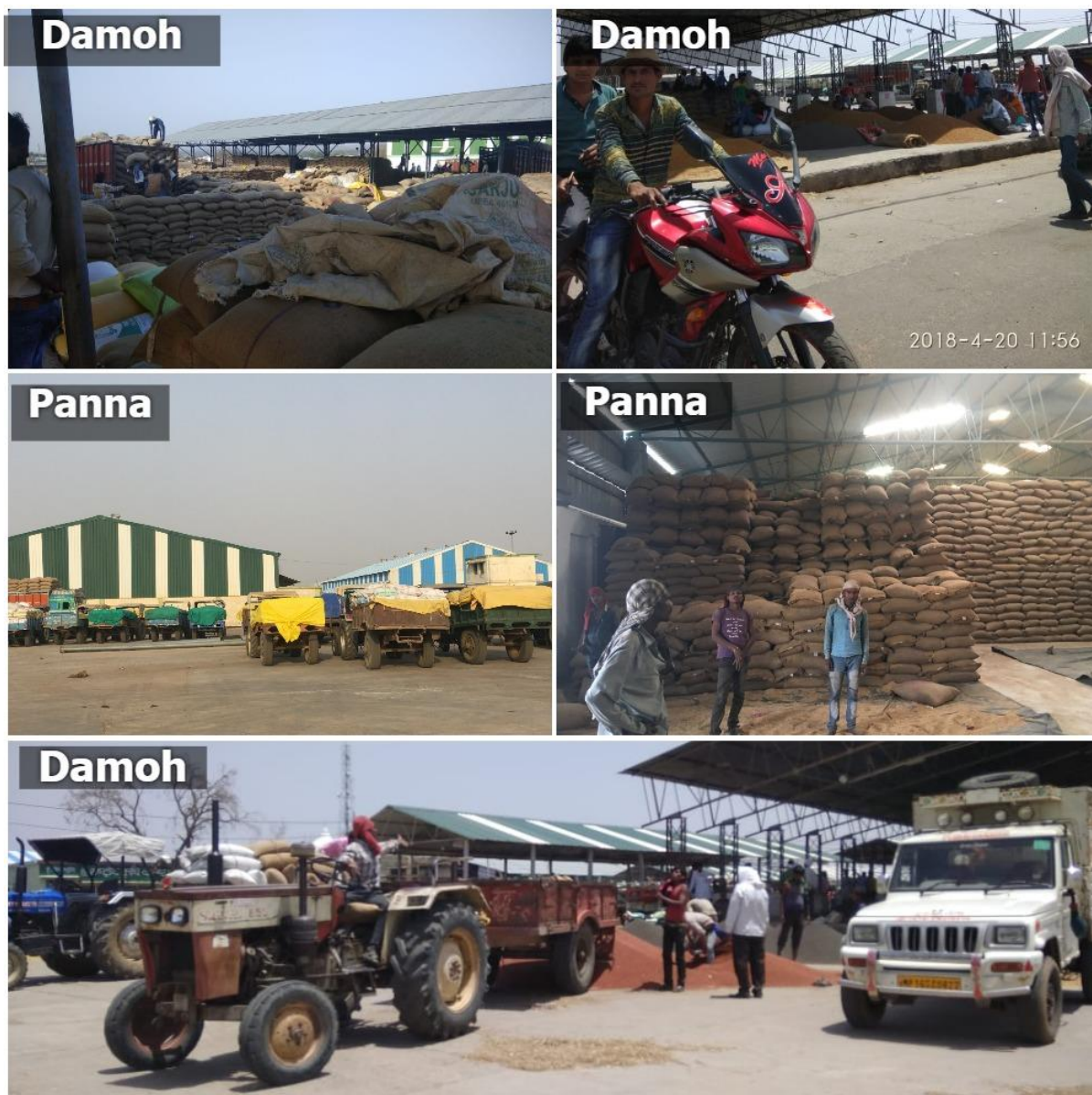
- In Madhya Pradesh, visited agricultural infrastructure was found to be operational. Warehouses in Chhatarpur, Damoh, Sagar were found to be filled with the grains procured by FCI for distribution not only in Madhya Pradesh, but also in Maharashtra and Chennai. Similarly in Panna, farmers were also present in the mandi complex selling their produce. According to farmers, earlier there was no storage in the district and grain used to get spoil.
- **Agricultural Input Center (AIC):** Field visit to AIC, Neminagar Damoh found that the AIC is in working order and has been handed over to the concerned department. The officials in the AIC have said that they are quite satisfied with the AIC as now they have their own place to store agricultural inputs, communication materials etc. Additional funds which were left over for this AIC have been used for planting few trees in the compound.
- **Haat bazar/ Mini Markets:** These are mini market facilities created in different districts of Bundelkhand in Madhya Pradesh. These bazars are operational once a week. A total of 29 such markets have been constructed under Bundelkhand

package. All the mini markets visited under evaluation exercise were operational and trading activities were taking place.

- Increase in storage capacity in Madhya Pradesh has led to better storage of procured grains. Godowns were found to be filled with procured grains in several districts.
- In Uttar Pradesh, almost all the agri-infrastructure construction has been completed except the specialised mandi yard at Chitrakoot. Construction work at Bagha RIN in Banda district has been stayed by the court orders.
- In districts like Hamirpur and Lalitpur, the mandi complexes were deserted with no shops having occupied by the local traders. In Chitrakoot, Specialized Mandi Yard was found to be still under construction, and the level of completion could be assessed to be not more than 50%. Delay in construction due to non-availability of labour has been cited as the major constraint by the contractor. However, the level of construction in other mandis was not found to be very good. Shutter for various shops/ storage yards were broken, floor as well as plaster was also broken at many places.
- According to the government of Uttar Pradesh records, 492 shops out of 531 in RINs have been allotted to local traders. But a number of RINs are non-operational due to non-willingness of traders to go to remote locations. According to local farmers/ residents, none of those RINs have ever been operational.
- Farmers closer to the operational mandis provided positive feedbacks, but those near non-operational mandis indicated no benefits due to Mandis and RINs created under the Bundelkhand Package.
- In Jhansi district, SMY as well as all the RINs are non-operational due to protests by the traders' union, who have raised a number of concerns related to their safety and price of new shops. However, due to district administration's active interventions, procurement of wheat in this season took place from the new SMY at Bhojla. In Lalitpur, SMY is also non-operational due to similar reasons, however, some RINs in the district are operational.

Survey Results

Change in Distance Travelled: One of the primary objectives of the construction of RINs was to reduce the distance travelled by farmers for selling their crops. This is supposed to have cascading effects on the reduction of crop wastage and loss which is very usual due to long distances required to be travelled by farmers to reach the main mandis. Also, this is expected to reduce the long waiting time outside the mandis for their sequence to sell the produce.



Among the survey samples, 60% of the respondent felt extremely satisfied in terms of change in distance they have to travel now for selling their produce. Another, 40% of the respondents were satisfied and none of the respondents reported that construction of RINs has not been useful.

Change in Quantity Sold: Due to reduced wastage of crop, it was expected that farmers will be able to sell more crops in the RINs. Around 20% of people felt an increase in quantity they sold in the markets, while 60% respondent noticed no or slight change in the quantity sold.

Change in Price Realization: Again due to reduction in crop wastage, reduction in transport cost as well as reduction in number of middlemen, it is supposed that there will be an improvement in the price realization for their crop to farmers. However, majority of farmers felt no or slight change in this particular parameter. There is delay upto 10-20 days in payment, where procurement is directly by the government. Upto 50000 is being paid in cash and above 50000 payment by cheque only.

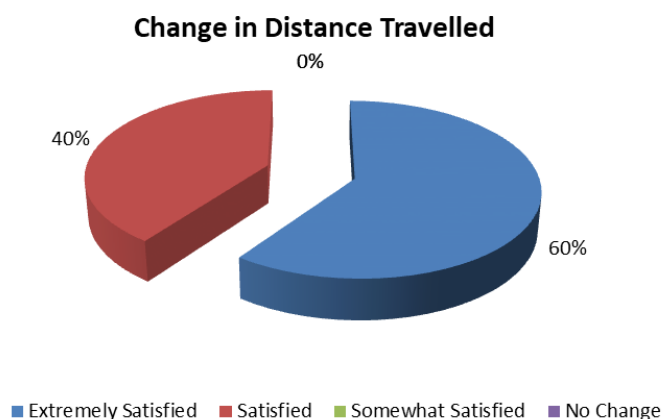


Figure 5.1 Level of satisfaction among farmers for change in distance travelled after construction of agri-marketing infrastructure under Bundelkhand package

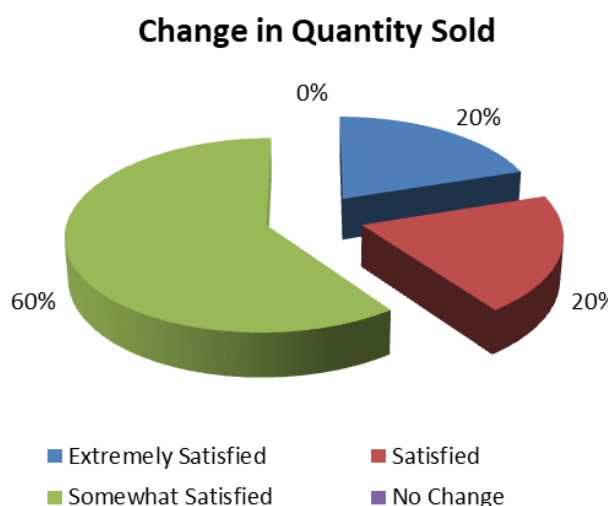


Figure 5.2 Level of satisfaction among farmers for change in quantity sold after construction of agri-marketing infrastructure under Bundelkhand package

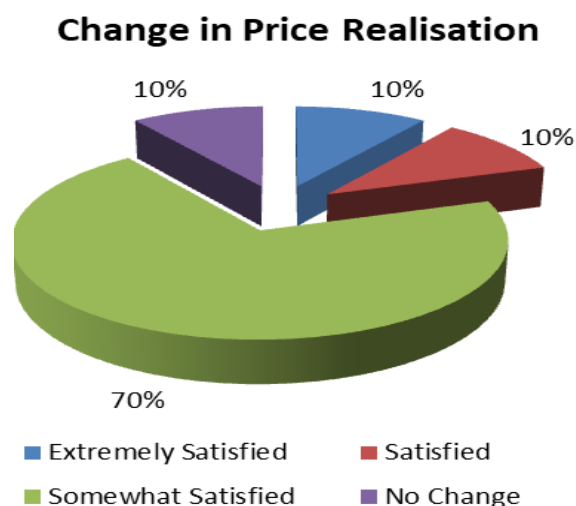


Figure 5.3 Level of satisfaction among farmers for change in price realisation after construction of agri-marketing infrastructure under Bundelkhand package

Overall level of Satisfaction: Overall, 53% of the ‘farmer-responses’ indicate satisfaction with the interventions and the Agri-marketing infrastructure created under the Bundelkhand package.

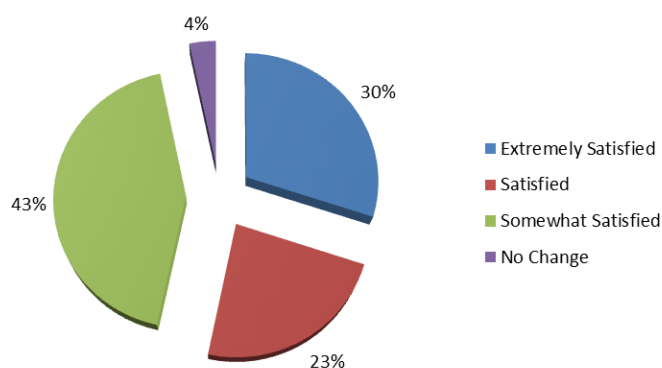


Figure 5.4 Overall Satisfaction among farmers due to construction of agri-marketing infrastructure under Bundelkhand package

Challenges/ Issues

- Consultation held with different level of authorities involved in mandi construction as well as with the stakeholders likely to get affected due to the projects indicate that the entire scheme of construction of mandi yards/ warehouses has been formulated at the top ministerial/ departmental level, with not much consultation with local officials. As a result, officials found it difficult to execute the implementation within a given timeframe.
- With reference to Uttar Pradesh, major issues for the low occupancy of mandis and RINs as highlighted by the local traders are listed below:
 - Cost of new shops is exorbitantly high. For example, shops have been classified into three categories in Lalitpur mandi, each having different prices. These prices are very high as compared to the cost being paid by the traders currently.
 - Size of shops is very small. Design of shops is not convenient for trading as well as storage of procured grains.
 - Location not suitable. New mandi as well as RINs are located far away from the city limits/ from the old mandi area. No transport facility is available as of now. This limits the availability of labour and other facilities, and will be an additional cost burden for the traders.
 - Safety issues as per the traders. To procure the grains from RINs, traders will have to travel to remote village areas along with cash money, which will be risky for their safety.
 - Survey not conducted prior to initiation of mandi construction, no consultation has been taken with the mandi parishad prior to construction. As a result, traders are not happy.
 - Traders are also not happy with the overall approach towards the auction process. As a result, several rounds of auctions have gone without a single bid being submitted by traders.
 - Trading platforms are not connected with shops

- Also, it was noted that general perception about the overall mandi construction process is not very friendly. They seem to be disappointed due to displacement to a new complex with limited facilities as well as requirement to procure the grains from the distant places.
- Attitude of officials related to warehousing corporation as well as Mandi board in some districts of Madhya Pradesh was not found to be very cooperative, which limited a more thorough assessment of agri-marketing infrastructures in the state.

Recommendations

There is an urgent need to address the issues related to non-occupancy of RINs as well as mandis. If the issues are not tackled immediately, these are going to be a complete failure. In the purview of expenditure 'already' incurred in the construction activities, below mentioned points are being proposed for implementation:

Schemes which are large in nature with respect to cost/ area/ expected benefits should involve much wider consultation with district administration/ local stakeholders of the area where project is being implemented. They should be properly informed and trained about the need for such a scheme, for example, rational behind construction of RINs close to villages.

Specialized Market Yards

- Shops at Specialized Mandi Yards may be allotted at a discounted price, lower than the current formula being used for ascertaining the ceiling for shop price. This should be done with the condition of vacating the shops in old mandi by the traders. The price of land in old mandi, which are closer to city limit is likely to be much higher as compared to the cost incurred in constructing the new mandi. Alternative usage/ selling of land in old mandi can recover the discount provided to traders.
- Proper transport facility should be arranged from the city to new mandi complexes.

Rural Infrastructure Nucleii

- For an effective utilization of RINs in rural areas, it is necessary that government assisted procurement programme be implemented. Private traders may not be interested to procure from the distant areas. Also, it is doubtful that the purpose of timely procurement closer to villages as well as at an appropriate price will be met due to disinterested attitude of private traders. In such a case, it will be useful that district administration itself take the initiative to procure from RINs and transport to the city.
- RINs may be handed over to the panchayat samitis, for their maintenance as well as utilization. These panchayat samitis may be provided with the necessary resources/ training for the procurement and transport from RINs.
- As the trading activity, if it starts at RINs, will remain limited to a few weeks of a year, it will be good to explore alternate uses of RINs. They can be used by Panchayat Samitis/ Gram Panchayats for community activities.
- RINs could be used for trading activities related to other agricultural produce also, like vegetables.

CHAPTER 6

GOVERNANCE AND IMPLEMENTATION MECHANISM

6. Governance and Implementation Mechanism

Planning and evolution of the package

An Inter-Ministerial Team (IMT) visited Bundelkhand Region for consultation with respective State Governments of Uttar Pradesh and Madhya Pradesh in Feb, 2008 and submitted its report. Planning for Bundelkhand package evolved with the consultation workshops held with the local stakeholders organised at the district level. These workshops identified the key needs and shortlisted the key areas of interventions as expressed by the stakeholders. IMT mentioned that analysis of the various data sets reveals occurrence of severe meteorological, hydrological and agricultural droughts which 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, digging of farm ponds and open wells.

Based on the comprehensive report and recommendations from IMT, Bundelkhand Drought Mitigation Package was approved on 19th November 2009, and had 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. Government of India approved the continuation of the Bundelkhand special Package during the 12th Plan period (2012-2017) under the Backward Regions Grant Fund (BRGF) with a financial outlay of Rs. 4400 crore.

A number of activities were implemented under each sectors of Bundelkhand Package; Agriculture – Crops/Horticulture, Animal Husbandry, Marketing, Dairy, Environment and Forestry, Fisheries, Warehousing and Marketing Infrastructure, Medium and Minor Irrigation Project, Rural Drinking Water Supply, Water Lifting Devices, Water Resources and Watershed Management.

Assessment

Planning and evolution of the package was based on the background exercise conducted to assess the need of the communities. The plans covered all the various aspects related to augmentation of water availability in the region, increasing livelihood opportunities for the communities as well as building necessary infrastructure for marketing of agricultural produce. Project led to creation of a number of water conservation infrastructure including check dams. A large number of minor irrigation projects have also been constructed in the region.

However, there was a disproportional focus to different sectors and lack of uniformity in the projects envisaged. This was mainly due to the inputs received from individual states and their own assessment of the requirements. These inputs seem to have missed detailed scientific hydrological investigation about the availability and likely water demand in the region. A balance of experience and scientific assessment based on modelling tools would have helped in systematic and sustainable augmentation of water resources.

Financial Allocation

Total provision under Bundelkhand Package was Rs 3,860 Cr for Madhya Pradesh and Rs. 3,606 Cr for Uttar Pradesh. 84% of the total budget outlay amounting to Rs. 6,257.35 Cr. has been released to the states.

Sectoral Allocation

Activities related to water received the maximum allocation equivalent to 66% of the additional central assistance (ACA). Activities related to agriculture were apportioned 27% and those related to animal husbandry and dairy were allocated with 3% of ACA. Rest of the ACA was meant for activities related to environment and forests.

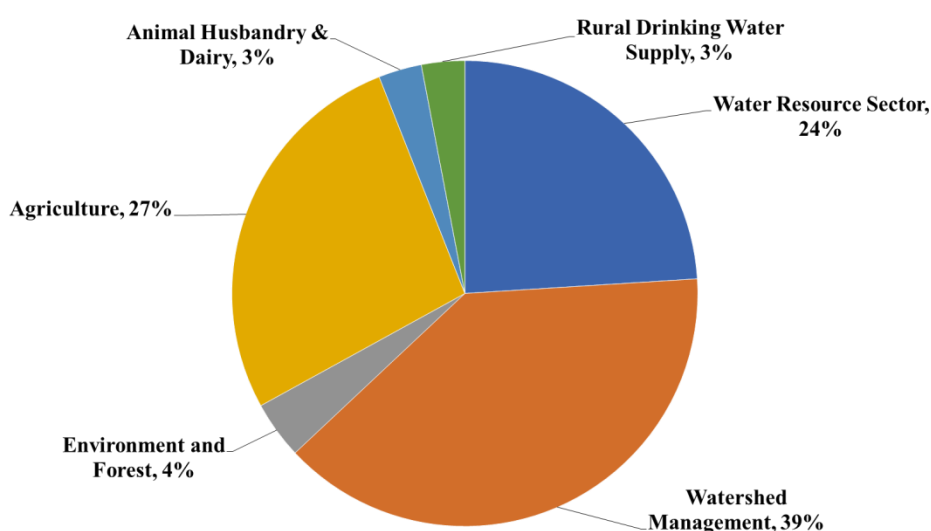


Figure 6.1 Sectoral Allocation of finances under Bundelkhand package

A number of activities were implemented under each sectors of Bundelkhand Package. These activities can be grouped into three specific groups: 1. Water Positive Interventions; 2. Livelihood Support Activities; 3. Agri-marketing Infrastructure.

Sectoral Allocation in Individual States

Different states gave different priority to different sectors based on their understanding and assessment of the need of the region. Tables below provide an account of allocation under different schemes by both Uttar Pradesh and Madhya Pradesh.

Water Positive Interventions (WPI)

Madhya Pradesh spent about 73% of total ACA allocation under BKD package on the WPI while Uttar Pradesh spent 66% on WPI activities. Different WPI activities included interventions related to major, medium and minor irrigation projects; construction and renovation of dugwells; provision of lifting device, tubewell and energization of existing wells; construction of check dams and stop dams; provisions for availability of drinking

water through piped water supply system, etc.; providing sprinkler set and HDPE pipes; and activities related to soil and water conservation in the region.

Major and Medium Irrigation Projects

Madhya Pradesh spent about 22.5% of total ACA allocation under BKD for major and medium irrigation projects. Almost 1/3rd of this was spent in the development of Rajghat Project Command Area Development, which included correction of system deficiency as well as Command Area Development works. Uttar Pradesh spent about 17.1% of total ACA allocation under BKD for major and medium irrigation projects. Major portion of this amount has been spent on 41 works related to restoration capacities of canals, repairs, renovation and re-modelling of canals.

Minor Irrigation Projects

Madhya Pradesh spent about 26.5% of total ACA allocation under BKD for minor irrigation projects. These schemes included completion of works under 49 ongoing minor irrigation projects, construction of 118 new minor projects and repair and renovation of ponds/ tanks related to 3 schemes. Uttar Pradesh spent merely 2.6% of ACA on minor irrigation schemes which included repair and renovation of ponds/ tanks and reconstruction of water distribution network. Instead of creating new infrastructure, focus was laid on repair and renovation of existing structures.

Dug Wells/ Renovation/ Lifting Device/ Tubewells

Uttar Pradesh spent a major portion of its ACA on digging of dugwells/ tubewells, renovation and recharging of existing wells/tanks/ponds as well as installation of lifting devices/ energization of tubewells. Total amount of 18% of ACA was allocated for the purpose. This was almost equivalent to 27% of total amount for water positive interventions.

Stop Dams/ Check Dams

Both Uttar Pradesh (10%) and Madhya Pradesh (7%) have spent significant amount of their ACA allocation in construction of stop dam/ check dams. This amounts to 15% and 10% of their ACA expenditure for Water Positive Initiatives, respectively. This has led to construction of 900 check dams in Uttar Pradesh and about 350 stop dams in Madhya Pradesh.

Drinking Water

Besides these irrigation water interventions, schemes for drinking water were also implemented in all the districts. An amount of 11-12% of their ACA has been spent by both the states for the provision of drinking water. This is equivalent of 19% for Uttar Pradesh and 15% for Madhya Pradesh of the expenditure for WPIs. In Uttar Pradesh, on an average 400 hand pumps have been installed in every district. Additionally, piped water supply projects - 12 in phase I and 49 in phase II, have been implemented. In Madhya Pradesh, total 1287 projects were envisaged and 94% had been completed by March 2017. Among these, 1168 projects are based on tubewells and 119 projects are based on wells.

Table 6.1 Fund allocation for different Water Positive Interventions

Water Positive Interventions	Uttar Pradesh	Madhya Pradesh
Scheme	<i>Fund Allocation</i>	<i>Fund Allocation</i>
Major and medium irrigation projects	375.31	723.47
Minor irrigation projects	56.31	857.53
Dug wells/ renovation/ lifting device/ tubewells	390.7	
Stop dams/ Check Dams	212.4	235
Drinking Water	272.91	352.48
Sprinkler set/ HDPE pipes	43.81	
Soil and Water Conservation	94.31	187
Total	1445.75	2355.48

However, only beneficiaries of the well construction/deepening activities were 4 districts namely- Jhansi, Lalitpur, Mahoba and Chitrakoot. Close to 5000 wells each, have either been constructed/ deepened in Jhansi and Lalitpur districts itself, out of 15000 beneficiary wells under Bundelkhand package. There was no clarity on the rationale for focussing well construction/deepening activities within these 4 districts only.

Livelihood Support Activities

Both Uttar Pradesh and Madhya Pradesh spent a meagre 2.8% and 5.2% of their ACA on livelihood support activities, respectively. These activities were mainly related to dairy development and animal husbandry. However, Madhya Pradesh spent some amount to support fisheries activities also, in the Bundelkhand region.

Table 6.2 Fund allocation for different Livelihood Support Activities in Madhya Pradesh

Livelihood Support Activities in Madhya Pradesh	
Animal Husbandry & Dairy Development	
Murra Bull Supply	4.52
Goat Supply	17.55
Establishment of Fodder Bank	1.3
Goat Breeding Farm	1.99
Establishment of Livestock Development Centers by NGO	14.04
Dairy Developments Works	21.3
	DSC
	BMC
	EMT/EWS
	Dairy Plant
	DCS Membership
	Milk Procurement
Cattle Feed Plant and Milk Marketing	20
Provision of Travis and shade for Expansion of Veterinary Services in Bundelkhand	7
Establishment of LN2 Plant and Ratona Farm, Sagar	2.68

Livelihood Support Activities in Madhya Pradesh	
Establishment of Famers and AI Training center at Ratona Farm, Sagar	5
Establishment of Murrah Buffalo Male calf Reaing units	15.43
Accelerated Fodder Development Programme	7.13
Establishment of Semen Station at Datia	13.43
Dairy Development Activity	29.33
Chaff Cutter	
Secretary	
Tester	
AHW	
Milk Tankers	
Total	160.7
Fisheries	
Utilization of Existing Seasonal Ponds	0.62
Strengthening of Fish Seed Farms	0.7
Training and Capacity Building of Fisherman	1.13
Training to fisherman	
Net Distribution to Fisherman	
Boat Distribution to Fisherman	
Development of Fish Marketing and Market Linkages	3.08
Construction of whole sale fish market	
Construction of retail fish Market	
Total	5.53
Grand Total	166.23

Table 6.3 Fund allocation for different Livelihood Support Activities in Uttar Pradesh

Livelihood Support Activities in Uttar Pradesh	
Animal Husbandry	
Establishment of Livestock Development-cum-A.I. Centers	15.34
Establishment of Fodder Banks	1.27
Establishment of Fodder Blocks	2
Establishment of goat units	6.93
Distribution of Murrah Buffalo bulls	1.02
Awareness Campaign for removal of "Annapratha"	1.75
Establishment of goat units	7.5
Total	35.81
Dairy Development Activity	
Cooperative societies	26.74
Mini kit Distribution	
Urea Molasses	
Cattle feed Urea Molasses	
Training /Extension.	

Livelihood Support Activities in Uttar Pradesh	
New Plant at Jhansi	
Plant Up-gradation	
Chilling Center	
Total	26.74
Horticulture	
Topworking in Desi wild Ber	2.5
Establishment of Horticulture estates	3.15
Establishment of nutritional Garden	2.45
Development of Sabzi Patti	6.13
	14.23
Grand Total	76.78

Agri-marketing Infrastructure

Uttar Pradesh and Madhya Pradesh have spent around 31% and 22% of their ACA under BKD package on creation of infrastructure for agri-marketing facilities. Under this intervention market yards, local mandis and warehouses have been created.

Table 6.4 Fund allocation for different Agri-marketing Infrastructure activities

Agri-Marketing Infrastructure	MP	UP
Warehousing & Marketing Infrastructure including Mini Agriculture Market	574.5	667.77
Mini Agriculture Market	64.56	
Colour Sortex Plant	18	
Agriculture Input Center	12	
Seed Godown and Processing Center	5.44	
Development of Pulses Extension Programme	30	
Total	704.5	667.77

Assessment

A significant amount of funds have been allocated under the Bundelkhand package, with a more or less equal distribution among the two states. However, sectoral allocation within the states has been very different between the two states. For example, within water positive intervention activities, Madhya Pradesh allocated a significant amount to minor irrigation projects, but UP focused more on construction/ deepening of dugwells and recharge structures. Similarly, allocation to major and medium irrigation projects by the two states is very different. These differences are mainly due to differences in planning of projects by the two states.

Whereas micro-level hydro-climatic characteristics of the Bundelkhand regions in two states are different, a kind of uniformity could have been useful if the projects may have been planned with a holistic and comprehensive view of the development of the region.

Stakeholder Consultation Workshop

A stakeholder consultation workshop was organised to understand the experiences of district officials engaged in implementation of the Bundelkhand package. All the officials shared their experiences about the region, about the implementation of the package and gave inputs for further improvement of the program.

A SWOT (*Strength, Weakness, Opportunity and Threat*) analysis of the programme by district officials indicated different set of advantages and disadvantages of the package.



Department of Agriculture

Agriculture department mentioned that the program has helped to improve the crop yield of the region because of the well-integrated approach adopted by the program. Representative from department mentioned about the structures created under the package and the benefits due to them like sprinkler systems and water conservation measures. It was highlighted that the insufficient allocation of fund and lack of smooth flow of funds was a major hindrance in implementation of the program. It was suggested that the farmers should be trained also on usage and maintenance of the equipments given to them. Examples were cited where delay in fund release during second phase badly affected the structures created in previous phase. Department specifically recommended that the work at both upper and lower reaches should happen simultaneously and sufficient funds should be provided for the same.



Table 6.5 SWOT Analysis by Agriculture Department

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> Well integrated approach Successful application of sprinkler irrigation 	<ul style="list-style-type: none"> Uncertainty of budget release and continuation of scheme Budget was insufficient in the first phase 	<ul style="list-style-type: none"> Train farmers for using sprinkler and drip irrigation equipment Include more surface water conservation interventions and restoration of old structures Funds to be allocated for agricultural research 	<ul style="list-style-type: none"> Non-inclusion of maintenance cost and procedure Insufficient budget allocation

Department of Horticulture

Horticulture department mentioned that the program has been beneficial and some of the benefits are ensuring nutritional security for poor people, increase in income, and availability of vegetables for whole year. Department undertook 4 activities under this program:

- Top working of Desi Ber plant: production from desi ber plants were improved
- Establishment of Horticulture state: farmers having upto 5 hectare land and provision for irrigation were benefited under this scheme. Plants of custard apple, guava and other fruits were planted.
- Establishment of Nutritional Garden: for poor families who can't afford fruits. Free fruit saplings were given
- Development of Sabji Patti around the cities and town: hybrid seeds were promoted



Representatives from the department mentioned that the main concern was insufficient fund and more area should be brought under sabji-patti cultivation especially in rural areas. But they mentioned that there is lack of staff in the department.

Table 6.6 SWOT Analysis by Horticulture Department

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> Nutritional gardens and better horticulture models are helping poor people Due to this program desi ber is source of income for farmers 	<ul style="list-style-type: none"> Farmers did not take care of plants as they had no incentives Budget was delayed which affects work 	<ul style="list-style-type: none"> Include small farmers, having land area of 2 hectares 	<ul style="list-style-type: none"> Insufficient budget allocation No incentives to farmers

Department related to Watershed management

Irrigation department representatives mentioned that some of the benefits of the program included reclamation of waste land, reduction in soil erosion, improvement in agricultural productivity, recharge of groundwater, etc. The main concern was unavailability of detailed operational guidelines for officials to follow. It was mentioned that since there is variation in different components of program, a clear set guideline is essential to ensure quality & sustainability. The main suggestion that came out from the department was that policy decisions from various levels should come in time and sustainability of the interventions should be ensured.



Table 6.7 SWOT Analysis by Department related to Watershed Management

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> • Reclamation of waste/scrub land • Reduction in soil erosion • Improvement in agricultural productivity • Increase in Groundwater recharge • Reduced Migration • Improvement in income of selected farmers through livelihood asset management taken under programme 	<ul style="list-style-type: none"> • Timely allocation of budget • Detailed operational guideline • Variation in different components of programme • Scarcity of staff 	<ul style="list-style-type: none"> • Need for timely policy decisions 	<ul style="list-style-type: none"> • Unsustainable approach

UP Jal Nigam/ Jal Sansthan

Representative from UP Jal Nigam mentioned that some of the activities taken under this package were beneficial like surface water source scheme, provision of solar pumps. But the weakness was theft of water which affected the success of program. It was also mentioned that there should be timely release of funds. It was highlighted that some of the challenges that they see is in revenue collection and lack of maintenance due to paucity of funds. Also, it was suggested that instead of implementing big schemes number of small schemes should be implemented.



Table 6.8 SWOT Analysis by Jal Nigam

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> Installation of solar dual pumps has helped to get access to more water 	<ul style="list-style-type: none"> Release of fund was in installment which affected the progress of work 	<ul style="list-style-type: none"> Small schemes should be promoted 	<ul style="list-style-type: none"> Theft of water or equipment in big schemes

Department of Electricity



Representative of the department mentioned that the program has led to many benefits like improvement in groundwater strata; improvement in irrigation potential; increase in crop yield; poor farmers were benefitted due to electricity connection. It was also enumerated that some of the weak points of the program were lack of inclusion of maintenance, reconstruction and renovation cost into the package and delay in allocation of funds. It was suggested that there is need to adopt holistic approach for each sector and allocation of funds should be from start of financial year. Department also suggested that other schemes like MGNREGA should not be incorporated into this package and beneficiaries especially farmers should be trained in

this program.

Table 6.9 SWOT Analysis by Department of Electricity

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> • Groundwater strata improved • Irrigation Potential improved • Better irrigation facilities achieved • Crop yield increased • Cropping pattern changed due to improvement and assured irrigation • Poor farmers got benefit of electric connection 	<ul style="list-style-type: none"> • Convergence of funds was a problem as activities under this program needs skilled labour • Maintenance, reconstruction and renovation components were not incorporated • 65% fund was allocated but surface irrigation components was inadequate • untimely allocation of funds 	<ul style="list-style-type: none"> • Holistic approach should be adopted sector wise • Main thrust should be on development of canals/ water reservoirs/ check dams and ponds instead of exploiting ground water which creates dark zone • Long term funds and projects could be sanctioned • Allotment of funds should be done in month of April starting of Financial year • For better water management training programs should be conducted for farmers to use better and modern irrigation technologies • MNREGA fund should not be incorporated 	<ul style="list-style-type: none"> • Risk of creating more dark zones due to excess withdrawal of ground water for drinking and irrigation purpose • Due to increase of agriculture land deforestation is a big threat • Environment friendly crop pattern should be applied • Excess deforestation increased the 'Anna System' which is big threat to farmers • Cleaning of canals should be done through mechanized way because manual cleaning is not effective due to its' depth.

Department of Animal Husbandry

Department of Animal Husbandry stated that the program has helped in establishment of government units for goat farming and provided more than 80 bulls to the villagers within the Jhansi district itself under the Bundelkhand package. Representative from department also mentioned that they have encouraged local people through awareness campaign to participate in the program. It was also mentioned that they have provided mobile veterinary service in the village area to minimize the health risk to livestock. Under the Bundelkhand package, department has taken many initiatives to improve the socio-economic status of local community. It was suggested that for the improvement, department could take few initiatives like open market for goat purchasing and provide running fund for assets management.

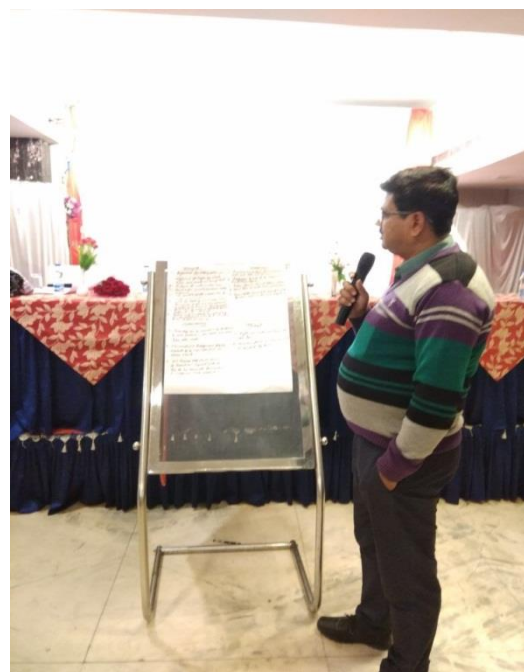


Table 6.10 SWOT Analysis by Department of Animal Husbandry

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> Establishment of Government Units Establishment of mobile veterinary service Awareness campaign Upliftment of income for poor farmers Upliftment of social status of peoples Improvement of breed to increase milk production 	<ul style="list-style-type: none"> Assets has been established but running cost is not included Responsibility of purchasing of goat to be given to implementer of project 	<ul style="list-style-type: none"> Market should be open for goat purchasing In every project running cost must be included For every project technical and non-technical staff must be involved 	<ul style="list-style-type: none"> Non-inclusion of maintenance cost and procedure Insufficient budget allocation

Dairy Development Department

Dairy Development Department made presentation on SWOT analysis through which they presented some facts of the dairy development program under the Bundelkhand package. Representatives from the department highlighted major benefits of the package in dairy sector. Department organized 80 milk societies in different villages through which 2441 milk producers benefited. They also took few initiatives to enhance milk quality along with increase in milk production which improved the socio-economic status of the beneficiaries. It was mentioned that the department has also focused on the health of animals with the help of TIP (Technical Input Programme) Mix, fodder kits, Mineral mix kits. Total 1,43,223 beneficiaries got benefitted with these schemes where they got free seeds and green fodder for the animals.



Some of the weak points of the program were also raised like due to low milk price, milk producers take less interest. It was suggested that the program should provide subsidy to farmers & milk producers on milk purchase like other states are doing and start producing fermented and indigenous milk products in dairy plants.

Table 6.11 SWOT Analysis by Dairy Development Department

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> Organized 80 milk societies in different villages by which 2441 milk producers benefited Enhance the milk production Improvement in social and economic status of rural area Improvement in milk production and quality 	<ul style="list-style-type: none"> In present situation farmers/producers' milk sale rate are too low Indigenous breeds to be improved in Bundelkhand region Farmer has not taken interest to feed their animal properly 	<ul style="list-style-type: none"> Subsidy can be provided to the farmer & milk producers on milk purchase like other states Fermented and indigenous milk products to be manufacture in dairy plant At Jhansi milk plant is based on liquid milk. It has to be renovated for fermented & indigenous milk products 	<ul style="list-style-type: none"> Milk purchase rates are low Minimum milk purchase price to be decided by Government

Department of Economics and Statistics

The department of Economics and Statistics made presentation on SWOT analysis. Representative of the department mentioned the program had many benefits for all the sectors like increase in forest area and greenery; developed minor and major irrigation system, techniques and infrastructure for agriculture, animal husbandry and dairy along with extension in horticulture area. They also electrified many tube wells under the program. Department also enumerated some of the weak points of the package like delay in releasing of funds which affect the implementation of program on time. It was suggested that there is need of district level monitoring system which can help in implementation of Bundelkhand package. It was also mentioned that department should develop online platform to monitor the flow of funds and direct interaction between central and state or district level departments.



Table 6.12 SWOT Analysis by Department of Economics and Statistics

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> • Increase in forest area and greenery • Development of minor and major irrigation infrastructure and capacity • Development of agriculture techniques and mechanism • Development of agri -marketing infrastructure • Development of animal husbandry and dairy sector • Extension of horticulture area • Electrification of tube-wells 	<ul style="list-style-type: none"> • Delay in releasing of funds (central to state, state to HoD, HoD to district department) • Fund releasing information not sent by the HODs 	<ul style="list-style-type: none"> • Implementation of package can be improved if at district level - monitoring infrastructure and resources are provided • By the development of online software for monitoring and inter-actions between GoI, state government, HoDs, line department, • Remote sensing impact based planning and implementation 	<ul style="list-style-type: none"> • Cost and timeline given is low

Department of Environment & Forest

Representatives from department of Environment & Forest presented benefits of the Bundelkhand package where they took many initiatives to increase moisture in forest area which led to better survival of trees and availability of water for wild animals. Program also benefited the farmers who have crop field in nearby area. It was mentioned that the ground water level in wells of Bundelkhand region is increasing gradually which may help in maintaining the water availability for drinking. It was also highlighted that through the program department provides employment to the local people.

Some of the weak points of the program were also enumerated like requirement of more funds to construct *pacca* check dams which are more effective and long lasting than *kaccha* check dam. It was suggested that increasing the field staff will help in better implementation of the program. Officials emphasized that the power should be given to department to implement the scheme independently for easy and fast work.



Table 6.13 SWOT Analysis by Department of Environment and Forests

Strength	Weakness	Opportunity	Threat
<ul style="list-style-type: none"> • Increase in moisture in Forest areas from soil and moisture conservation activities • Availability of water for wild animals • Helpful for the survival of trees • Helpful for adjoining farmers' fields for crops • Increase in groundwater level in wells • Local employment availability 	<ul style="list-style-type: none"> • More fund were required for check dams to be more effective (For construction of <i>pacca</i> check dams • Lack of lower staff (*Field staff) which should be increased 	<ul style="list-style-type: none"> • Power should be given to department, to implement the scheme independently for easy and fast work 	<ul style="list-style-type: none"> • <i>Pacca</i> check dams are more effective, so more funds should be given and the department should be given freedom for implementation for works

Recommendations

Successful implementation of large scale development programmes requires adequate funds, appropriate policy framework, and effective delivery mechanism. Availability of sufficient funds does not guarantee the effective implementation of poverty alleviation programmes. Equally important factors are a viable scheme and well planned scheme as well as a robust delivery system to optimally utilise funds and achieve sustainable growth. Other important factors necessary for achieving the success of government programmes are a transparent system of accountability, participation, feedback mechanism, monitoring and evaluation.

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 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 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 reevaluate 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 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 in the later part of the package period, it could have been mainstreamed from the beginning. The middle and lower level officials engaged in implementation activities should have been the target. A capacity building of these 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 through the 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 feedback on existing policies which should come from the officers in charge at the lowest tier of development administration, that is, either the block development officer or a

district-level officer in charge of development 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 however, these efforts 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 implementation of package activities.

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 converging 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 package.

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 shall 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 be created or 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. Within Bundelkhand region, some of the districts receive much better rain and 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 in Bundelkhand is the immediate need. Interlinking of river projects at various stages of construction in the region shall be completed expeditiously. The drinking water projects should be linked with perennial source of surface water rather than relying on the groundwater resources. The water stressed region like Bundelkhand should not be victimised with overuse due to subsidised power or water supply.

CHAPTER 7

OVERALL ASSESSMENT

7. Overall Assessment

Evaluation of implementation of Bundelkhand Drought Mitigation package through survey among beneficiaries, analysis of data available through various departments, field verification as well as discussions with officials at different level engaged in the implementation of package has helped in assessment of benefits accrued through the package.

Change in Area under Wheat Cultivation

Wheat is the most important crop in almost all the districts of Bundelkhand. Triennial ending average area under wheat cultivation in Bundelkhand districts of Uttar Pradesh and Madhya Pradesh was 6.23 Lakh Ha and 5.36 Lakh Ha, respectively, in 2008-09 during the start of the package. However, triennial ending average area under wheat cultivation in Bundelkhand districts of Uttar Pradesh and Madhya Pradesh was 8.06 Lakh Ha and 7.60 Lakh Ha, respectively, in 2015-16 indicating an increase of about 30% and 42% respectively from the baseline.

Most of this increase has been due to shift in cropping pattern among the farmers, who have switched from the cultivation of Masoor, Jowar and other coarse millets to Wheat, now. A decline in area under Jowar cultivation of almost 30% in Uttar Pradesh and about 70% in Madhya Pradesh districts of Bundelkhand region can be noted.

Moreover, in comparison to adjoining non-Bundelkhand districts, growth in area under wheat cultivation in Uttar Pradesh has been very significant. In Madhya Pradesh also, average growth in area under wheat cultivation in Bundelkhand districts almost matches with the growth in adjoining non-Bundelkhand districts.

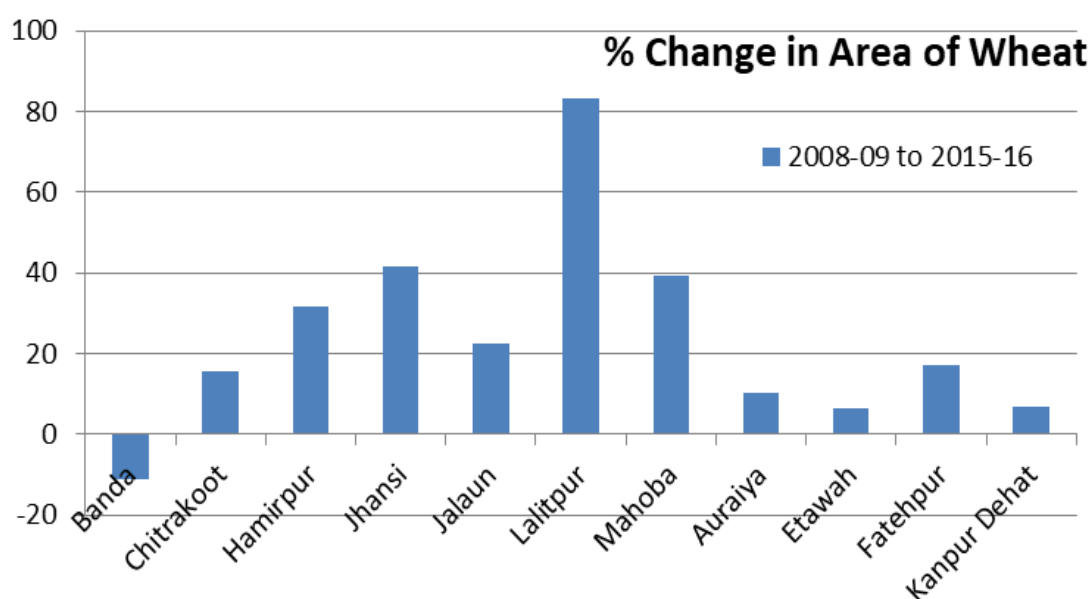


Figure 7.1 Percentage change in Area under Wheat Cultivation in Bundelkhand districts of Uttar Pradesh as compared to adjoining districts

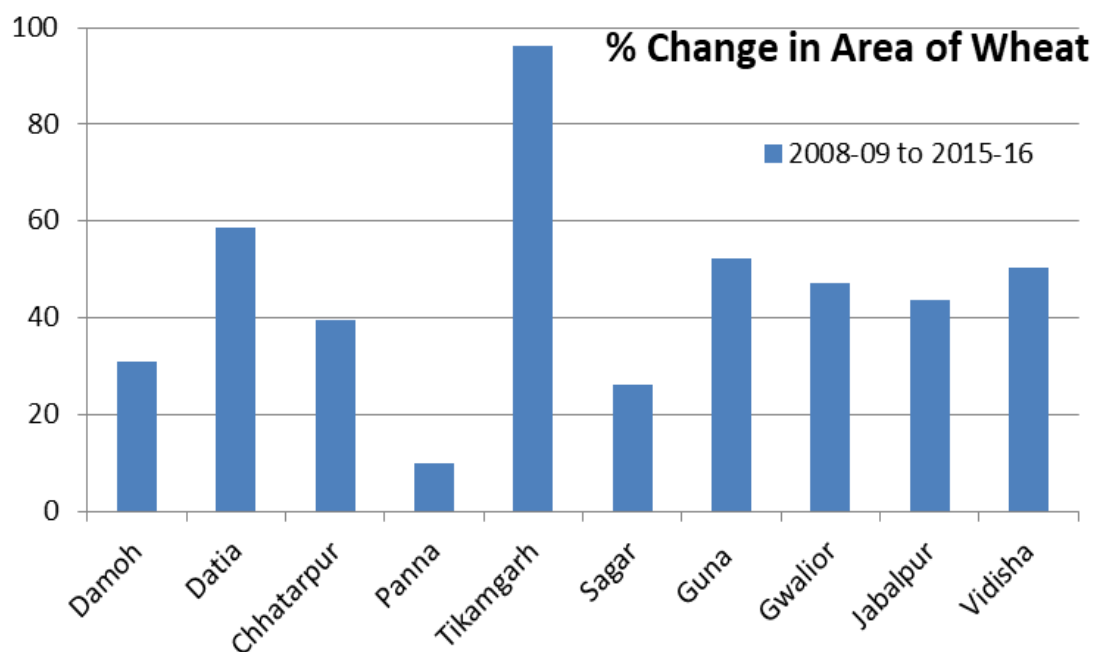


Figure 7.2 Percentage change in Area under Wheat Cultivation in Bundelkhand districts of Madhya Pradesh as compared to adjoining districts

Change in Production of Wheat

Similar to area under wheat cultivation, its production has also increase manifold during the implementation of Bundelkhand package. Triennial ending average production of wheat in Bundelkhand districts of Uttar Pradesh and Madhya Pradesh was 12.5 Lakh Ton and 7.5 Lakh Ton, respectively, in 2008-09 during the start of the package. However, triennial ending average production of wheat in Bundelkhand districts of Uttar Pradesh and Madhya Pradesh was 14.2 Lakh Ton and 16.91 Lakh Ton, respectively, in 2015-16 respectively.

As such increase in area under wheat cultivation in Uttar Pradesh has not been able to transform into equivalent increase in production of wheat, except in Lalitpur district. In Lalitpur district, wheat production during the package has almost doubled, but increase in other districts is marginal. This is in contrast to increase in production of wheat in Madhya Pradesh, where the same has been almost uniform and production in all the districts taken together has almost doubled.

Employment Generation

Expenditure incurred under the Bundelkhand Package has been useful in creating employment opportunities in the region. Infrastructure created under the package has been able to generate both direct as well as indirect employment opportunities. Simultaneously, it was also found that package was able to generate self-employment as well as contractual employment opportunities as well.

Direct Employment

- BKD package created opportunity for employment of about 700 people in different schemes
- Water supply schemes with treatment plants have employed pump operators
- Each mandi/ RIN has employed computer operators, attendants and security persons

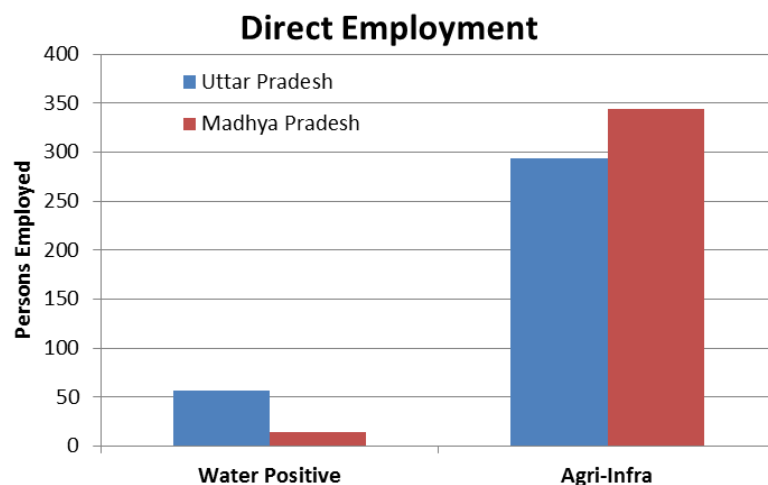


Figure 7.3 Number of persons employed directly under Bundelkhand package under different initiatives

Indirect Recurring Employment

- BKD package created opportunity for self - employment of about 13000 people and contractual employment of 3600 people in different schemes
- Livelihood support activities like Goatry and Bull Induction provided self-employment
- Activities related to dairy and horticulture have generated contractual employment
- Piped drinking water schemes have contracted pump operators being paid by WUA

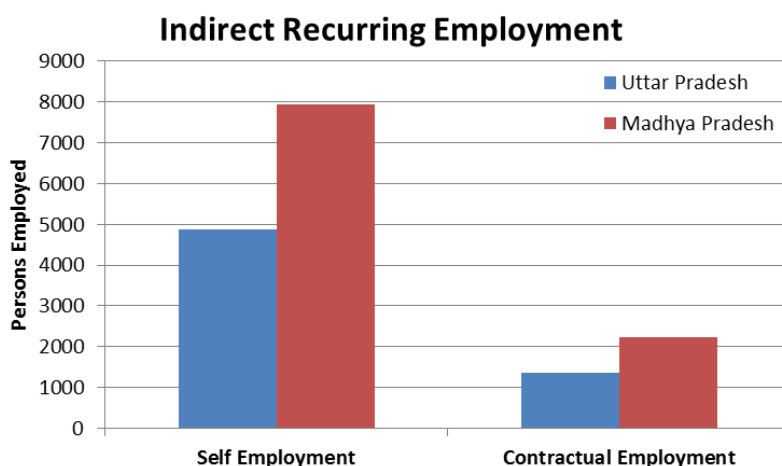


Figure 7.4 Number of indirect recurring employment opportunities generated due to Bundelkhand package in the region

Indirect Non-recurring Employment

- A number of infrastructure have been built under the Bundelkhand Package. Besides Major, Medium and Minor irrigation projects, approximately 1250 check dams and more than 15000 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.
- As such, Bundelkhand package was able to generate about 8.56 Crore Man-days employment in Uttar Pradesh and Madhya Pradesh.
- Man-day jobs created during construction of Water Positive and Agri-infrastructures

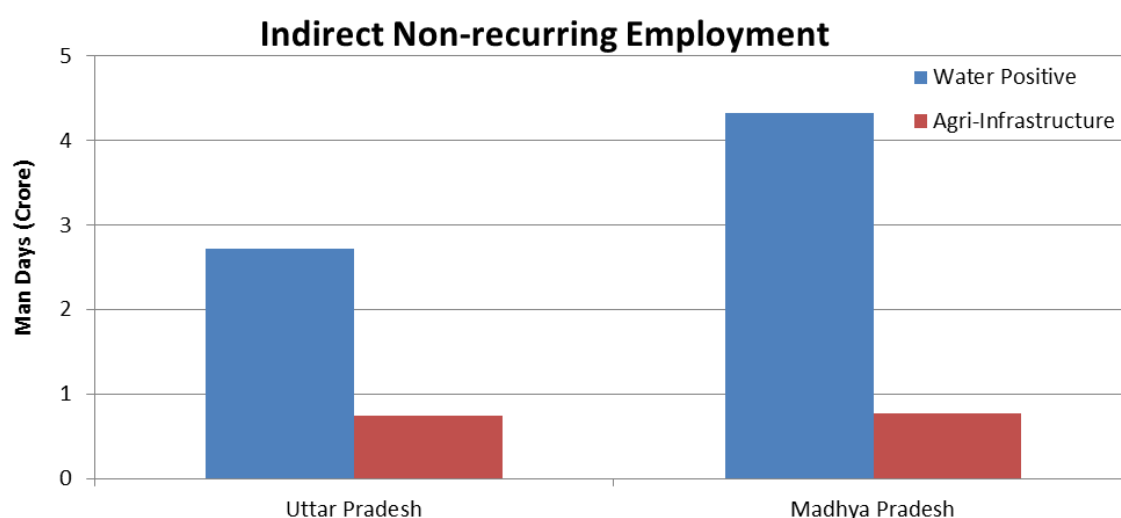


Figure 7.5 Number of indirect non-recurring employment opportunities generated due to Bundelkhand package in the region

Assessment based on Indicators

Based On the overall evaluation of the various components of the package, different impact indicators could be graded as below:

1. **Highly Significant/ Highly Satisfactory:** Indicators which show very high level of benefits among the beneficiaries and the data suggests a very significant impact. Processes which show high level of effectiveness or efficacy are graded as highly satisfactory.
2. **Significant/ Satisfactory:** Indicators for which quantitative assessment is not possible but beneficiaries reported about the benefits or felt satisfied with the interventions, were graded as significant. Processes which were effective but have scope for further improvement were graded as satisfactory.
3. **Limited Impact/ Marginal:** Those impact indicators for which the outcome was limited to a small number of beneficiaries or for which the impact was very negligible
4. **No Impact:** Those indicators which were non-noticeable at all.
5. **Can't be determined:** Indicators which could not be determined based on the information available or collected or if they were beyond the scope of evaluation exercise.

Table 7.1 Socio-economic Impact Indicators and grade of achievements

S. No.	Particulars	Impact Indicator	Grade	Remarks
1	Household Income (for marginal, small, medium and large)	Increase in income, expenditure, assets	Highly Significant	A significant increase in income has been reported by majority of beneficiaries to WPI projects. Increase in income of LSA beneficiaries is also remarkable.
		Diversification of income sources	Limited Impact	Diversification in terms of change in cropping pattern is noticed, however, no diversification in sources of income is observed
		Improvement in crop yield productivity	Significant	People reported increase in availability of irrigation water has led to significant increase in the production
		Changes in cropping pattern	Highly Significant	Majority of beneficiaries have switched to high value crops like Wheat from Jowar. New Sugarcane and Rice cultivation is also observed.
		Changes in cropping intensity (increasing/ decreasing)	Highly Significant	Cropping Intensity has increased. People have also grown multiple crops in some districts like Datia
		Changes in irrigated area (surface water/ ground water)	Significant	Surface water irrigated area has increase significantly.
		Increase in price realisation	Limited Impact	Marginal increase in price realisation can be observed in terms of reduction in transportation cost for limited beneficiaries of functional mandis
		Adoption of new and/ or sustainable technology	Can't be determined	

2	Governance, Financial feasibility-Risk analysis and Milestone	Assistance in marketing or agriculture produce, increase in value addition	Limited Impact	
		Outcome of scheme in terms of targeted beneficiaries' access to and satisfaction with public delivery of farm services, adoption of new technologies and income generation	Significant	
		Process of project formulation and approval	Satisfactory	Project formulation was satisfactory as it included all the necessary components requisite for Drought mitigation. However, a hydrological system analysis shall be taken up for the entire Bundelkhand region, both for present as well as future scenarios. Also, a higher degree of freedom shall be provided to the district line department officials in formulation of projects specific for their districts
		Additional income earned by beneficiaries as a result of implemented activities	Highly Satisfactory	Increase in crop under high value crop and increase in production has led to generation of additional income to WPI beneficiaries. Moreover, reduction in distress selling by milk producers and increase in income of Bull beneficiaries has also improved income among the beneficiaries
		Quality of Implementation	Satisfactory	Implementation of package has been satisfactory with reference to achievements; however, scope for further improvement still exists.

	Implementation process followed <i>vis a vis</i> process prescribed under the scheme	Satisfactory	No deviation was observed in terms of deviation in implementation process	
	Average delay, if any, in starting implementation	Marginal	Marginal delay is noticed for some schemes of some districts only, mainly due to delay in land acquisitions etc.	
	Physical achievement <i>vis a vis</i> targets approved	Highly Satisfactory	Physical achievement is close to 100% of target in all the districts	
	Financial achievement <i>vis a vis</i> targets approved	Highly Satisfactory	Financial Achievement is close to 100% of target in all the districts	
	Average time overrun, if any, in completing the implementation	Marginal	Marginal time overrun is noticed for some schemes of some districts only	
	Impact of decision for changed funds routing mechanism from directly to project implementing agencies (states, districts, central)	Significant	Due to direct availability of funds, implementing agencies were better able to design the projects	
	Efficacy and effectiveness of fund flow mechanism of scheme in all sectors impacting productivity in agriculture and allied sectors in terms of physical and financial achievements and institutional linkages	Highly Satisfactory	Considering the 100% financial and physical achievement of ALL the schemes in ALL the districts, efficacy and effectiveness could be graded as significant	
	Financial powers of key functionaries	Can't be determined		
	Risk Analysis	Can't be determined		
3	Employment Opportunities	Increase in employment opportunities	Marginal	Increase in production and shift to high value crops would likely have generated additional employment in terms of farm labours, however, the same was not possible to be determined quantitatively

	Increase in wage rates	Can't be determined	
	Reduction in migration (peak period of months)	Can't be determined	
	Opportunities for women and vulnerable groups	Significant	Majority of beneficiaries for the schemes related to dugwell construction, dairy, goatary or bull induction were small and marginal farmers. A significant impact on the life and livelihood of these beneficiaries can be noted. Reduction in distance travelled to collect water has reduced the stress on women, who are able to devote additional time in other activities
	Alternate employment opportunities (micro-enterprises)	Significant	Package was able to generate both direct as well as indirect employment opportunities for people of the region.
	Change in number of people out-migrating for wage	Can't be determined	Due to lack of information about the baseline migration, it was not possible to determine change in migration, however, seasonal migration to nearby districts is still prevalent.
4	Livestock		
	Increase in the number of high yielding breeds of cattle	Significant	A very significant increase in number of high yielding cattle is reported by the beneficiaries, however the number of beneficiaries is limited
	Improvement/ increase in milk output	Significant	Farmers reported an increase in the breed of their cattle due to AI or Bull Induction, which has resulted in better milk output than earlier. But the number of beneficiaries is limited

		Increase in unit income from dairying	Significant	Farmers reported a regular income from selling the extra milk from their animals. But the number of beneficiaries is limited
5	Ground Water	Improvement in the ground water level and yield	Can't be determined	
		Increase in the irrigated area	Limited Impact	Beneficiaries of wet dugwells have reported increase in land productivity
		Changes in the cropping pattern	Limited Impact	Majority of dugwell beneficiary were earlier growing rainfed crops, however, the shift in cropping is not significant
		Diversification into high value crops	Limited Impact	Diversification from coarse grains to vegetables was reported by some respondents
6	Surface Water Resources	Increase in number of water bodies	Significant	Addition of >1000 check dams and extension of canal system has increased the number of surface water bodies in the region
		Increase in surface water supply	Significant	As farmers are receiving higher number of irrigation water through Major irrigation projects, surface water supply has increased. However, the same does not hold for the check dam projects due to dry years in recent past.
		Transformation from seasonal to perennial crops	Negligible	
7	Marketing	Quantity Sold before construction of warehouse and special mandis Quantity sold in RINs Increase in Price Realisation	Limited Impact	Majority of RINs were found to be non-functional. However, farmers closer to functional RINs reported reduction in wait time as well as distance travelled to sell their produce.

	Average distance earlier travelled	Significant	Almost 60% of the beneficiaries around functional mandi/ RINs reported a reduction in the distance travelled by them to sell their produce.
	Average distance travelled now		
	Sale of produce		
	Average transportation cost	Can't be determined	
	Average travel distance	Can't be determined	

ANNEXURE

ANNEXURES

बुंदेलखंड सूखा शमन पैकेज समाजिक प्रभाव मूल्यांकन प्रश्नावली

तारीख

जिला: ग्राम:

मुखिया का नाम:	1. परिवार के
2. परिवार का गाँव/खंड/जिला:	
3. आयु (पूरे किए वर्षों में):	
4. शिक्षा (स्कूली पढ़ाई के वर्ष):	
5. जाति: अनु.जाति/अनु.जनजाति/पिछड़े वर्ग/सामान्य:	
6. परिवार का आकार: वयस्क पुरुष:; वयस्क महिलाएं:; बच्चे (< 18 वर्ष):;	
7. आर्थिक श्रेणी: एपीएल/बीपीएल	
8. किसान परियोजना : सीमांती/लघु/अन्य (पूर्व किसान परियोजना के 2.5 एकड़/ की श्रेणी 5.0 एकड़ /> 5.0 एकड़)	
9. कमान क्षेत्र में किसान के खेत की स्थिति: शीर्ष/मध्य/पिछला भाग	
10. क्या जल उपयोगकर्ता संघ के सदस्य हैं: हाँ/नहीं	
11. क्या आपने कोई शुल्क भरा है: हाँ/नहीं	
12. शुल्क कितना है: रुपए—	

13. बुंदेलखंड परियोजना का नाम जिसके तहत लाभ की प्राप्ति की:

परियोजना का नाम	वर्ष	लाभ की किस्म
सिंचाई विस्तार		
खुदे हुए कुँए		
पंप सेट		
खेती बाड़ी		
बकरी पालन/साँड कृत्रिम गर्भाधान		

एआई सेंटर/ चारा बैंक		
पाइप लाइन पेयजल/ हैंड पंप		
अन्य कोई		

सिंचाई विस्तार

14. जोत संबंधी ब्यौरा (एकड़ में)

विवरण	औसत		पिछले दस वर्षों से भू संबंधी कोई बदलाव
	वर्षा आधारित	सिंचित	
निजी जमीन (1)			
पट्टेदार जमीन (2)			
बंधक जमीन पर कब्जा (3)			
पट्टे पर दी गई जमीन (4)			
बंधक पर दी गई जमीन (5)			
कुल (1+2+3-4-5)			

15. फसल पैटर्न (एकड़)

फसल/ मौसम	वर्षा आधारित/ सिंचित	पिछले वर्ष	पिछले 10 वर्ष से यदि कोई बदलाव आया हो तो
खरीफ			
रबी			
सकल फसली क्षेत्र			

16. क्या खेत में बीज या प्रमाणित बीज है?

17. क्या सरकारी विभाग में प्रमाणित बीज लेने में कोई दिक्कत है?

18. प्रत्येक सिंचित फसल के लिए उपलब्ध सिंचाई संख्या

सिंचित फसल का नाम	एकड़	उपलब्ध सिंचाई-संख्या		
		औसत	पिछले वर्ष	कोई बदलाव
खरीफ				
रबी				

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19. उत्पादन (किग्रा. में)

फसल/मौसम	वर्षा आधारित/ सिंचित	एकड़	औसत उत्पादन	2016-17 (नवीनतम)	2016-17 के दौरान प्रति क्विंटल की दर से
खरीफ					
रबी					

20. वार्षिक पारिवारिक आय (रु.)

क्रम सं.	आय के स्रोत	औसत	2016-17 (नवीनतम)	कोई बदलाव और बदलाव का कारण
01	कृषि/खेत संबंधी स्रोत			
02	पशु (बिक्री एवं उत्पादन)			
03	मजदूरी (खेतीबाड़ी/खेत)			
04	मजदूरी (गैर-खेतीबाड़ी)			
05	मजदूरी (मगनरेगा)			
06	वेतन रोजगार			
07	एनएफएस गतिविधियों से प्राप्त आमदनी			
08	यदि कोई अन्य स्रोत हो तो कृपया स्पष्ट करें			
	कुल			

21. रोजगार दिवस (दिनों की संख्या)

विवरण	सदस्य संख्या	औसत	2016-17 (नवीनतम)	कोई बदलाव और बदलाव का कारण
परिवार श्रम				

खेतों पर काम मिलना				
गैर-कृषि रोजगार				
मगनरेगा रोजगार				
किराए के श्रमिकों की मजदूरी				

22. प्रवासन स्थिति

क्रम सं.	विवरण		औसत	2016-17 (नवीनतम)	कोई बदलाव और बदलाव का कारण
1	रोजगार के उद्देश्य से पलायन करने वाले पारिवारिक सदस्यों की संख्या				
2	वे व्यक्ति				
क)	जो गृह नगर से बाहर लेकिन जिले में ही किसी दूसरी जगह बसने जा रहे हों।	व्यक्तियों की संख्या			
		औसत दिवस संख्या			
ख)	जो गृह नगर से बाहर लेकिन राज्य में ही किसी दूसरी जगह बसने जा रहे हों।	व्यक्तियों की संख्या			
		औसत दिवस संख्या			
ग)	गृह नगर से बाहर लेकिन देश में ही किसी अन्य जगह बसने जा रहे हों।	व्यक्तियों की संख्या			
		औसत दिवस संख्या			
घ)	देश के बाहर प्रवास करने वाले।	व्यक्तियों की संख्या			
		औसत दिवस संख्या			

कृष्या प्रवासन स्थिति में बढ़ोतरी/घटोतरी के कारण दर्शाइए।

सर्वेक्षक की मुक्त टिप्पणी एवं संपूर्ण प्रेक्षण/प्रत्युत्तर

खुदे हुए कूप (नये या मौजूदा कूपों को अधिक गहराना)/पंप सेट लगाना

खुद का/सांझा

उपयोगिता: सिंचाई/पेय/दोनों

यदि सिंचाई के लिए इस्तेमाल किया जा रहा हो तो कृषि पर इसका प्रभाव फसल की किस्म :

फसल/ मौसम	वर्षा आधारित/ सिंचित	परियोजना से पहले		कूप निर्माण का वर्ष	परियोजना के बाद	
खरीफ						
रबी						
सकल फसली क्षेत्र						

उपलब्ध सिंचाई-संख्या

फसल/ मौसम	वर्षा आधारित/ सिंचित	परियोजना से पहले		कूप निर्माण का वर्ष	परियोजना के बाद	
खरीफ						
रबी						

सकल फसली क्षेत्र						
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उत्पादन

फसल/ मौसम	वर्षा आधारित/ सिंचित	परियोजना से पहले	कूप निर्माण का वर्ष	परियोजना के बाद	प्रति क्विंटल की दर से
खरीफ					
रबी					
सकल फसली क्षेत्र					

वार्षिक घरेलू आमदनी (रुपए)

कूप निर्माण/खुदे हुए कूप को अधिक गहरा बनाने से पहले की आमदनी :-

कूप निर्माण/खुदे हुए कूप को अधिक गहरा करने के बाद की आमदनी :-

कूप निर्माण/खुदे कूप को अधिक गहरा बनाने के कारण आमदनी में होने वाला परिवर्तन: _____

बकरी पालन इकाई

खरीदी/दी गई बकरियों का विवरण:

विवरण	दिए गए पशुओं की संख्या	पशु की आयु	पशु की कीमत	खरीद की तारीख	नस्ल का नाम	खरीद का स्रोत
पुरुष						
महिलाएं						
कुल						

दिए गए पशु की प्रमुख फिनोटिपिक (समलक्षणी) विशेषता _____

बकरी पालन इकाई का उद्देश्य: दुग्ध उत्पादन/मीट उत्पादन : _____

आय-जनन: पिछले 5 वर्षों की औसत आय (2012-2017)

बकरियों की बिक्री एवं दुग्ध बिक्री	
बकरी की देखभाल संबंधी लागत (श्रम मजदूरी सहित)	
निबल आय	

दौरे की तारीख को उपलब्ध पशुओं की कुल संख्या:

वयस्क नर	वयस्क मादा	नर (मेमने)	मादा (मेमने)

पालक द्वारा सामना की जाने वाली कोई समस्या

प्रजननकारी बैलों तक पहुँच

सेवा लाभ की संख्या:

अदा की गई राशि:

सेवा के बारे में सामान्य राय:

एआई सेंटर/चारा बैंक

सेवा लाभ की संख्या:

अदा की गई राशि:

सेवा के बारे में सामान्य राय:

कृषि (खेतीबाड़ी)

समेकित मार्केट यार्ड काम्प्लेक्स/हाट बाज़ार/ग्रामीण अवसंरचना तक पहुँच

उत्पादित फसल की किस्म
 फसल खरीदार: सरकारी / गैर-सरकारी / मंडी में स्वयं
 मंडी का नाम
 मंडी तक की दूरी
 मंडी तक पहुँचने की साधन
 परिवहन संबंधी कठिनाइयाँ
 पिछले वर्ष, कितनी बार मंडी का दौरा किया?
 सामान्य राय:

पाइपलाइन से उपलब्ध पीने का पानी / हैंड पंप

सिस्टम की स्थापना से पहले पीने के पानी की प्राप्ति कैसे करते थे? (लाभार्थियों से)

पाइपलाइन / हैंड पंप से पेय जल की व्यवस्था के बाद से कौन से बदलाव आए हैं?

निम्नलिखित मास के दौरान पेय जल की उपलब्धता

मास	सिस्टम की स्थापना से पहले		सिस्टम की स्थापना से पहले	
	1. पेयजल पर्याप्त रूप से उपलब्ध था। 2. उपलब्ध था लेकिन पर्याप्त नहीं था। 3. उपलब्ध था लेकिन स्रोत काफी दूर था।	पानी भरने के लिए तय की जाने वाली दूरी।	1. पेयजल पर्याप्त रूप से उपलब्ध था। 2. उपलब्ध था लेकिन पर्याप्त नहीं था। 3. उपलब्ध था लेकिन स्रोत काफी दूर था।	पानी भरने के लिए तय की जाने वाली दूरी।
अप्रैल				
मई				
जून				
जुलाई				

गाँव में सिस्टम की स्थापना से पहले कितने माह तक पानी पर्याप्त रूप से उपलब्ध था (मास संख्या)

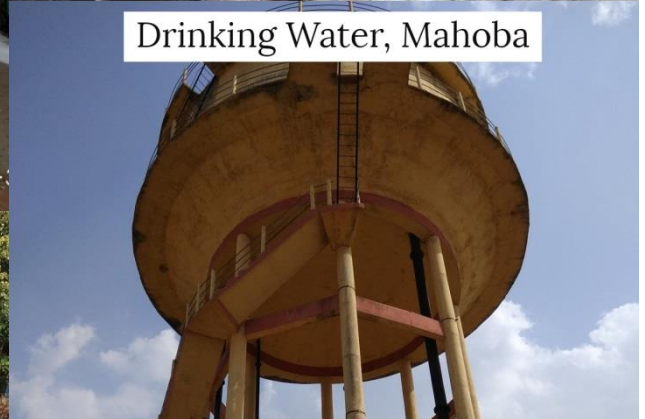
गाँव में सिस्टम की स्थापना के बाद कितने माह तक पानी पर्याप्त रूप से उपलब्ध था (मास संख्या)

सिस्टम का परिचालन एवं इसकी देखरेख का कार्य कैसे किया जाता है?

पीने के पानी को ले कर फिलहाल यदि कोई समस्या हो तो:



Milk Centre in District Sagar



Drinking Water Schemes in Different Districts



Dugwells in Different Districts



Fodder Banks



Agri-Marketing Infrastructure



Minor Irrigation Beneficiaries in Tikamgarh



Milk Co-operative Society in Tikamgarh



Rural Infrastructure Nucleii (RIN) in Lalitpur District



Dugwell and Pumpset beneficiary in Lalitpur District

Disclaimer: The Energy and Resources Institute (TERI), New Delhi received the grant from NITI Aayog, Government of India to conduct this study and produce this report. However, NITI Aayog shall not be held responsible for findings or opinions expressed in this report. This responsibility rests with The Energy and Resources Institute (TERI), New Delhi.



The Energy and Resources Institute

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