



**POLICY BRIEF**

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# CRITICAL POLICY INTERVENTIONS TO FAST FORWARD MICRO IRRIGATION IN INDIA

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# Introduction

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India is an agrarian society and the agricultural sector accounts for 18% of India's gross domestic product (GDP) while providing employment to 50% of the country's workforce<sup>1</sup>. India is one of the largest producers of fresh fruits and vegetables, milk, major spices, several crops such as jute, staples such as millets and castor oil seed. . Apart from this, India is also the second largest producer of wheat and rice<sup>2</sup>. India initiated its own Green Revolution programme in the field of plant breeding, irrigation development and financing of agrochemicals after 1960<sup>2</sup>. The Green Revolution had several benefits, such as increase in production due to the use of high-yielding varieties of seeds, crop genetic improvements and irrigation, which led to widespread poverty reduction. However, the unabated adaptation of unsustainable agricultural techniques and practices (high dependence on chemical fertilizers and pesticides) by farmers to produce more had an adverse impact on the environment. There were reports of loss of soil fertility, deteriorating state of water resources, pollution of groundwater and increase of salinity in groundwater. The National Institution for Transforming India (NITI Aayog) also stated that around 600 million Indians are now facing high to extreme water stress situation because of growing population and the ever-increasing demand for food. High variations in the range of electrical conductivity (EC) between 2.25 and 5.0 ds/m and heavy metals concentration in groundwater indicate the high salinity problem exacerbated by groundwater withdrawals and contamination of groundwater<sup>3</sup>. The average annual water availability in India is estimated to be 1869 billion

cubic meters (BCM). However, due to hydrological, topographic and other constraints, the utilizable water is expected to be about 1123 BCM, out of which 690 BCM is from surface water and 433 BCM from replenish able groundwater<sup>4</sup>.

The increasing demand of water from other sectors along with inefficient methods of irrigation has aggravated the problems of water scarcity. In order to tackle water scarcity situation in India, particularly in the agriculture sector, Government of India has come up with many irrigation programmes and schemes from time to time. Earlier most of them were based on the open canal system concept, but there is a drastic shift in current and upcoming irrigation programmes and schemes from the traditional irrigation method based on canal flood irrigation to the modern micro irrigation system that uses drip and sprinkler irrigation methods<sup>5</sup>.

There is a huge scope for micro irrigation systems (drip and sprinkler) and many micro irrigation schemes offer subsidies ranging from 50% to 95%<sup>6</sup>. There have been various success stories and projects on community-based approach for supplying irrigation water to agricultural areas that were earlier under rainfed agriculture and faced crop failures due to scanty rainfall showcasing the benefits of increased crop production and reduced cost of production with minimal water and power consumption through micro irrigation method adaptation. Various state governments have recognised the effectiveness of a community-based approach.

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<sup>1</sup> Madhusudhan, L. 2015. Agriculture role on Indian economy. *Business and Economics Journal* 6: 176. doi: 10.4172/2151b6219.1000176

<sup>2</sup> Newsroom: News Releases. CGIAR. Archived from the original on 26 June 2010. Retrieved 13 August 2010

<sup>3</sup> CPCB (Central Pollution Control Board). 2001. *Pollution Control Acts, Rules, and Notifications issued Thereunder*, Fourth Edition. New Delhi: Central Pollution Control Board, Ministry of Environment and Forests, Government of India

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<sup>4</sup> Details available at <http://pib.nic.in/newsite/PrintRelease.aspx?relid=107733>, last accessed on 26 June 2019

<sup>5</sup> Details available at [http://planningcommission.nic.in/reports/genrep/rep\\_irr2112.pdf](http://planningcommission.nic.in/reports/genrep/rep_irr2112.pdf), last accessed on 26 June 2019

<sup>6</sup> Details available at <https://cbps.in/wp-content/uploads/Micro-Irrigation-Study-final-14032013.pdf>

## Current Irrigation Sector Scenario in India

As agriculture is the main water guzzling sector in India, there is a need for water management in water-scarce regions and other regions overall for meeting the water needs of agriculture in future. Irrigation sector currently consumes 80% of the total water use. Owing to competing demands from other sectors, it is expected that water consumption in this sector will probably reduce to about 70% by 2050<sup>8</sup>. According to a World Bank report, groundwater has supported 60% of irrigated agriculture, whereas 40% of irrigated agriculture is supported by surface water<sup>9</sup>. This shows that irrigation is highly dependent on groundwater, and in many areas this causes over-extraction of groundwater and this issue needs to be addressed.

be attained by enhancing the efficiency of the demand side and the supply side in agriculture sector by the use of micro irrigation techniques.

Table 1 represents the source-wise net irrigated area and the percentage of the net irrigated area by source (in million hectares) in India. As per the table, from 1960 to 2015, area under canal irrigation increased from 10.37 Mha (million hectares) to 16.8 Mha, whereas area under tube-well irrigation increased from 0.13 Mha to 31.60 Mha, and overall there had been an increase in the net irrigated area from 24.66 Mha to 68.38 Mha. The increase in net irrigated area as well as the shift in dependence from surface water to groundwater has had a detrimental impact on the groundwater resources. As water resources

**Table 1: Source-wise net irrigated area and the percentage of the net irrigated area by source**

Year	Canal		Tanks		Tube wells		Other wells		Net irrigated area Mha
	Mha	%	Mha	%	Mha	%	Mha	%	
1960/61	10.37	42.05	4.56	18.49	0.13	0.55	7.15	29.01	24.66
1970/71	12.83	41.28	4.11	13.22	4.46	14.34	7.42	23.88	31.10
1980/81	15.29	39.49	3.18	8.22	9.53	24.62	8.16	21.08	38.72
1990/91	17.45	36.34	2.94	6.13	14.25	29.62	10.43	21.73	48.02
1995/96	17.12	32.06	3.11	5.84	17.89	33.51	11.80	22.10	53.40
2000/01	15.71	28.65	2.51	4.59	22.32	40.71	11.45	20.88	54.83
2005/06	16.72	27.50	2.08	3.40	26.03	42.80	10.04	16.50	60.84
2010/11	15.64	24.6	1.98	3.10	28.54	44.8	10.63	16.70	63.66
2013/14	16.27	23.90	1.84	2.70	31.13	45.70	11.31	16.60	68.10
2014/15	16.18	23.66	1.72	2.52	31.60	46.21	11.35	16.60	68.38

Source: Details available at [http://www.iasri.res.in/annualreports/ar2017-18/IASRI\\_AR\\_2017-18.pdf](http://www.iasri.res.in/annualreports/ar2017-18/IASRI_AR_2017-18.pdf), last accessed on 30 May 2019

The National Water Policy (NWP), 2012 states that water saving in irrigation is of utmost importance<sup>10</sup>. The Goal 4 of National Water Mission, 2008 of India highlights the main objective of NWM, which is to improve water use efficiency at least by 20% in all sectors, including domestic, industrial, agricultural and commercial. This objective can

become increasingly scarce, there is an urgent need to manage irrigation water efficiently and the adoption of micro irrigation systems is the need of the hour.

However, even though the overall potential micro irrigation in India is projected to be about 70 Mha (million hectares), the micro irrigation coverage achieved by 2018 was only around 9 Mha in 15 years<sup>11</sup>. Therefore, at the current coverage rate of 0.6 Mha/annum, it would take approximately more than 100 years to achieve the potential target of micro irrigation in India.

<sup>8</sup> Details available at [http://mowr.gov.in/sites/default/files/Guidelines\\_for\\_improving\\_water\\_use\\_efficiency\\_1.pdf](http://mowr.gov.in/sites/default/files/Guidelines_for_improving_water_use_efficiency_1.pdf), last accessed on 26 June 2019

<sup>9</sup> Details available at <http://www.worldbank.org/en/news/feature/2011/09/29/india-water>, last accessed on 26 June 2019

<sup>10</sup> Details available at [http://mowr.gov.in/sites/default/files/NWP2012Eng6495132651\\_1.pdf](http://mowr.gov.in/sites/default/files/NWP2012Eng6495132651_1.pdf), last accessed on 26 June 2019

<sup>11</sup> Details available at <https://www.nabard.org/auth/writereaddata/tender/0803190338NSP%20on%20Water%20Resources%20.pdf>, last accessed on 26 June 2019

# Benefits of Micro Irrigation

Micro irrigation ensures conservation and the efficient use of water, minimal wastage of water and higher productivity of crops with less water consumption by the usage of the drip irrigation method and the sprinkler irrigation method, respectively<sup>12</sup>. For optimal and efficient use of surface and groundwater sources for irrigation, micro irrigation method usage is one of the effective ways to grow more crops with less water.

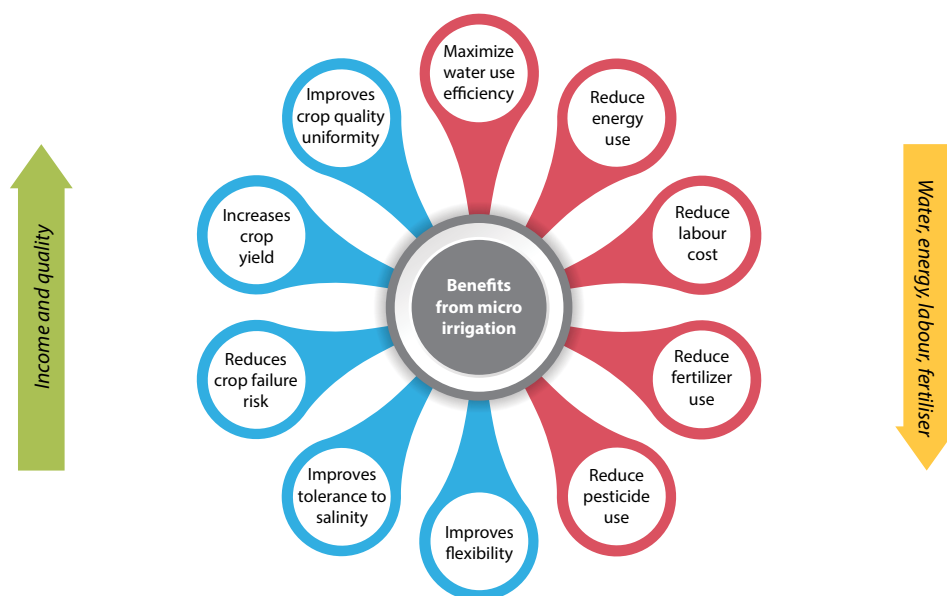
Micro irrigation includes the usage of drip and sprinkler systems. Micro irrigation could be one of the solutions to the challenges and issues faced by Indian agriculture. The water use efficiency of the flood method of irrigation in India is estimated to be only around 40%. This is mainly due to the significant losses through conveyance, distribution and evaporation, whereas micro irrigation systems can provide water use efficiency from 80% to 95%<sup>13</sup>. The reason for this difference is because transmission loss is nominal, while losses through evaporation, run-off and deep percolation are also reduced significantly by using

micro irrigation methods<sup>14</sup>. Efficient water use results in additional benefits such as an increase in the area coverage under irrigation with the same amount of water as well as increasing the potential usage of marginal/degraded land using micro irrigation systems.

An extensive field survey of beneficiaries was conducted by TERI in Balh valley, Sunder Nagar, Mandi Himachal Pradesh. It was seen that the adoption of micro irrigation system in the area has increased irrigation efficiency, resulting in 50% to 90% of water saving.

Listed below are several major reasons for adopting micro irrigation:

- Water use efficiency
- Reduction in energy consumption
- Reduction in fertiliser consumption
- Productivity enhancement of fruits/crops and vegetables
- Irrigation cost saving
- Increase in Farmers' income



**Figure 1: Benefits of micro irrigation adaptation**

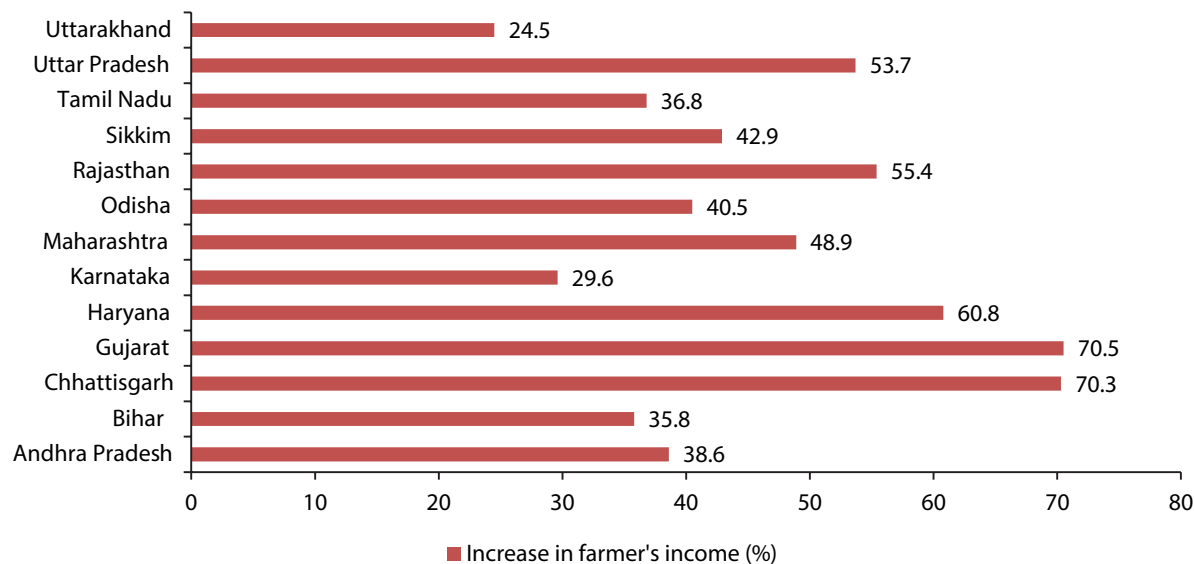
<sup>12</sup> Details available at <http://nwm.gov.in/?q=goal-4>, last accessed on 27 June 2019

<sup>13</sup> Details available at [http://mowr.gov.in/sites/default/files/Guidelines\\_for\\_improving\\_water\\_use\\_efficiency\\_1.pdf](http://mowr.gov.in/sites/default/files/Guidelines_for_improving_water_use_efficiency_1.pdf), last accessed on 27 June 2019

<sup>14</sup> Details available at <http://www.fao.org/tempref/docrep/fao/010/a1336e/a1336e.pdf>, last accessed on 27 June 2019

### Impact of Micro Irrigation Adoption – A Case Study of Himachal Pradesh

Himachal Pradesh (HP) has launched a state-wide micro irrigation scheme under which 80% subsidy is provided to farmers on the purchase of micro-irrigation systems. The Energy and Resources Institute (TERI) undertook an extensive field survey of beneficiaries from Balh valley Sunder Nagar, Mandi. In order to visualise benefits of drip and sprinkler methods of irrigation, beneficiaries and key persons from the project management team were also interviewed. In this project, irrigation was provided to 75,000 beneficiaries, covering an area of 2740 ha. Prior to this project, the area was rainfed with wheat–maize as the main crops. Under this project, for each 2 ha of agricultural land, one irrigation water outlet was provided. After irrigation water was provided by the micro irrigation system, farmers started growing vegetables such as tomatoes, cauliflower, cabbage and peas and even rice cultivation was possible because of assured irrigation. The percentage of irrigated area had risen considerably to 93.77% of the total cultivated area. While the cost of cultivation had increased by less than 1%, the availability of water through the micro-irrigation system has resulted in an increase of farmers' income by more than 230%. Currently, maize has been marginalised in the area and the cultivation of vegetables has gone up. The assured supply of irrigation water has increased the production of crops from 35% to 86%. The expenses on agricultural inputs such as seed, fertiliser and labour have not changed much when compared before and after the project period. The increased production with same input expenses increased the income of farmers on an average from Rs. 22,000 to Rs. 70,000. The willingness for adopting the MIS has changed significantly from 15% to 92%.



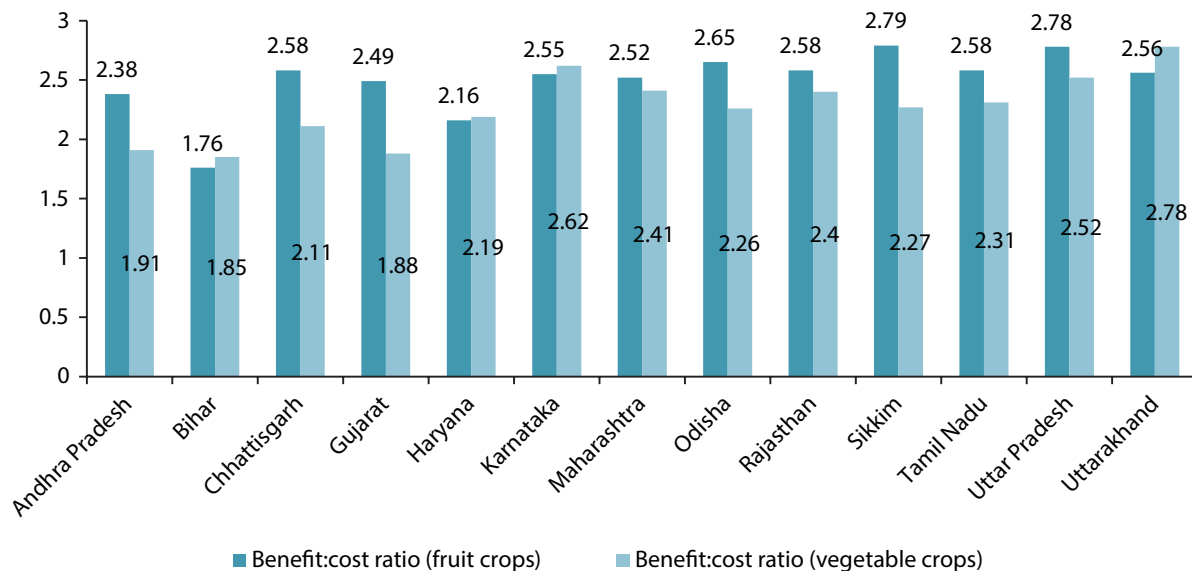
**Figure 2: Increase in farmer's income**

Source: Details available at <https://icfa.org.in/assets/doc/reports/indian-micro-irrigation-market.pdf>, last accessed on 15 May 2019

Figure 2 from Indian Council of Food and Agriculture (ICFA) shows that farmers have an increase in income ranging from 24.5% to 70.5%, with an average increase in income of about 46.8% after micro irrigation systems

adoption. The increase in farmers' income after the adoption of micro irrigation systems needs to be highlighted and shared especially with other farmers to ensure that these benefits could be availed by them as well.





**Figure 3: Benefit-cost ratio**

Source: Details available at: <https://icfa.org.in/assets/doc/reports/indian-micro-irrigation-market.pdf>, last accessed on 15 May 2019

The study also estimates the benefit-cost ratio shown in figure 3, which ranges from 1.76 (Bihar) to 2.79 (Sikkim) for horticulture crops, whereas it ranges from 1.85 (Bihar) to 2.78 (Uttarakhand) for vegetables crops with the adaptation of micro irrigation methods (Figure 3). An average benefit-to-cost ratio for the crops grown in each

state indicates the benefits to the farmers for adopting micro irrigation system. Benefit-cost ratio also shows that horticulture crops seem to be more profitable as compared to vegetable crops in majority of states such as Andhra Pradesh, Maharashtra, Gujarat, Odisha and Sikkim, where farmers have adopted MIS.

# Issues and Challenges of Micro Irrigation in Improving Irrigation Water Use in India

In spite of the well-known benefits of modern irrigation methods such as surface or sub-surface drip and sprinkler irrigation systems, they are not widely adopted on large scale by farmers because of high capital cost, non-reliable sources of water for the system, marginal and scattered agricultural landholdings, unavailability of subsidy at the required time or the delayed release of funds for installation of MIS that have already been approved, and the absence of easy financing mechanisms for farmers. Another hindrance for the poor adoption of these technologies is due to farmers' preference for traditional methods of irrigation owing to lack of knowledge of the benefits of MIS and lack of a dedicated team to support micro irrigation on field for farmers.

Moreover, due to periodic changes in components/schemes related to National Mission on Micro Irrigation, National Mission for Sustainable Agriculture and Prime Minister Krishi Sinchayee Yojana, several stakeholders

have stated that there seems to be lack of focus on micro irrigation in India<sup>15</sup>. The NITI Aayog report states that the following four major issues hinder the growth of micro irrigation:

## 1. Tedious financing machinery to beneficiaries

Financing for beneficiaries continues to be a major obstacle, as a result of which they continuously face difficulties in securing financing options. There is a persistent problem with the unavailability of funds in some states, resulting in further delay in fund disbursement from the state government to the dedicated cell/officer responsible for promoting and initiating MIS schemes at the state level. This in turn leads to lengthy cycles of subsidy, which is usually seen to be ranging from 120 to 150 days, whereas preferably it should be 75 days. There is a necessity to find ways to guarantee availability of funds on time and for simpler funding norms for farmers on priority<sup>16</sup>.

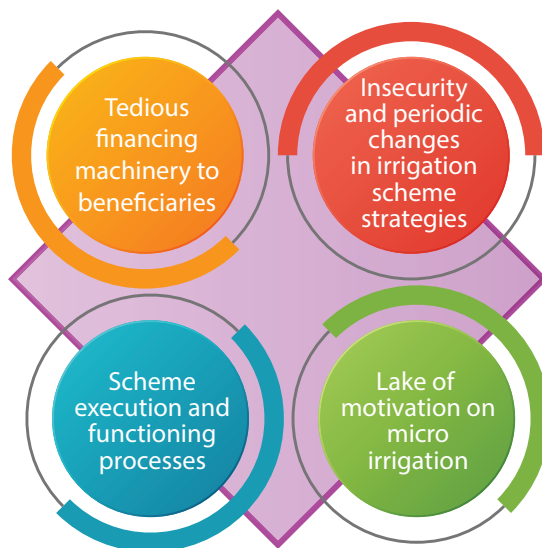


Figure 4: Major issues in micro-irrigation growth

<sup>15</sup> Details available at <https://www.grantthornton.in/globalassets/1-member-firms/india/assets/pdfs/micro-irrigation-report.pdf>, last accessed on 27 June 2019

<sup>16</sup> Details available at <http://agricoop.nic.in/sites/default/files/NCF3%20%281%29.pdf>, last accessed on 27 June 2019

## 2. Insecurity and periodic variations in irrigation scheme strategies

Owing to the lack of effective and long-term strategies, most of the schemes are operational only for a limited period of time at the state level. In this context, Federation of Indian Chambers of Commerce and Industry (FICCI) report has revealed that on average schemes are operative only for 5 months in a year to the farmers<sup>17</sup>. As a result, farmers could not avail the benefits of the scheme during peak water demand months. Also, this could result in the farmers missing the cropping season, leading to their inability to gauge the real benefits of the micro irrigation system<sup>18</sup>.

## 3. Scheme execution and functioning processes

Most of the micro irrigation schemes are inefficient in terms of their execution and functioning, particularly in terms of the time taken and length of the process of scheme execution. In a few states, the scheme implementation and launch process occurs during the months of August and September, as a result of which there is a lag in irrigation water supply and timely irrigation to the field.

By the time a scheme actually starts to provide water for crop, the main season has already ended<sup>19</sup>. Therefore, beneficiaries are not able to get the optimal benefit of the available micro irrigation technology. Thus, there is a need for timely completion of the process (preferably before monsoon season) for better synchronisation with the farmers' interest and demands. The lack of a robust monitoring system makes the task of managing scheme execution and functioning extremely difficult. This has a detrimental impact on the efficiency of implementing MIS.

## 4. Lack of motivation on micro irrigation

A diluted focus on the micro irrigation scheme is still prevalent, with the government of India providing funds for MIS since 2014–15 as a component of government schemes and not through the dedicated mission such as the previous National Mission on Micro Irrigation (NMMI). This is also followed to a large extent at the state level as only a few states have a dedicated team to promote micro irrigation, and most others do not provide the due importance needed, thus leading to deceleration in the growth of MIS<sup>20</sup>.

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<sup>17</sup> Details available at <https://www.grantthornton.in/globalassets/1.-member-firms/india/assets/pdfs/micro-irrigation-report.pdf>, last accessed on 27 June 2019

<sup>18</sup> Details available at <https://icfa.org.in/assets/doc/reports/indian-micro-irrigation-market.pdf>, last accessed on 15 May 2019

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<sup>19</sup> Details available at <https://www.grantthornton.in/globalassets/1.-member-firms/india/assets/pdfs/micro-irrigation-report.pdf>, last accessed on 27 June 2019

<sup>20</sup> Details available at [https://www.worldfoodprize.org/documents/filelibrary/youth\\_programs/borlaug\\_ruan\\_international\\_internship/2017\\_student\\_papers/BATTLESFINAL\\_BR\\_REPORT\\_672DF0AFDC363.pdf](https://www.worldfoodprize.org/documents/filelibrary/youth_programs/borlaug_ruan_international_internship/2017_student_papers/BATTLESFINAL_BR_REPORT_672DF0AFDC363.pdf), last accessed on 27 June 2019

# Central Government Schemes for Micro Irrigation: A Critical Analysis

## **National Mission on Micro Irrigation, 2010**

Recognising the need for better water productivity in the agriculture sector, the government has taken various initiatives since 1992 for promoting micro irrigation system (MIS)<sup>21</sup>. The year 2006 saw real momentum when the Government of India (GoI) launched a Centrally Sponsored Scheme (CSS) for micro irrigation. This scheme was later upgraded to the National Mission on Micro Irrigation (NMMI) and implemented through the year 2013–14 by the Ministry of Agriculture & Farmers Welfare. However, by 2014–15 the National Mission for Sustainable Agriculture (NMSA) was made operational and micro irrigation activities were implemented under the On Farm Water Management (OFWM) component of the scheme<sup>22</sup>.

### • **Enabler of the scheme**

- a. Specific focus on micro irrigation
- b. Scheme implementation for a sustained time period
- c. Allow for higher efficiency and transparency
- d. The focus on providing after-sale service helped to maintain the farmers' interest
- e. Provisioning of subsidy support by government for the demonstration of the micro irrigation systems
- f. Increase in awareness among farmers

### • **Hinderer of the scheme**

- a. Disbursement of funds was seen as being inefficient as the funds have to go through numerous steps and are not directly transferred to the farmer or the micro irrigation supplier/ implementer
- b. Area ceiling limit (5 ha)

- c. Lack of focus on water scarcity issues
- d. Lack of uniform scheme implementation: The implementation of the scheme varied drastically from state to state. In some states, the parallel involvement of more than one department with the MIS implementing agency resulted in inefficiencies and confusion
- e. Inadequacy of guidelines, especially with respect to the cost structure of micro irrigation components for subsidy release (BOQ's for drip and sprinkler systems), resulted in improper estimation of cost and subsidy amounts

## **National Mission for Sustainable Agriculture (NMSA), 2014**

Micro irrigation comes under 'On Farm Water Management' component of National Mission for Sustainable Agriculture. This component has the objective of enhancing water use efficiency by promoting technological interventions and adopting efficient on-farm water management technologies and processes. Effective harvesting and management of rainwater in combination with the Rainfed Area Development (RAD) component was also prioritised<sup>23</sup>.

### • **Enabler of the scheme**

- a. Focuses on enhancing water use efficiency by promoting efficient on-farm water management technologies and equipment as well as effective harvesting and management of rainwater
- b. Promoting location-specific agronomic activities

### • **Hinderer of the scheme**

- a. Requires more focus on water scarcity issues
- b. Inadequacy of guidelines especially with respect

<sup>21</sup> Naveen Kumar, M. R. and Sathyapriya, E. 2018. Micro irrigation system in Agricultural context: An overview

<sup>22</sup> Reddy, K.Y. and Reddy, L. N. 2016. Progression of micro irrigation into canal commands – APMP experiences. *Water and Energy International* 59: 51–57

<sup>23</sup> Details available at [http://agricoop.nic.in/sites/default/files/Final\\_guidelines.pdf](http://agricoop.nic.in/sites/default/files/Final_guidelines.pdf), last accessed on 27 June 2019

to the cost structure of micro irrigation components for subsidy release (BOQ's for drip and sprinkler systems) resulted in improper estimation of cost and subsidy amounts

- c. Area ceiling limit of 5 ha per family

#### ***Prime Minister Krishi Sinchayee Yojana, 2015***

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) scheme under the Ministry of Water Resources, RD&GR and the Ministry of Agriculture & Farmers Welfare focuses on providing an end-to-end solution to the irrigation supply chain. The government's strategy at this time is on "Har Khet Ko Paani" (water for every farm) as well as "Per Drop, More Crop". PMKSY was launched in 2015, with the integration of micro irrigation in the flagship scheme as a fundamental component<sup>24</sup>. The objective of the scheme is "to achieve convergence of investment in irrigation at the field level, and expand cultivable area under assured irrigation." PMKSY scheme principally focuses on increasing gross irrigated area, bridging the gap between irrigation potential and utilized potential, strengthening

the water distribution network and augmenting water use efficiency and management.

#### • **Enabler of the scheme**

- a. Focus on an end-to-end concept
- b. Scheme convergence and removal of redundancies
- c. Greater accountability at the district level by district magistrates for successful implementation of this scheme

#### • **Hinderer of the scheme**

- a. Funds are unable to keep up with increasing demand in some states
- b. The scheme does not address the delays in subsidy disbursement that have been observed in other schemes such as NMMI, NMSA
- c. Scheme does not lift area ceiling cap, although several experts have suggested that raising the cap to 10 ha from the current ceiling of 5 ha would be very beneficial

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<sup>24</sup> Details available at <https://pmksy.gov.in/>, last accessed on 27 June

2019

# State-wise Analysis for Effective Implementation of PMKSY Scheme

The states of Maharashtra, Andhra Pradesh, Karnataka, Gujarat and Rajasthan account for over 80% of the estimated micro irrigation (MI) potential in India. Under PMKSY scheme, 87% of the funds are allocated to the seven major states, which are Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu, Telangana, Gujarat and Madhya Pradesh<sup>25</sup>. Therefore, a brief analysis was done to review the implementation of the scheme and observations are presented for measures to be taken to accelerate the subsidy-driven scheme.

## **Andhra Pradesh**

In Andhra Pradesh, Andhra Pradesh Micro Irrigation Project (APMIP) has a dedicated team to promote micro irrigation while monitoring and data transparency is achieved through IT operations, but there are several issues that APMIP still facing. There was a lack of awareness of the scheme amongst the farmers as well as suppliers and officials of the implementing agency. The NITI Aayog report highlighted that high proportions of 83% and 52% of the beneficiaries of Warangal and Kurnool districts, respectively, in Andhra Pradesh report this lack of awareness. Training needs assessment was seen as requirement before initiating a capacity building programme<sup>26</sup>.

It was found that delayed payments from the state agriculture department to Andhra Pradesh Micro Irrigation Project (APMIP) is a special purpose vehicle to initiate MIS leads to prolonged cycles of subsidy, that is, 120–150 days, whereas ideally it should be 75 days<sup>27</sup>. There have been several instances where even though the payment cheques issued by APMIP are cleared by the state finance department, there is a delay in the transfer of funds by the state treasury to the implementing agency. This is one of the major hindrances for the industry players to invest, thereby limiting the scope of business in this sector.

<sup>25</sup> Details available at [https://niti.gov.in/writereaddata/files/document\\_publication/PMKSY-Booklet.pdf](https://niti.gov.in/writereaddata/files/document_publication/PMKSY-Booklet.pdf), last accessed on 27 June 2019

<sup>26</sup> Details available at [http://planningcommission.gov.in/reports/peoreport/peo/peo\\_microagri.pdf](http://planningcommission.gov.in/reports/peoreport/peo/peo_microagri.pdf), last accessed on 27 June 2019

<sup>27</sup> Details available at <https://www.grantthornton.in/globalassets/1.-member-firms/india/assets/pdfs/micro-irrigation-report.pdf>, last accessed on 27 June 2019

In the case of Gujarat Green Revolution Company Limited (GGRC) model, there is comparatively less uncertainty for the micro irrigation system supplier with regard to mobilizing funds. In this case, the state treasury in Gujarat releases the final payment to the implementing agency within 90 days without any delay. Similarly, in case of APMIP, ensuring the payment within specific timeline will reduce any needless inefficiencies and delays in the subsidy process.

## **Gujarat**

While reviewing the GGRC model, it has been found that GGRC has a different set of pros and cons compared to APMIP. GGRC also has a dedicated team that is promoting micro irrigation and monitoring and data transparency is backed by efficient IT operations. However, MIS implementation process is comparatively lengthier than APMIP owing to extensive online and offline documentation work, time-consuming delays in undertaking technical and design evaluation and release of work orders and some of the institutional challenges that need to be addressed. An unnecessary delay in the issuing of work order by GGRC in many cases results in delayed micro irrigation system installations. As a result, the benefits of micro irrigation system are either not visible or even at times the farmer is unhappy with the progress and abandons the plan to adopt MIS. An excessive delay in inspection of micro irrigation systems installed at site by third party inspection agencies and further in release of final payments would affect the credit cycle of the micro irrigation industries, thus leading to low MIS coverage. The entire process of documentation should be streamlined for the efficient implementation of the PMKSY scheme.

It was also reported that there was poor performance in terms of provisioning of training, showcasing through demonstration farm and other capacity building activities. There is a need to intensify the efforts and provide a fresh push on this aspect<sup>28</sup>.

<sup>28</sup> Details available at [http://planningcommission.gov.in/reports/peoreport/peo/peo\\_microagri.pdf](http://planningcommission.gov.in/reports/peoreport/peo/peo_microagri.pdf), last accessed on 27 June 2019

## **Maharashtra**

Maharashtra has taken a number of initiatives in the field of micro irrigation. Subsidy programme is one of the major initiatives taken to popularize micro irrigation even during the mid-1980, but at present the entire subsidy process is facing certain pitfalls that have hampered the growth of MIS<sup>29</sup>.

The main issue prevailing in Maharashtra is undue delays in disbursement of subsidies to farmers for installing micro irrigation systems. As the subsidy is processed through the Direct Beneficiary Transfer (DBT) model, the farmer has to make an upfront investment, which is a major issue for poor and marginalized farmers who may not have the capital to invest in MIS. This delay in disbursement of subsidies has a detrimental impact on farmers, limiting the ability to implement MIS.

The study conducted in Maharashtra by Namara, Nagar and Upadhyay<sup>30</sup> also highlights that majority of micro irrigation users belong to a relatively affluent farmers group, while the poorer section of the farming community has not been able to garner much benefit from inventions in micro irrigation due to financial constraints and cropping patterns. Micro irrigation at times ends up being unsustainable for poor and marginal farmers because government schemes and financial assistance programmes do not cover the re-procurement of drip and sprinkler systems in case the system becomes outdated and damaged prior to the period of next available assistance.

Maharashtra Government needs to evaluate the current micro irrigation system subsidy process and make the entire subsidy process time bound to reduce the impact on poor and marginalized farmers. Training and capacity building is also lacking in Maharashtra. For example, only 3% of the beneficiaries have reported that they have

received an instruction manual along with the micro irrigation system. Moreover, majority of farmers in the state were not satisfied with the after-sales service. In order to overcome this, an integrated effort needs to be adopted for exercising an effective control on the after-sales service and for providing capacity building programme to farmers<sup>31</sup>.

## **Haryana**

The state of Haryana offers subsidy of up to 90% in order to promote drip irrigation in the state; however, the sought-after results are yet to be seen<sup>32</sup>. There needs to be a change in the strategy, such as the introduction of MIS demonstration farms and conducting exposure visits showcasing the benefits accrued by the progressive farmers that could help bring in the desired result.

In order to make micro irrigation scheme implementation smooth and flexible for farmers, streamlining the processes in MIS implementation is required. There is a need for a nodal agency responsible for the projects related to the micro irrigation to reduce confusion and the subsequent slow progress in micro irrigation scheme implementation.

## **Other States**

In other states such as Uttar Pradesh, Jharkhand, Karnataka, it has been found that in the current Direct Beneficiary model, the farmer is required to pay upfront cost of the system. In this system, it is observed that usually 100% of the cost is to be paid in advance to MIS suppliers, which most farmers lack the ability or willingness to do so. The lack of knowledge of benefits results in farmers not opting for loans, specifically for installation of MIS. The DBT model of subsidy prevents widespread coverage under MIS as the expansion depends only on the credit and risk taking capability of the MIS suppliers.

<sup>29</sup> Business Line. 2019. Tap drip irrigation to save water. The Hindus, 08 June [online]. Details available at <https://www.thehindubusinessline.com/opinion/tap-drip-irrigation-to-save-water/article27688289.ece>, last accessed on 11 June 2019

<sup>30</sup> Namara, R. E., Nagar, R. K and Upadhyay, B. 2007. Economics, adoption determinants, and impacts of micro-irrigation technologies: empirical results from India. *Irrigation Science* 25: 283–297

<sup>31,32</sup> Details available at [http://planningcommission.gov.in/reports/peoreport/peo/peo\\_microagri.pdf](http://planningcommission.gov.in/reports/peoreport/peo/peo_microagri.pdf), last accessed on 27 June 2019

Other important reason for the poor adoption of MIS even in the water-scarce regions is the easy access and availability of subsidized canal water and electricity for irrigation. Considering the actual cost of these resources, an appropriate pricing on canal water and electricity could encourage farmers to adopt this technology<sup>33</sup>. Also, in several states, it was observed that there is an absence of inviolable deadline which in turn encourages the authority in charge to execute the scheme in their own crafted time frames, and many times this result in unnecessary delays.

Arguments are made that the DBT model should be Direct Benefit Transfer model instead of Direct Beneficiary Transfer. In this model, wherever farmer is unable to pay full payment upfront, there could be a provision of No Objection Certificate (NOC) from the farmer and the payments could be transferred to MIS suppliers directly by the state agriculture department.

In case of Vijayapura district of Karnataka, clogging of emitters, damage caused by rodents, poor quality of products, high installation cost, poor after-sales service, delays in loan and subsidy approvals, and lack of technical support are key obstacles for the adoption of micro irrigation by the farmers in the region<sup>34</sup>.

Officials in the state of Punjab have stated that the micro irrigation systems distributed under the scheme do not last for full 10 years. This results in the situation where the beneficiaries have to either wait for a few more years before they become eligible for another round of subsidy or give up on using micro irrigation altogether. In order to solve this issue, the officials have recommended decreasing the duration for the re-eligibility for subsidy from the present 10 years to 5 years<sup>35</sup>. However, strengthening after-sales services would build the confidence of beneficiaries for adopting MIS, thereby enhancing subsidy less sustainability.

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<sup>33</sup> Saleth, R. M., ed. 2009. Strategic Analyses of the National River Linking Project (NRLP) of India, Series 3. Promoting irrigation demand management in India: Potentials, problems and prospects. Colombo, Sri Lanka: International Water Management Institute. 177 p, last accessed on 27 June 2019

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<sup>34</sup> Kumar, N. A. and Poddar, R. S. 2015. Economic evaluation of micro-irrigation programme in Vijayapura district. *Karnataka Journal of Agricultural Science* 28 (3): 373–376

<sup>35</sup> Details available at [http://planningcommission.gov.in/reports/peoreport/peo/peo\\_microagri.pdf](http://planningcommission.gov.in/reports/peoreport/peo/peo_microagri.pdf), last accessed on 27 June 2019



# Policy Recommendations for Wider Adaptability of Micro Irrigation in India

The following core policies are recommended based on learnings, observations and literature reviewed:

- **Institutional set-up for synergy among the nodal institutions responsible for implementing PMKSY scheme**

There is a need to ensure a closed loop system for effective implementation of PMKSY scheme. The current silo-based approach of Ministry of Water Resources, Ministry of Agriculture and State Watershed Departments will not be effective enough. In order to achieve effective implementation, there is a need for the creation of a fully empowered special purpose vehicle (SPV) (which has funds from the nodal ministries and departments) that is responsible for effective implementation micro irrigation under PMKSY scheme. This SPV should be responsible for all the activities, including on-ground implementation as well as monitoring and meeting the MI targets. Considering the importance and benefits of SPV, there is a need to set up SPV in various states of India where SPV is not available along the lines of GGRC and APMIP for operative implementation of PMKSY throughout the country.

- **Proposition for effective implementation of existing schemes**

At present, in some states such as Punjab, Haryana, Rajasthan and Maharashtra, farmers are required to pay for the upfront cost of the micro irrigation system. The farmers have to bear the initial cost ranging from 50% to 100% of the total cost to be paid in advance to the MIS suppliers, which puts further strain on most of the farmers<sup>36</sup>. The lack of firm guidelines tends to result in poor implementation of MIS. There could be a provision of NOC from farmers wherever farmer is unable to pay full payment upfront for MIS and payments could be transferred to MIS suppliers directly.

<sup>36</sup> A Narayanamoorthy, 2006, Potential for drip and sprinkler irrigation in India, IWMI-CPWF project on 'Strategic Analysis of National River Linking Project of India, last accessed on 27 June 2019

In 80% of the states, the lack of proper guidelines for subsidy funds disbursement could result in delays in implementation of the scheme<sup>37</sup>. There is a need for greater transparency in the micro irrigation implementation process. Information should be easily accessible by all stakeholders in order to ensure proper monitoring and completion of MIS within deadlines and reduce hassles for the farmers. IT should be used to enhance monitoring, showcasing of best practices and improving transparency in the sector.

- **Capacity building of the farmers and other stakeholders**

Majority of the district and block officials of different states have advised to enhance capacity building of both stakeholders, that is, beneficiaries and officials, on the operation and maintenance of micro irrigation systems. A report by NITI Aayog has also stated that around 61% of beneficiaries have demanded for increasing both awareness and capacity building through training and demonstrations<sup>38</sup>.

The capacity of Water Users Associations (WUAs) should be enhanced with the support of public and private sector in India to improve water use efficiency by providing trainings on the operation and maintenance of MIS on field. The networks of Precision Farming Development Centres (PFDC) that have been established in India and are available in every state to promote precision farming for hi-tech horticulture need to be strengthened and equipped to function as training centres to impart training to large numbers of farmers<sup>39</sup>.

<sup>37</sup> Details available at <http://planningcommission.gov.in/plans/mta/mta-9702/mta-ch31.pdf>, last accessed on 27 June 2019

<sup>38</sup> Details available at [http://planningcommission.gov.in/reports/peoreport/peo/peo\\_microagri.pdf](http://planningcommission.gov.in/reports/peoreport/peo/peo_microagri.pdf), last accessed on 27 June 2019

<sup>39</sup> Details available at <https://www.ncpahindia.com/faqs#second>, last accessed on 27 June 2019

- **Awarding “Infrastructure” status to micro irrigation sector**

Granting infrastructure status to the irrigation sector could result in single-window clearance for irrigation projects in different states, thereby saving time. The infrastructure status in the irrigation sector would encourage private agencies to take part in restructuring the decades-old irrigation infrastructure, leading to better management of existing irrigation water supply networks and better planning of future irrigation water projects. For example, under the water and sanitation category, Reserve Bank of India (RBI) has notified, “Infrastructure” status to Water

Supply Pipe Lines and to Irrigation (Dams, Channels and Embankments); this facilitates international investments directly and easy access to infrastructure funds.

Similarly, it is important that micro irrigation (MI) sector is declared as infrastructure entity and prioritized sector, so that it would be eligible for the benefits entitled to major/medium/minor irrigation projects and specifically facilitate the access to international finance and infrastructure funds. Moreover, it will help to reduce the operating cost for MIS manufacturers, which will in turn reduce the burden of MIS cost on farmers.

## Concluding Remarks

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Agriculture is an important sector for a developing nation, but this sector in India consumes significant amount of resources. In India, there is a huge scope of micro irrigation systems. Although the government had come up with few central and states sponsored schemes, the scale of adopting micro irrigation methods is relatively low. Some of the key suggestions are as follows:

- There is a need to formulate and opt or implement State Water Policy in consonance with irrigation schemes and the National Water Policy. Systematic policy focus and administrative initiatives such as revision of the State Irrigation Acts are imperative for achieving water use efficiency in the irrigation sector. Policies focusing on an integrated approach involving all stakeholders are necessary for the wider adoption of micro irrigation technologies.
- Participatory Irrigation Management should be a common approach involving all stakeholders, particularly Gram Panchayats, Water Users Associations (WUAs), local bodies and NGOs. Induction of NGOs could be considered to motivate users and educate farmers in efficient water use and management of the irrigation system.
- Policy wise regulatory changes could be made in order to accelerate subsidy process for the rapid execution of the scheme. While framing or modifying the policies for the promotion of micro irrigation, all stakeholders, which include state governments, Panchayati Raj Institutions (PRIs), farmers, bankers and industries, should be involved in order to bring all of them on one platform.
- One of the major hindrances for widespread adoption of micro irrigation is the capital cost in its installation. The government has come up with different subsidies, but lack of awareness of the benefits of MIS has resulted in poor adaptation of these technologies. There is a need to sensitise farmers by helping them visualise the benefits of using the micro irrigation through pilot demo farms. Educating farmers regarding various precision irrigation methods such as micro irrigation has to be a primary agenda of agricultural and water-related departments.
- Policies and programmes for irrigation sector development should have a greater focus on increasing availability of water and simplifying the process of availing incentives/subsidies to farmers for adaptation of micro irrigation systems to promote “Per drop, More Crop – Micro Irrigation (MI)” and “Har Khet Ko Pani” initiative under PMKSY scheme.
- Most of the micro irrigation schemes have a current area ceiling limit of 5 ha per family; however, several irrigation experts have suggested that increasing this limit to 10 ha would be very beneficial to farmers and aid the accomplishment of the targets for MIS in India.
- Special purpose vehicle (SPV) could be set up in all the states in order to streamline all the institutions responsible for micro irrigation scheme implementation on one platform to facilitate farmers to implement MIS easily on ground, which ultimately advances water use efficiency. There is an enormous opportunity to increase micro irrigation area coverage while also increasing the GDP of the country and ensuring food security for growing population.
- Water saving and water use efficiency schemes and strategies such as awareness campaigns on micro irrigation techniques, training and capacity building programmes on sustainable agriculture and stakeholders consultation related to micro irrigation systems must be adopted as best practices for all agricultural water users.
- There is a need for better transparency in micro irrigation implementation process. Information should be easily accessible by all stakeholders in order to ensure proper monitoring and completion of MIS within deadlines and reduce hassles for the farmers. There should be IT supported operations in every state to enhance monitoring, showcasing of best practices and improving transparency in the micro irrigation sector.
- Direct Benefit Transfer (DBT) model could be introduced in conjunction with Direct Beneficiary Model in order to enhance efficiency and transparency and to reduce delays in the release of funds. The DBT model should

be Direct Benefit Transfer model instead of Direct Beneficiary Transfer. In this model, wherever a farmer is unable to pay full payment upfront, there could be a provision of No Objection Certificate (NOC) from the farmer and the payments could be transferred to MIS suppliers directly by the state agriculture department.

- Certain states in India has made usage of micro irrigation systems mandatory for water guzzling crops such as sugarcane in order to conserve water, especially in water stress areas. This initiative could also

be taken up at the national level with the inclusion of other water guzzling crops. Moreover, a special subsidy programme might be introduced for water guzzling crops such as sugarcane, banana and vegetables.

- In order to encourage adaptation of micro irrigation and its promotion among the poor and marginal farmers, a special scheme could be introduced that links the bank loan facility for digging wells with electricity connection for pump sets to those farmers who are ready to adopt the micro irrigation system.

# Annexure 1

## State-wise Analysis of Schemes and Subsidy Process under National Mission on Micro Irrigation, 2010 and Prime Minister Krishi Sinchayee Yojana, 2015

Sl. No.	State	Policy/mission	Dedicated cell/officer in the dept. to promote MIS	Enabling factors for MIS schemes	Hindering factors for MIS schemes	Subsidy process*	Payment terms*	Subsidy extent*	Area coverage under Micro Irrigation System (2018)** (Hectares)	Funding source
1	Maharashtra	National Mission on Micro Irrigation	Not available	Funds are sufficient to implement MIS schemes; farmers awareness rate is high for MIS; large-scale MIS adaptation for cash crops such as sugarcane, cotton, and banana	State irrigation scheme process guidelines are ambiguous; funds are unutilized with low priority; share of state for funds under PMKSY is delayed	DBT, smooth, online	55%, 45%, 0%	50%-60% of MIS cost with no ₹/ha cap; maximum 5 ha land coverage per farmer	1,545,369	Government of Maharashtra; Government of India

2	Andhra Pradesh	Prime Minister Krishi Sinchayee Yojana 'Per Drop More Crop' component	Andhra Pradesh Irrigation Project (APMIP)	Presence of APMIP (special purpose vehicle to initiate MIS schemes); state irrigation scheme process guidelines are clear with timelines; funds are utilized with high priority; share of state for funds under PMKSY is on time	Insufficient funds; long delay in payment disbursement; very long payment cycles is a major hinderer in the scheme	Non-DBT, smooth, online	10%, 50%, 40%	50%–100% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage	1,584,949	Government of AP; Government of India (with NABARD assistance)
3	Gujarat	National Mission on Micro Irrigation	Gujarat Green Revolution Company Limited (GGRC)	Funds are sufficient to implement MIS schemes; presence of GGRC (SPV); state irrigation scheme process guidelines are clear with timelines; funds are utilized with high priority; share of state for funds under PMKSY is on time	The undue long and complex processes and constant and sudden changes in processes by GGRC for availing subsidies are major hindrances; non-viable pricing leading to low micro irrigation business at the state level	Non-DBT, complex, online	25%, 0%, 75%	60%–85% of MIS cost at ₹/ha with cap; no ceiling on area coverage	1,281,136	Government of Gujarat; Government of India
4	Karnataka	National Mission on Micro Irrigation	Karnataka Antharaganga Micro Irrigation Corporation (KAMIC) (Proposed) (SPV)	Share of State for funds under PMKSY is on time; State Irrigation scheme process guidelines are clear with timelines; Scheme has higher potential with higher priority for execution	Absence of SPV; funds are insufficient	DBT, smooth, online	0%, 0%, 100%	80%–90% of MIS cost with no ₹/ha cap; district-wise quotas and ceilings; maximum 5 ha land coverage	1,286,640	Government of Karnataka; Government of India

5	Tamil Nadu	Pradhan Mantri Krishi Sinchayee Yojana "Per Drop More Crop" component	Tamil Nadu Horticulture Development Agency (TANHODA) (SPV)	Presence of SPV; Share of State for funds under PMKSY is on-time; State Irrigation scheme process guidelines are clear with timelines and effective implementation; Funds are utilized with high priority and strong monitoring.		Non-DBT, Smooth, Online	0%, 60%, 40%	75%–100% of MIS cost with ₹/ha cap; ceiling on area coverage; maximum 5 ha land coverage	503,206	Government of Tamil Nadu; Government of India
6	Punjab	Rashtriya Krishi Vikas Yojana, 2007	Not available	Funds are sufficient to implement MIS schemes	Share of State for funds under PMKSY is delayed; absence of SPV; round the year fund disbursement is unavailable; State Irrigation scheme process guidelines are unavailable; no priority; dismal situation	Non-DBT, smooth, online	0%, 100%, 0%	80%–90% of MIS cost with no ₹/ha cap; maximum 5 ha land coverage but additional subsidy given by state to support farmer holding a land above 5 ha	48,281	Government of Punjab; Government of India
7	Haryana	Prime Minister Krishi Sinchayee Yojana "Per Drop More Crop" component	State Agriculture department under on-farm water management; State Horticulture department under Pradhan Mantri Micro Irrigation Mission	Funds are sufficient to implement MIS schemes; round the year fund disbursement is available; share of State for funds under PMKSY is on time	State Irrigation scheme process guidelines are clear but only on paper; no priority; process is delayed due to late starting of the online MIS portal; inconsistency in policies; incessant changes	DBT, smooth, online	0%, 0%, 100%	60%–85% of MIS cost with no ₹/ha cap, especially in critical and overexploited blocks; maximum 5 ha land coverage but additional subsidy given by state to support farmer holding a land above 5 ha	594,911	Government of Haryana; Government of India

8	Uttar Pradesh	Prime Minister Krishi Sinchayee Yojana "Per Drop More Crop" component	Deputy Director of Horticulture (Nodal Officer)	Funds are sufficient to implement MIS schemes; round the year fund disbursement is available; share of State for funds under PMKSY is on time; State Irrigation scheme process guidelines are clear without timelines	Only 70% of the funds are utilized by the state to promote MIS programme with low priority	DBT, smooth, offline	0%, 0%, 100%	50%–90% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage.	99,027	Government of Uttar Pradesh; Government of India
9	Chhattisgarh	National Mission on Micro Irrigation	CHAMPS – Chhattisgarh Agriculture Mechanisation and Micro-irrigation Process Management System (SPV)	Funds are sufficient to implement MIS schemes; higher potential; high priority	Share of State for funds under PMKSY is delayed; round the year fund disbursement is unavailable due to extensive time lag between installments of state share; State Irrigation scheme process guidelines are clear but ineffective implementation; harassment in third-party inspection; undue queries; delays in implementation	Non-DBT, complex, online	0%, 0%, 100%	80%–90% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage	297,343	Government of Chhattisgarh; Government of India



10	Madhya Pradesh	National Mission on Micro Irrigation	MPFSTS (Dept. of Horticulture) and MPDAGE (Dept. of Agriculture)	Funds are insufficient to implement MIS schemes; share of State for funds under PMKSY is delayed; round the year fund disbursement is unavailable due to extreme lapse in release of payments; no separate state irrigation scheme process guidelines, PMKSY guidelines are only followed; low priority; approvals and release of final payments are as per the discretion of the department officials	Both, online	50%, 0%, 50%	40%–80% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage.	521,425	Government of Madhya Pradesh; Government of India
11	Rajasthan	Pradhan Mantri Krishi Sinchayee Yojana "Per Drop More Crop" component	Rajasthan Hort. Development Society	Funds are sufficient to implement MIS schemes; 60%–70% fund utilization with high priority	Non-DBT, smooth, online	0%, 100, 0%	50%–70% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage	1,836,750	Government of Rajasthan; Government of India

12	Telangana	Pradhan Mantri Krishi Sinchayee Yojana "Per Drop More Crop" component	Not available	State Irrigation scheme process guidelines are clear with timelines; funds are utilized with high priority; share of State for funds under PMKSY is on time	Absence of SPV; round the year fund disbursement is unavailable due to pending documentation by NABARD	Non-DBT, smooth, online	0%, 60%, 40%	90%–100% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage	221,910	Government of Telangana; Government of India
13	Bihar	National Mission on Micro Irrigation	Not available	Funds are sufficient to implement MIS schemes	Absence of SPV; round the year fund disbursement is unavailable (slack due to untimely up gradation of the portal); share of State for funds under PMKSY is delayed, State Irrigation scheme process guidelines are still not rolled out for the current financial year; funds are unutilized with low priority	DBT, smooth, offline	0%, 0%, 100%	60%–75% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage.	114,576	Government of Bihar; Government of India
14	Jharkhand	National Mission on Micro Irrigation	Not available	Funds are sufficient to implement MIS schemes	Share of State for funds under PMKSY is delayed; round the year fund disbursement is unavailable; absence of SPV; State Irrigation scheme process guidelines are still not rolled out for the current financial year; funds are unutilized with low priority	Non-DBT, smooth, online	0%, 0%, 100%	80%–90% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage.	32,412	Government of Jharkhand; Government of India

15	North-Eastern States	National Mission on Micro Irrigation	Not available	Funds are sufficient to implement MIS schemes	Share of States for funds under PMKSY is delayed; round the year fund disbursement is unavailable; absence of SVP; State Irrigation scheme process guidelines are unavailable; funds are unutilized with low priority	Non-DBT, complex, offline	0%, 40%, 60%	45%–60% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage	23,825	Governments of NE states; Government of India
16	West Bengal	Pradhan Mantri Krishi Sinchayee Yojana "Per Drop More Crop" component	Not available	Funds are sufficient to implement MIS schemes	Share of State for funds under PMKSY is delayed; round the year fund disbursement is unavailable; absence of SVP; State Irrigation scheme process guidelines are unavailable; funds are unutilized with low priority	Non-DBT, smooth, online	0%, 0%, 100%	50%–55% of MIS cost with ₹/ha and per family caps; maximum 5 ha land coverage	53,317	Government of Bengal; Government of India

\*Data collected in consultation with the micro irrigation industries as well as inputs from some state government departments, farmers and other relevant published sources.

\*\* *Pocket Book of Agricultural Statistics*. 2018. Government of India Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Cooperation & Farmers Welfare, Directorate of Economics & Statistics, New Delhi, last accessed on 28 June 2019

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