



# PROCEEDINGS OF 'SAHI FASAL' WORKSHOP

Aurangabad, Maharashtra, 13th January 2020

## Abstract

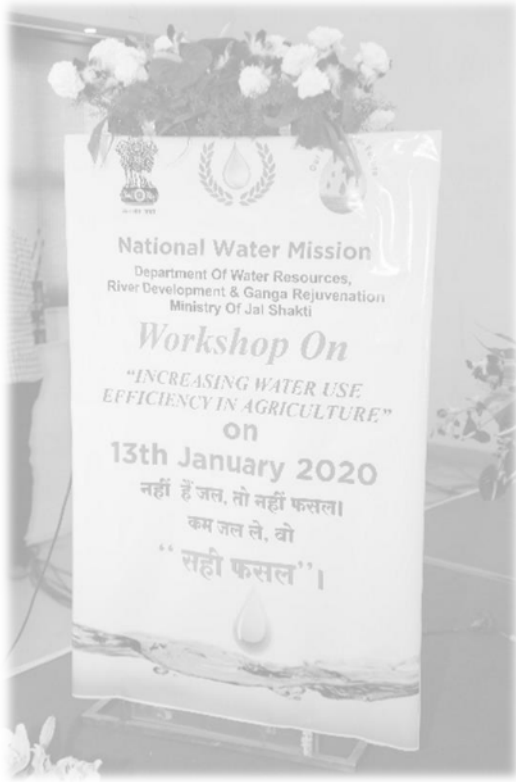
A workshop was organized in Aurangabad as part of the national campaign on "Sahi Fasal" to nudge farmers towards growing crops that uses less water, promotes nutritional security and provides profits to farmers.

National Water Mission,  
Department of Water Resources, RD & GR,  
Ministry of Jal Shakti,  
Government of India



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## Background Note

India is an agrarian country being one of the top producers of several crops such as wheat, rice, pulses, sugarcane, and cotton globally. It is also the source of livelihood for about 58 percent of India's population. In the financial year 2017-2018, the gross value added by agriculture, forestry, and fishing is estimated at Rs 18.53 trillion (US\$ 271.00 billion).

Currently, about 51% of the agricultural area cultivating food grains is covered by irrigation. The rest of the area is dependent on rainfall (rain-fed agriculture). Cross country comparison of water use efficiency shows that India uses 2-3 times water to produce one unit of major food crops as compared to other major agricultural countries like China, Brazil and the USA.

The Economic Survey 2015-16 observed that India largely uses the technique of flood irrigation, where water is allowed to flow in the field and seep into the soil. This results in the wastage of water since excess water seeps into the soil or flows off the surface without being utilized.

Though 78 percent of freshwater available in the country is diverted towards agriculture, still only 48 percent of the gross cropped area has been brought under irrigation indicating the unchecked use of groundwater. Water guzzling crops like paddy and sugarcane crops together occupy one-fourth of the gross cropped area consuming over 60 percent of the total irrigation water supplied to agriculture. For future sustainability of agriculture, improving water use efficiency is key priority of Indian Agriculture.

In future, the inter-sectoral competition for water is going to increase with the rise in urbanization along with agriculture. But with increasing population, per capita demand for more food, feed and fiber is also going to increase. It may be worth noting that water is likely to be a more binding constraint to Indian agriculture than even land. This will lead to a challenging situation of “how to grow more agri-produce with less water on a sustainable basis”.

Reforms must start from water use in agriculture with raising agricultural productivity per hectare of land rather than per cubic meter of water supplied and/or consumed. Secondly reforms should be brought by aligning the crop production according to natural water resource endowment of state. Production of paddy in Punjab and sugarcane in Maharashtra

indicates that crops are not being cultivated in line with the climatic and hydrogeological pattern of the state. The water guzzler paddy and sugarcane crop which uses more than 60 percent of irrigation water available in the country are largely being cultivated in the most water-scarce regions of the country restricting irrigation water availability for other major crops of the region. The root cause for misalignment between cropping pattern and water resource availability can be attributed to the inability in production of the water guzzler crops in the water abundant states owing to highly subsidized pricing of water, power, and fertilizers, and assured prices of their outputs in other agriculturally advanced states. The need for reform in policies and programs to rectify the misalignment in cropping pattern from a water perspective is urgently needed.

These water guzzling crops are also grown states that are water scarce because of highly subsidized pricing of water, power, and fertilizers, and assured prices (government determined) of their outputs in these states. These incentives have been ensured in states like Punjab, Tamil Nadu etc. to erect suitable procurement structures for rice or attract sugar mills in their areas making production of rice and sugarcane profitable. This has led to a major misalignment in cropping patterns from the point of view of water availability. The hot-spots being Punjab-Haryana belt for rice and Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu for sugarcane.

Climate change is also adversely affecting agriculture making it prone to droughts, floods, etc., the frequency and intensity of which is likely to increase in the future.

There is a need to utilize scarce water resources in the best way possible. The present Government has been concerned with the issue and has prioritized agriculture water use through schemes like “Har Khet ko Pani – Water for every field” and “per drop more crop”.

The concept of “*Sahi Fasal*” is a step to nudge the Indian agriculture in a direction that promotes crops which uses water efficiently, has nutritional quality and is economically profitable to the farmers. Creating awareness among farmers on micro –irrigation, soil moisture conversation and initiating dialogues among policy makers to improve procurement policies, effective pricing of inputs (water and electricity) are key steps towards promoting the concept of “Sahi Faisal”. In addition, bringing policy makers, programmers together in framing policy/ programs that promote water conservation in agriculture along with mainstream agricultural policies will aid the rapid uptake of the program among key stakeholders. Furthermore, altering from price policy approach of heavily subsidizing inputs to income policy approach of directly giving money into the accounts of the farmers on per hectare basis (direct benefit transfer of input subsidies) and letting prices be determined by market forces.

The Government of India launched National Action Plan on Climate Change (NAPCC) which inter-alia identified the approach to be adopted to meet the challenges of impact of climate change through eight national missions including National Water Mission (NWM). NWM’s objective is “conservation of water, minimizing wastage and ensuring its more equitable distribution both across and

within States through integrated water resources development and management”.

The goal three and four under the mission are Focused attention to vulnerable areas including over-exploited areas and increasing water use efficiency by 20% respectively. Water use efficiency in agriculture has assumed critical importance because of the increasing areas under irrigation and high water requirements of crops. The Prime Minister of the nation during the launch of Atal Bhujal Yojna also emphasized on diversifications to less water intensive crops in agriculture sector. With the above in view, NWM has launched a campaign namely ‘Sahi Fasal’ for the purpose of educating the farmers to grow less water intensive crops. The campaign was kick-started with workshops conducted in Amritsar and New Delhi in the month of November, 2019.

Maharashtra is the second largest state in India in terms of population and geographical area. Like other states about 55 percent population is directly or indirectly depends on agriculture. The state accounts for about 6.8% of the India’s gross cropped area (GCA) and contributes to 11% of the country’s gross domestic product (GDP) from agriculture in 2018-2019. The agriculture & allied activities sector contributes 11 % to the state’s income. It is observed that Maharashtra approximately contributes to half the country’s production of Jawar cotton, sugarcane each year. The state has also emerged as an important producer of important fruits, vegetables and flowers especially in-house.

Through Maharashtra is one of the richest states in terms of per capita income, its

agriculture performance is not up to the mark. This is mainly due to predominant cultivation of the crops under rainfed conditions and low irrigation coverage of around 18%. Sugarcane farming has also been attributed to low coverage of irrigation in Maharashtra though the state has the largest number of major and medium irrigation projects.

As per Maharashtra Water and Irrigation Commission (MW & IC, 999), the water demand in 2030, both from surface and groundwater is likely to be about 103 BCM comprising 86% for irrigation and 14% for non-irrigation uses. Thus, there is likely to be a serious supply - demand gap of the freshwater over the upcoming one and half decade, unless additional storages are created as also demand management measures are deploy.

The state is divided into 5 division, viz. Marathwada, Vidharbha, Konkan Khandesh, Desh and Konkan. Marathwada is the region comprising the eight districts of (divisional headquarters) Jalna, Aurangabad, Parbhani, Hingoli, Nanded, Latur, Osmanabad and Beed. Marathwada has lagged behind the rest of Maharashtra in economic prosperity due to lack of natural resources and water scarcity. Since it is a rain-shadow region, it is prone to drought and numerous farmer suicides have been reported due to inability repay agricultural loans. Irrigation water, in real terms reaches not more than 50,000 acres of cultivable land.

Aurangabad District which lies in the Marathwada region of the state is affected by drought frequently. Major part of the district falls in Godavari basin with a small area in north eastern parts falling Tapi

Basin. Although a considerable area in Aurangabad district is under canal command area of various major and minor irrigation projects but major parts of the district is showing declining trend of water levels due to exploitation of ground water for irrigation and other purposes at a faster rate. Currently as per the Central Ground Water Board Report, the district falls in the semi critical category with the stage of groundwater development begin 73%.

The major crops grown in the district are Cotton, Jawar. Wheat & Corn. Cotton being a cash crop is grown majority by all the farmers is known to have high water requirement. On an average, India uses 22,500 liters of water to produce 1 kg of cotton. However, unsustainable way of production of cotton through rainfed irrigation system is causing major water deficiency in the region. Research has shown there are vast tract of shallow soils

with poor fertility coupled with uneven distribution of rainfall over larger area, has led to decrease in cotton productivity in the district when compared to other districts of the state. The recurrent droughts and early termination of monsoon rains during September in Marathwada region call for strong water harvest programs, better management of irrigation water and capacity building of the farmers on sustainable farm water management practices.

In this series, NWM organized another workshop on “Increasing water use efficiency in Agriculture” on 13/01/2020 at Aurangabad. The inaugural session of the workshop was followed by technical sessions on Crop Economics, Crop Diversification and Integrated approach for increasing Water Use Efficiency with the engagement of prominent speakers.

## Agenda: Inaugural Session



- Inauguration Exhibition: Shri Rattan Lal Kataria, Honorable Minister of State, Ministry of Jal Shakti, New Delhi
- Welcome Address: Shri. G. Asok Kumar, Additional Secretary & Mission Director, National Water Mission, New Delhi
- Opening Address I: Shri Nand Kumar Ghodele, Mayor, Aurangabad Municipal Corporation, Govt. of Maharashtra
- Opening Address II: Shri R.R. Pawar, Secretary, CADA, Govt. of Maharashtra
- Opening Address III: Shri U.P. Singh, Secretary, D/o Water Resources, RD & GR, M/o Jal Shakti, New Delhi
- Key Note Address: Shri Rattan Lal Kataria, Honorable Minister of State, Ministry of Jal Shakti, New Delhi





## Welcome Address



**G. Asok Kumar  
Additional Secretary and  
Mission Director, National  
Water Mission**

Current practices of managing water need to be restructured, not least to allow posterity to continue taking delight in the virtues of water."

Shri G. Asok Kumar, welcomed all the delegates, officials and farmers and painted his narrative with a historical hue evoking a sense of reverence amongst the participants, and farmers, in particular, towards the multitudes of cultural and religious legacies which they collectively cherish; and, thereby encouraged participants for collectively preserving these legacies and managing their shared risks – of which, he exclaimed, water has emerged as the most menacing! He explained further that water’s defining ability to cut through the core of all of our collective endeavors merits our special attention towards ensuring its logical management so as to continue reaping the scores of benefits offered by this supernal resource. He continued to instill a sense of shared responsibility amongst participants to manage the shared risks they all face in the wake of depleting water resources and corresponding threat to their economic and social state of affairs. He concluded by demanding urgent restructuring of agricultural practices to suit the principles of efficient water management in this region.

## Opening Remarks I: People Centric Approach towards Irrigation Management



Nand Kumar Ghodele  
Mayor, Aurangabad Municipal  
Corporation

“Chronic agrarian distress stems from our exceeding dependency on the vagaries of monsoon for meeting agriculture water needs.”

Shri Nandkumar Ghodele, Mayor, Aurangabad Municipal Corporation, expressed his satisfaction upon learning how water has occupied a central position in our national policy discourse and that significant actions are introduced for its conservation at a basin wide scale. He made special reference to the Namami Ganga Program and how it is ensuring revitalization of River Ganga to its former glory. He informed the participants towards the need for similar policy directions for conserving the River Kham – which continues to undergird the very existence of human society in this region. He, thereafter, pointed towards the chronic agrarian distress which, he explained, stems from the exceeding dependency of farmers on the vagaries of monsoon for practicing agriculture. He enunciated the extant efforts of Maharashtra Government in allaying this distress by way of doling out loan waiver schemes and other measures for agriculture water management, such as those introduced under their flagship Jal Yukt Shivar Abhiyan. He concluded by emphasizing upon the need for bringing in concerted and comprehensive actions towards water management covering the gamut of challenges facing its sustainable use and conservation.

## Opening Remarks II: Need for Strengthening Policy-Practice Interfacing



R.R. PAWAR  
Secretary, CADA, Govt. of  
Maharashtra

*“What our farmers need is a measured nudge towards growing ‘Sahi Fasal’. With right amount of knowledge and skills, they will be poised to orchestrate a new paradigm in the agriculture sector.”*

Shri R.R. Pawar, welcomed the participants and appreciated the efforts put together by central water ministry and state water resources department in a collaborative way to organize this workshop on a critical subject, especially for farmers. He emphasized on the fact that despite large scale construction of dams and provisioning of canal systems all across the State by the water resources department, large tracts of cultivated area still remain dependent on the vagaries of monsoon. This workshop is organized in recognition of the need to understand how we can maximize the agricultural produce within the limited resources. He informed the participants that in eight districts of Marathwada region, there are 45 major dams, 81 medium dams and 838 minor dams. Though the overall water availability in all dams is 62%, it is only 32% in the case of 838 minor dams. He added that the farmers of Marathwada region are hardworking and now seasoned to use less water for more produce, however some knowledge gaps continue to inhibit full transformation of extant agriculture practice in the region. Shri Pawar concluded his talk by motivating farmers to get the requisite information and training from district level knowledge centers and YASHDA Pune respectively, so that farmer can accelerate implementation of improved farming practices and, in return, earn maximum profits while continuing agriculture in the resource-poor regions of Maharashtra.

## Opening Remarks III: Informing our collective efforts with the scientific canons of irrigation water management



U.P. Singh

Secretary, D/o Water  
Resources, RD & GR, M/o Jal  
Shakti

*"The secret to sustainably manage India's water resources lies in our collective efforts towards managing India's dynamic groundwater resources."*

Shri U.P. Singh articulated his fascination towards the cultural edifice of Aurangabad which he found to be presenting a scintillating mix of architectural, historical and traditional offerings to any person who makes a sincere visit to this cultural capital of India. However, a region theretofore celebrated for its historical grandeur has now, worryingly, become etched in the public's memory as a poster child for drought, and ensuing distress and destitution. While Shri U.P. Singh was honest in his lament, he was also motivating in his recognition of the hosts of grassroots efforts being seen from time to time in this region, and others around the country. Cases of Hiware Bazar and Jakhni, were among the many examples Mr. Singh cited during his inaugural address. He continued alluding to the successful cases of public-led grassroots movements of water conservation observed throughout the country, while explaining the enabling factors and the necessary wherewithal available that had led to their success.

Sourcing inspiration from these stories of participatory water management, he expounded how the Government of India has found itself cajoled to introduce the principles of public participation in the way ground water is managed in India and, therefore, has recently rolled out a scheme titled "Atal Bhujal Yojna". Groundwater resources in this country, as he noted, paved the way for green

revolution and, he continued, not only made possible the idea of 'food self-sufficiency', but, much to its credit, catapulted India as one of the leading producer of many agriculture products. For him, the secret of India's sustainable water management, therefore, lies in how we manage our groundwater resources as against the popular belief of building large dams. He referred to the situation in Maharashtra, where successive investments for construction of large scale dams, which had inflated to the tune of exorbitant decibels, have failed to yield corresponding benefits in the form of irrigation potential created.

On the point of irrigating practices in agriculture, he seemed earnest in his call for bringing a paradigm shift in our approach whereby scientific tenets for enabling effective application of water on the farms become installed therewith. He expanded on this concept by making an anecdotal reference of his yester-time conversation with the Honorable Prime Minister of India, Shri Narendra Modi, wherein Mr. Modi had drawn an analogy to underscore our current imprudent practice of spate/flood irrigation and perceptively said that 'as we feed a baby desirous of milk with a spoon instead of bathing him/her with the milk s/he had so desired, we must observe precision in our application of water for plugging crops' water requirements just as they desire'.



## Key Note Address: Fixing Policy Imperatives to support Crop Diversification



Rattan Lal Kataria  
Honorable Minister of State,  
Ministry of Jal Shakti

“Current policy arrangements have entrenched a skewed incentives thereby coaxing farmers to grow water intensive crops.”

Shri Rattan Lal Kataria, established the need to sustain the competitive status of agriculture sector in the wake of increasing pressure from urbanization, industrialization and climate change. He exclaimed that, although India has established itself as one of the leading producers of many agriculture crops, current trends in the way water is used and managed for supporting the agriculture industrial complex is grossly deplorable.

He added that the current policy arrangements for supporting the agriculture sector, including the procurement policies for securing the farm produces, have created skewed incentives for the farmers to grow water intensive crops and to continue adopting inefficient water management practices for growing their crops. He introduced some of the steps that the Government of India and some state governments are taking to provide ensured irrigation to farmers and increasing their crop yield, viz. Har Khet Ko Pani and More Crop per Drop. He added how the government of Haryana has successfully diversified 50,000 hectares of land towards maize and millets crops alongside introducing MSP arrangement for the purchase of these crops at competitive pricing for encouraging their mass adoption by farmers.

Shri RL Kataria also requested the participants to make water management in agriculture a 'Jan Andolan'. He informed the participants as to how National Water Mission, through its Sahi Fasal Campaign, aims to nudge the agriculture sector to adopt crops which uses less water, uses it efficiently, have high nutritional value and are economically remunerative to the farmers. He took the case of cotton plantation in Marathwada region which happens to be an aberration considering the resources and climatic conditions prevalent in this region. He explained the economics present in the trading of embedded water via cotton sales in order to sensitize the farmers as to how they are inadvertently losing their precious water resources in the sale of agriculture produce. He expounded how 1 kg of cotton requires around 22500 liters of water and when put in the context of cotton export, amount to large volumes of water getting traded (or lost!) in a virtual form from a water deficient state to another state/country.



## Agenda: Technical Session



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### 10:25 – 14:15 Technical Session

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Ground Water Development  
& Management – an Overview

Ms. Anu Radha Bhatia, CGWB, Pune

Crop Diversification

Dr. Dinesh Kumar, Principle Scientist, ICAR, New  
Delhi

Voices from the Field I

Shri. Bhagwan Khanda Bankar

Making Farming Climate  
Smart & Water Resilient

Shri Abhijit Kawathekar, DM, WOTR, Pune

Alternate Crops

Shri Dr. D.H. Pawarm Professor (Retd.) WALMI,  
Aurangabad

Micro Irrigation

Shri Sanjay Mutkule, Sr. Agronomist, Jain Irrigation  
Systems Ltd. Jalgaon

Conglomerate Measures to  
Enhance Field Efficiency

Dr. D.G. Durbude, Associate Professor, WALMI,  
Aurangabad

Pipe Distribution Network &  
Micro Irrigation

Shri. A.B. Nirmale, Assistant Professor, WALMI,  
Aurangabad

Voices from the Field II

Shri N.D. Askand, Chairman, WUA, Tirthpuri

Conclusion & Vote of Thanks

Shri. S.K. Arora, Advisor, NWM, New Delhi



## Presentation I: Ground Water Development and Management – an Overview



Anu Radha Bhatia  
Sr. Hydrogeologist, CGWB

“India’s total ground water extraction accounts for a quarter of the World’s total ground water extraction.”

The Technical Sessions began with the lecture of Smt. Anu Radha Bhatia on the topic of ‘Ground Water Development and Management – an Overview’. At the outset, she explained the rudiments of ground water science – its occurrence and distribution below the surface – to encourage swift uptake of principles of ground water management amongst the participating farmers. Following her explanation of the hydrogeological setting across India, she chalked an evidence based perspective of the extent to which ground water resources are developed in India. She explained that in India, out of the total extraction of 230 Km<sup>3</sup> - which itself amounts to a quarter of the total ground water extractions in the world – 92% is roughly used for irrigation purposes alone. Continuing further, she maintains how the current unsustainable practices of ground water management in India need urgent restructuring and, in this connection, she promulgated the case for efficient use of ground water in the agriculture sector.

Before venturing into water use efficiency concept, she guided the audience on two most commonly acknowledged principles of water management – demand side and supply side management approaches. This assisted the audience in situating the practice of water use efficiency within the overall framework of demand side management and how the efforts in this regard can be complemented with supply side management approaches.

She presented various means available to irrigate the crops and informed participating farmers about the benefits of using more efficient means of irrigation in terms of food (increase in yield) , water (increase in water savings) and energy securities (reduction in the need for pumping excess waters).

She subsequently apprised participants' of supply side management paradigm available, for promoting an informed practice of judicious use of available water resources. She showcased the techniques of rainwater harvesting, water budgeting, conjunctive use of ground and surface water resources, watershed treatment, stream channel modifications and about the need for scientific adoption of emerging tools for sustainable water management on their fields and catchments in large.

## Presentation II: Crop Diversification



Dr. Dinesh Kumar  
Pr. Scientist, ICAR, Delhi

"A comprehensive understanding of the Soil-water interaction should guide the exercise of designing public policies in India."

Second lecture was related to crop diversification and was delivered by Dr. Dinesh Kumar. He expounded farmers' as to how sustained practice of monoculture has put them in a disadvantageous position by way of increasing risk of insect-pests and diseases, increasing weed pressure, increasing economic risks and damaging soil's fertility. He mentioned about the benefits offered via adopting an informed practice of multiple cropping and explained the two most commonly adopted practice of crop rotation and intercropping in this regard. He underscored the ecological connection between soil health and water use efficiency as underpinning the principles of multiple cropping.

He summarily elaborated the principled need for diversifying crops that uses less water and does so more efficiently. He narrated various examples of multiple cropping alongside ancillary measures for increasing crop yields, like laser leveling, fertilization and efficient irrigation technologies. He also delivered suitable measures for drought proofing crops by means of multiple cropping and does so to foment adoption of right mix of behavior amongst drought stressed farmers of Marathwada and Vidharbha.

## Presentation III: Making Farming Water Smart and Climate Resilient



Abhijit Kawathekar  
Deputy Manager, Watershed  
Organization Trust

“Water Budgeting is a tool that quantifies water availability in a village, aiding its equitable and judicious use for all purposes, keeping in mind climate variability.”

The next presentation was on the subject of ‘Crop Economics’. The speaker for the session was Shri Abhijit Kawathekar. Briefly touching upon the problem areas concerning agriculture, he noted that soil quality & water quality is deteriorating, ground water levels are declining, extreme weather events like unseasonal rains, strong winds and hail storms are causing huge losses to farmers. 54% of the country’s population is already facing high water stress. He explained that surface canal irrigation has been steadily declining while groundwater today irrigates over 60-80% of India’s farm lands. According to a report in CGWB, over 22% of groundwater assets have dried up, gone critical or are overexploited in the country. He, therefore, underlined the need for making agriculture Climate Resilient. This necessitates the need for a system of Water Budgeting & Management.

According to him, water budgeting management should be done with a systematic approach wherein the existing water availability should be matched with projected water demand. Accordingly, the cropping patterns should be chosen in line with net water availability keeping in mind household food security and market (income) needs. In this system, sustainable surface and ground water management and water conserving technologies are introduced for suitable results.

Shri Kawathekar also emphasized the need for capacity building to promote water budgeting at the village level. Sharing case studies from his work, he acknowledged that his organization has prepared a tool that quantifies water availability in a village, aiding its equitable and judicious use for all purposes, keeping in mind climate variability. Under this programme, communities are capacitated to monitor groundwater levels, prepare crop plans in line with net available water, adopt water efficient technologies and adopt government norms to promote equitable and sustainable use of water. He concluded that the approach towards using water efficiently in agriculture should be “More Crop Per Drop”.

## Presentation IV: Pre Monsoon Cotton Cultivation on Jain Drip



Sanjay Mutkule  
Sr. Agronomist, Jain Irrigation  
Systems Ltd, Jalgaon

"Jain Irrigation has emerged as a lodestar in the field of micro/drip irrigation, and we are continuing with our mission to make irrigation water management a sustainable enterprise but also a one which supports farmers' bottom line."

The presentation on 'Micro Irrigation' was delivered by Shri Sanjay Mutkule. Touching upon the basics of drip irrigation, he explained that, in this method, water is applied directly to the root zone of plants in frequent intervals in precise quantities as per the crop water requirement. He further introduced the audience to the concept of 'Fertigation', which refers to the application of fertilizers dissolved in irrigation water through drip irrigation system.

Shri Mutkule, presented the case study of cotton cultivation to explain the benefits of drip irrigation to the audience. Cotton, being one of the most important cash crops forms the largest segment of industries in India. He explained that the yield of cotton depends on the climatic conditions, proper nutrition & plant protection measures and water management practices with the adoption of advance technology. He revealed that the cotton crop can give 45-60 quintal/ha yield of kapas under drip irrigation. Some notable advantages of Drip Irrigation in Cotton include saving of water, increase in yield, minimization of weed problem and saving of time and labor.



## Presentation V: Conglomerate Measures to Enhance Field Efficiency



Dr. Dilip Durbude  
Associate Professor, WALMI,  
Aurangabad

"A scheme of Incentives need to be designed to accelerate adoption of right mix of behaviors amongst farmers and irrigation agencies for promoting sustainable and equitable management of irrigation system."

The next presentation was delivered by Dr. Dilip Durbude on 'Conglomerate Measures to Enhance Field Efficiency'. He began his presentation expressing concerns over the harmful impacts of climate change on the finite water resources in the country. He explained that this has led to uncertain precipitation, uneven rainfall, increased rainfall density, reduced groundwater recharge, rising sea level, melting of glaciers, among other alarming consequences. According to him, only one out of three people would have accessibility to water in the coming future, causing conflicts worldwide. He added that the efficient use of available water will occur only by undertaking appropriate techniques for optimizing water use efficiency, scientific water management and farm practices and apt measures for minimizing water loss.

Shifting his focus to Water Use Efficiency, he stated that the present level of water use efficiency in agriculture of surface water & ground water is 35-40% & 65-70% respectively. However, the efficiency can be improved at 60% for the former and 75% for the latter through strategic measures like ensuring improved water efficiency on both Supply and Demand side, conducting field research and promotion of water neutral and water positive technologies like recycling of water.

Dr. Durbude further introduced the audience to three technical efficiency components of irrigation projects namely; Storage Efficiency, Conveyance Efficiency, On Farm Application Efficiency.

Some structural measures to enhance field application efficiency will include regular/periodic maintenance of field channel, restoration of channel sections, lining of field canals, piped irrigation network and use of micro irrigation, as suggested by him. Dr Durbude also advocated for involvement of farmers in the management of Irrigation Systems and formation of Water Users Associations in this regard.



#### About National Water Mission

National Water Mission was established in 2008 under the National Action Plan on Climate Change to ensure conservation of water, minimization of wastage and more equitable distribution of water both across and within states through integrated water resources management. This Mission's overall activities are organized around the following five goals, viz.

1. Comprehensive water database in public domain and assessment of impact of climate change on water resources.
2. Promotion of citizen and state action for water conservation, augmentation and preservation.
3. Focused attention to vulnerable areas including over-exploited areas.
4. Increasing water use efficiency by 20%.
5. Promotion of basin level integrated water resources management.