SALIENT FINDINGS AND RECOMMANDATIONS OF TASK FORCE ON MICROIRRIGATION

N. Chandrababu Naidu
Chairman






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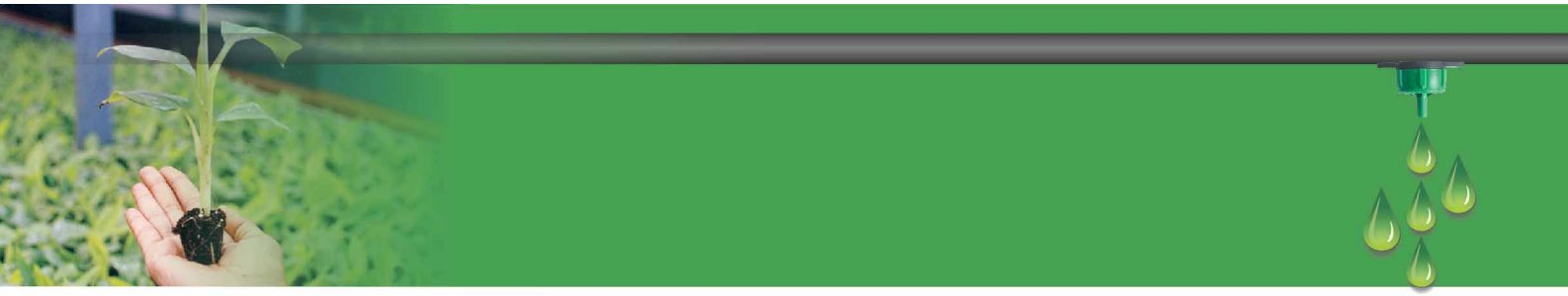
N. Chandrababu Naidu,
Chairman

H.P. Singh
Member Secretary

Government of India, Ministry of Agriculture,
Department of Agriculture & Cooperation, New Delhi.

January, 2004



PREFACE

Indian Agriculture, accounting for 25 per cent of the nation's Gross Domestic Product (GDP), 15 per cent of exports and 60 per cent of the employment, continues to be the mainstay of the economy. Having achieved laudable success in agricultural production in the last 50 years, India has transformed herself from a food deficit to a food surplus country. But, there are many challenges which Indian agriculture is facing in the fast changing scenarios. Relating to the natural resources and production base, water has emerged as the most crucial factor for sustaining the agricultural sector.

India accounts for 16 per cent of the world's human population and nearly 30 per cent of the cattle with only 2.4 per cent of the land and 4 per cent of the water resources. Even if the full irrigation potential is exploited, about 50 per cent of the country's cultivated area will remain unirrigated, particularly with current level of irrigation efficiency. The share of water for agriculture would reduce further with increasing demand from other sectors. But the demand for water for agricultural purposes is estimated to increase to produce increasing quantities of food, horticultural produce and raw material for the industry. Efficient management of water is, therefore, key to future growth of Indian agriculture.

Past interventions for development of irrigation, often due to misplaced and inappropriate policies, have led to indiscriminate use of water and have only helped to create a system, which could cater to the needs of sub-optimal production. Besides, serious agro-ecological and sustainability problems have emerged due to the lack of appropriate technologies, poor technology transfer mechanisms and inadequate institutional support systems. While the water table rise and water logging along with secondary salinization is the problem in canal command areas, receding water table along with ground water pollution in many States are the daunting problems in tube well irrigated areas. The water use efficiency (WUE) in Indian agriculture, at about 30-40 per cent, is one of the lowest in the world, against 55 per cent in China. This requires paradigm shift in conservation and in agriculture policies, which should lead to saving of water, fertilizer and energy resulting in crop diversification and equitable distribution of resources.

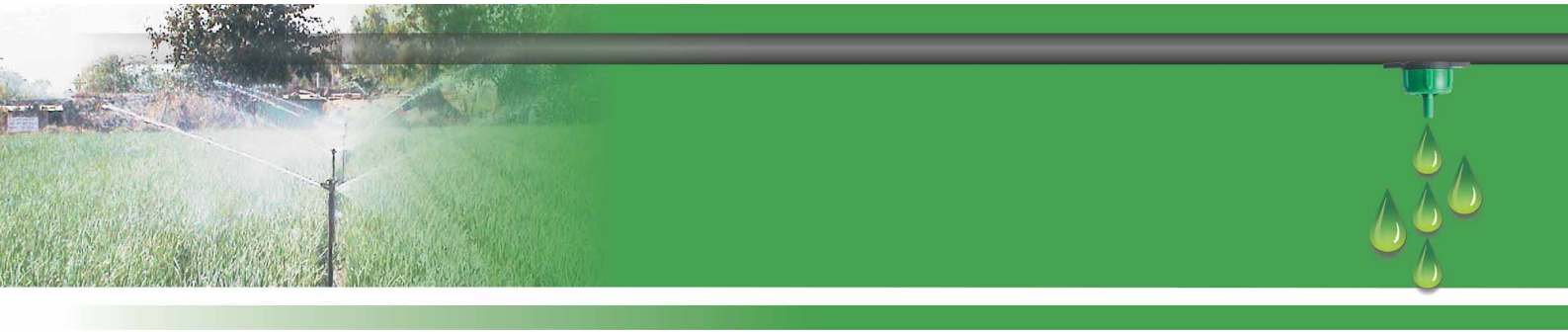
The Government of India has played a catalytic role in promotion of efficient management of water through the use of modern methods of irrigation, leading to a coverage of 0.5 million ha under drip and 0.7 million ha under sprinkler irrigation. Recognizing the need for efficient use of water and the necessity for increasing the water use efficiency, the Government of India constituted the Task Force on Microirrigation to seek guidance on improved technologies, appropriate policy interventions and strategic institutional supports.

The Task Force had wide consultations and in-depth deliberations, including 4 meetings, State level consultations, and suggestions from the public through the electronic media, before coming out with its recommendations, which hopefully are both practical and implementable. Recognising the vast potential of coverage under microirrigation to the tune of 69 million ha and its role in enhancing productivity, diversification and sustainability, the Task Force underscored the need for synergistic blend of technology and policy, particularly, reduction in taxes levied on microirrigation systems, easy availability of credit through financial institutions and building of a strong institutional support for overseeing the development of sector. The Task Force sees that a target of 3.00 M.ha under microirrigation (2 M.ha) under drip and 1 M.ha under sprinkler) is a distinct possibility during the Tenth Five Year Plan period with the hope to cover the potential area by the year 2030.

I, as the Chairman of the Task Force would like to thank all the Members for their active participation. I am also thankful to all the States for their cooperation. I am grateful to Shri R.C.A. Jain, Secretary (A&C), Department of Agriculture & Cooperation for providing the support of the Department and also for providing inputs for the report. My thanks are also due to Dr. H.P. Singh, Member Secretary, for his commitment and hard work in convening the meetings, preparing draft reports and providing technical support.

I am sure, the Government would give serious consideration to operationalize the recommendations, which will go a long way in the furtherance of the Indian Agriculture and livelihood security.

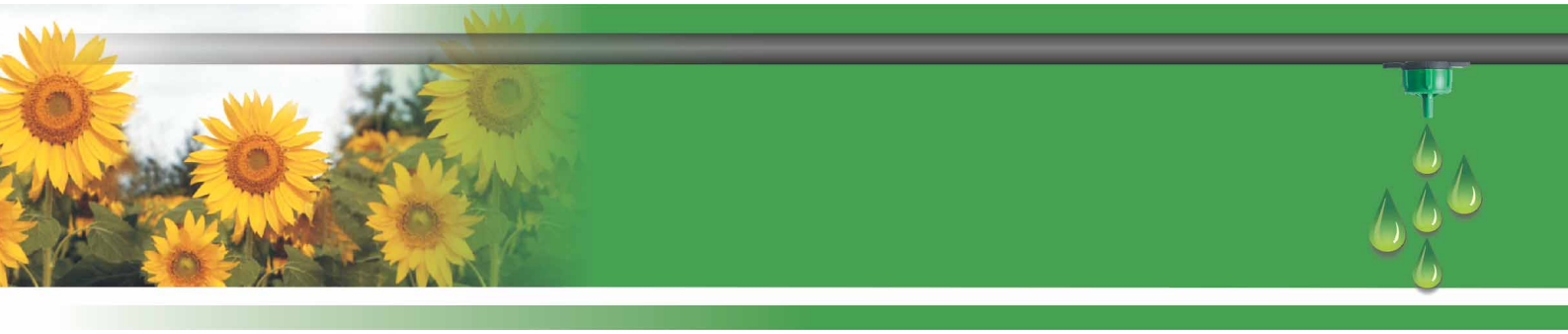
(N. CHANDRABABU NAIDU)



ACRONYMS

A&C	-	Agriculture and Cooperation
AFC	-	Agricultural Finance Corporation
AP	-	Andhra Pradesh
APMIP	-	Andhra Pradesh Micro Irrigation Project
ASAE	-	American Society of Agricultural Engineers
B	-	Boron
BCM	-	Billion Cubic Meter
BCR	-	Benefit Cost Ratio
BIS	-	Bureau of Indian Standards
CBIP	-	Central Board of Irrigation and Power
CIPET	-	Central Institute of Plasticulture Engineering Technology
CVD	-	Countervailing Duty
DAC	-	Department of Agriculture and Cooperation
DCPC	-	Department of Chemicals and Petrochemicals
DI	-	Drip Irrigation
DIS	-	Drip Irrigation Systems
DIT	-	Drip Irrigation Technology
DPAP	-	Drought Prone Area Programme
dS/m	-	deci Simon per meter (unit of Electrical Conductivity)
EC	-	Electrical Conductivity
FAD	-	Food and Agriculture Division
GDP	-	Gross Domestic Product
GI	-	Galvanised Iron
GNP	-	Gross National Product
GoAP	-	Government of Andhra Pradesh
GoI	-	Government of India
gph	-	Gallons per Hour
ha	-	Hectare
HDPE	-	High Density Polyethylene
HP	-	Horse Power
HR	-	Hour
HYV	-	High Yielding Varieties
ICAR	-	Indian Council of Agricultural Research
ID	-	Internal Diameter
IDE	-	International Development Enterprises
INCID	-	Indian National Committee on Irrigation and Drainage
IPCL	-	Indian Petrochemicals Corporation Ltd
ISO	-	International Organisation for Standardisation
JISL	-	Jain Irrigation Systems Ltd
kg/ha	-	Kilograms per Hectare
km^3	-	Cubic Kilo Meter
kW	-	Kilowatt
kWhr	-	Kilowatt Hour
LDPE	-	Low Density Polyethylene
LEPA	-	Low Energy Precision Application
LLDPE	-	Linear Low Density Polyethylene
lph	-	Litres per Hour

lps	-	litres per second
M ha m	-	Million Hectare meter
M	-	Million
m/sec	-	Meter per Second
m^3	-	Cubic Meter
M ha	-	Million Hectare
MI	-	Microirrigation
MIS	-	Microirrigation Systems
MITs	-	Microirrigation Technologies
mm	-	millimeter
MoA&C	-	Ministry of Agriculture and Cooperation
MT	-	Metric Tonne
NABARD	-	National Bank for Agricultural and Rural Development
NCPA	-	National Committee on use of Plastics in Agriculture
NCPAH	-	National Committee on Plasticulture Applications in Horticulture
NCPF	-	National Council for Precision Farming
NCDC	-	National Cooperative Development Corporation
NGO	-	Non Governmental Organisation
NPW	-	Net Present Worth
NRC	-	National Research Centre
O&M	-	Operation and Maintenance
PDC	-	Plasticulture Development Centre
PFDC	-	Precision Farming Development Centre
PP	-	Poly Propylene
PVC	-	Poly Vinyl Chloride
Q/ha	-	Quintals per Hectare
QRC	-	Quick Release Coupler
R&D	-	Research and Development
RBI	-	Reserve Bank of India
RIDF	-	Rural Infrastructure Development Fund
Rs.	-	Rupees
SAD	-	Special Additional Duty
SAU	-	State Agricultural University
SBI	-	State Bank of India
SC	-	Scheduled Castes
SDF	-	Sugar Development Fund
SFDA	-	Small Farmers Development Agency
SI	-	Sprinkler Irrigation
SIT	-	Sprinkler Irrigation Technology
sq. m.	-	Square meter
ST	-	Scheduled Tribes
t/ha	-	Tonnes per Hectare
TERI	-	Tata Energy Research Institute
TF	-	Task Force
TFM	-	Task Force on Microirrigation
TOR	-	Terms of Reference
UV	-	Ultra-Violet
VAT	-	Value Added Tax
W	-	Watt
WALMI	-	Water and Land Management Institute
WDF	-	Watershed Development Fund
WUA	-	Water Users Association
WUE	-	Water Use Efficiency
%	-	Percent



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SALIENT FINDINGS & RECOMMENDATIONS

BACKGROUND

1. Agriculture, a way of life in India, has shaped the thought, outlook and culture of the people for centuries. The agro-climatic condition of the country is suitable for growing a variety of crops, which are found in most parts of the world. Agriculture will continue to be the engine of country's growth and development. Besides being the backbone of the national and household food and livelihood securities of over 650 million people, agriculture sector accounts for 25 per cent of the nation's Gross Domestic Product (GDP), 15 per cent of the export and employs about 60 per cent of the workforce.

2. Resource-wise, the country accounts for 16 per cent of the world's human population and nearly 30 per cent of the cattle with only 2.4 per cent of the land and 4 per cent of the water resources. The total surface water availability of the country is estimated to be 1953 Billion Cubic Metres (BCM) of which only about 690 BCM is utilizable. Similarly, the replenishable ground water availability is to the tune of 432 BCM of which only 342 BCM is utilizable. Even if the full potential is exploited, about 50 per cent of the cultivated area will remain under rainfed agriculture. Water is the life-blood of agriculture and it consumes over 80 per cent of the fresh water resources. Judicious exploitation and management of water, therefore, holds the key for the future growth of Indian agriculture.

3. As widely recognized, the Green Revolution was ushered in and nurtured by the integrated seed-water (irrigation)–fertilizer technology. In congruence with the spread of the HYV seeds, irrigation percentage in the country increased from less than 20% in 1950-51 to nearly 40% now, the net irrigated area climbing to over 82 million hectares in 2002. However, the rate of growth of irrigated area had considerably decelerated in recent years, partly due to the exhaustion of easily irrigable areas and the depletion and degradation of water resources.

4. The requirement of water by different sectors by 2025 is estimated to be 105 M ha m, but the share of water for agriculture is expected to get reduced from the present level of 84 per cent to 69 per cent by 2025. On the other hand, the demand for water for agricultural purposes is estimated to increase from 470 BCM in 1985 to 740 BCM in 2025. During the same period, the demand for non-agricultural use of water will multiply four-fold, from 70 BCM to 280 BCM.

5. Misplaced and inappropriate policies leading to indiscriminate use of water, lack of appropriate technologies, poor technology transfer mechanisms and inadequate and defective institutional support systems have led to serious agro-ecological and sustainability problems in irrigated areas. While the water table rise and water logging to the extent of 8.5 M ha is the problem in canal command areas along with secondary salinization, receding water table at a rate of as high as one meter annually along with underground water pollution in many states are the daunting problems in tubewell irrigated areas. The water use efficiency (WUE) in Indian agriculture, at about 30-40 per cent, is one of the lowest in the world, against 55 per cent in China.

6. The vulnerability of Indian agriculture is bound to be severe lest the present trend of water use and management is changed. The International Water Management Institute forecasts that by 2025, 33 per cent of India's population will live under absolute water scarcity condition. The per capita water availability, in terms of average utilizable water resources in the county, has dropped drastically from 6008 m^3 in 1947 to 1250 m^3 now and is expected to dwindle to 760 m^3 by 2025. The International Conference on Water and the Environment, Dublin and the United Nations Conference on Environment, the Earth Summit, Rio De Janeiro, both held in 1992, the Millennium Summit, 2000, and the Earth Summit Ten Years Later, 2002, had drawn world's attention to this crisis.

7. Rainfed lands are not only low in productivity and sustainability and are more prone to risks, as compared to those in irrigated areas, but are also the location for (proportionately) greater concentrations of poor and hungry persons. This can be obviated to some extent by expanding irrigated areas through improving water management and water use patterns. **Presently, the problem facing the country is not the development of water resources, but the management of the developed water resources in a sustainable manner.** By adopting efficient water management practices, the bulk of India's agricultural lands could be rendered as irrigated. Microirrigation is one such practice.

8. Microirrigation which allows application of water to root zone of the crops through specially designed equipment known as emitters, has already been adopted by some countries for transforming their agriculture. India introduced this technology on a commercial scale in the Eighth Plan and during the past decade about 1.20 M ha could be covered under microirrigation, mostly under horticultural crops.

However, the coverage so far has been minuscule in the face of the fact that almost 69 M ha could be covered through this improved system.

CONSTITUTION OF THE TASK FORCE

9. Should the national policies and governance systems perpetuate the ills of faulty water management and condemn the people inhabiting the vast rainfed areas to remain and die poor? Obviously, the above trend and inefficiency of water use in agriculture, which is destructive and self-defeating, must not only be curbed but also reversed to sustainably meet the future needs and aspirations of our people.

10. Recognizing the urgent need for increasing the water use efficiency, the Union Finance Minister in his budget speech of 2003 - 2004 announced the decision of the Government to go into all aspects of water management and irrigation by constituting a Task Force, which reads as follows:

    "Water management and irrigation

    The recent drought again brings into sharp focus the need for conserving our water resources. A number of initiatives have already been taken to conserve land and water resources. States are also encouraged to promote drip and sprinkler irrigation through supply of equipment at subsidized rates. But these efforts have to be intensified. Therefore, a bipartisan Task Force, headed by the Chief Minister of Andhra Pradesh, and with a Minister of Agriculture from another State, as one of the members, will be constituted to recommend measures needed to be adopted firstly, to expand the coverage of such irrigation, thereafter to also suggest safeguards so that the intended benefits actually reach the target groups."

11. In pursuance of the above announcement, the Ministry of Finance constituted a Task Force on Microirrigation (TFM) under the Chairmanship of Shri N. Chandrababu Naidu, Chief Minister of Andhra Pradesh with the following Terms of Reference (Annexure-I):

    i. To suggest strategies to expand coverage of area under microirrigation in the country.

    ii. To suggest institutional mechanism needed for promoting microirrigation including quality assurance, regionally differentiated technologies and interventions.

    iii. To suggest technological support for regions and crop specific interventions on microirrigation.

iv. To suggest measures so that the intended benefits reach the target groups.

v. The Task Force will submit its Report within six months time.

12. The TFM held meetings on 21.08.2003, 25.09.2003, 24.11.2003, and 15.12.2003, besides field visit in Jalgaon, Maharashtra. Visit was also undertaken by the Chairman and Member Secretary of TFM to Israel to see the progress in microirrigation and to have interaction with the leading industry representatives there. A web page was also launched (http://agricoop.nic.in) on 1st of August, 2003 for seeking suggestions of the public. Letters were also sent to the State Governments to get their suggestions. State level consultations were held in the states of Gujarat, Haryana, Punjab, Tamil Nadu and Uttar Pradesh. The deliberations during the meetings, responses received through the Internet as well as through mail provided valuable inputs for firming up the recommendations of the TFM.

FINDINGS

13. The Task Force recognized that agriculture and allied sectors including horticulture will continue to be a prime mover for the growth and prosperity of the nation. However, there are a number of challenges, which are confronting the growth of the sector. By 2010, agricultural production, including horticulture production will have to be doubled, mostly through yield enhancement and increase in cropping intensity, coupled with sustainability. In the quest for improving productivity, water would be the most critical input.

14. The irrigation sector, mostly due to the overwhelmingly high prevalence of surface irrigation will have to address the challenges of low WUE in face of the depleting water resources. The efficacy of development and need-based adoption of microirrigation system to meet the challenges should be examined. As witnessed in developed and selected developing countries, including those in India, microirrigation, comprising drip, minisprinkler and sprinkler, must become a pivotal element of integrated water use system with many agro - ecological, socio-economic and environmental advantages. Microirrigation has emerged as a tool for effective management of resources which saves water, fertilizers and also electricity and is one of the interventions in high value agriculture leading to diversification. In short, it is a versatile solution provider - distributing the benefits completely, evenly and equitably unlike other irrigation systems.

15. The microirrigation system has to be seen as a holistic approach to address:

Poverty alleviation: essentially through increasing income, converting vast rainfed areas into irrigated areas which are endowed with greater productivity and stability and through the creation of additional employment opportunities, especially by involving the private sector.

Horticulture–led diversification of agriculture: leading to the promotion of high value commodities with tremendous prospects for capturing new markets, particularly under the WTO regime. The system also permits commercialization of protected horticulture with tremendous economic returns.

Enhanced productivity: through the increase in yield improved quality of the product and reduced labour and input costs – resulting in greater competitiveness in the liberalized world market. **"More crop per drop" must be the driving force.**

Environmental protection and ecological security: by promoting precision farming where the correct quantity, correct time and correct place of application of the irrigation water is assured. There is a significant reduction in accumulation of salt in the root zone in the associated problems of water table rise and water logging, in salinisation and in the fall of the water table in tubewell command areas.

Promotion of equity: by adopting microirrigation technology in varying settings as it is non-specific to location, topography, commodity and the quality of land. Its adoption in waste lands and in hill and mountainous regions will greatly improve the socio-economic condition of the people in such hitherto un-reached areas.

Reduced biotic and abiotic stresses: through need-based and precise application of water, as several diseases and pests are commonly associated with excess water. Sprinkler irrigation is proving a tremendous success in Rajasthan and Madhya Pradesh as the system is having significant impact on reducing the further degeneration of the land and in mitigation of the abiotic stresses, particularly high temperature and drought.

16. Though the hectarage under drip irrigation in the country rose from a meager 1500 hectares in 1980s to nearly 5 lakhs hectares in 2002, yet the technology adoption is confined only to 12 States and the area is negligibly small in most of the Eastern and Northeastern States. Maharashtra is the single most progressive State in terms of the area under drip with a hectarage of 2 lakhs contributing to almost 46 per cent of the drip area in the country. Karnataka, Tamil Nadu and Andhra Pradesh follow this with percentages of about 21, 14 and 12, respectively

and Gujarat is the distant 5th one with a meager percentage of 2.5. Andhra Pradesh has now given major focus on microirrigation under the Andhra Pradesh Microirrigation Project (APMIP) and has planned to cover about 2.5 lakh ha in the next two years.

17. Presently, this technology is in vogue only for a very few crops. Among the horticultural crops, drip technology is adopted mostly, in coconut with a penetration of 19%. This is followed by banana (11%), grapes (10%), mango (9.4%), citrus (7.9%) and pomegranate (6.2%). All other crops individually contribute to less than 5 per cent of the area under drip. There is need to expand the technology to many other fruits, vegetables and cash crops.

18. The sprinkler irrigation has got many of the advantages of the drip system. But, an added advantage is that it is more economical for use in canal command areas because of cereal dominated cropping pattern and convincingly it has been demonstrated in gravity fed irrigation projects in Madhya Pradesh and Haryana. Secondly, this system is most suited for frost protection on the one hand and cooling of crops on the other and could be used most advantageously in oilseeds and pulses to improve the productivity and increase production for substituting imports.

19. Development of microirrigation suffers from the following constraints:
    - Lack of credit facilities
    - Poor institutional support system.
    - Lack of skilled human resources, availability of appropriate material and technical know-how.
    - Generally perceived as a technology-driven movement, hence receives resistance from certain quarters.
    - The initial cost of establishing MIS is high, hence generally out of the reach of resource-poor farmers.
    - Not integrated with total water management system, hence generally viewed in isolation.
    - Lack of information on temporal and spatial variation in soil moisture and on the optimal fraction of soil to be wetted.
    - Lack of availability of low cost soluble fertilizers and other agro chemicals.

STRATEGIES AND APPROACH

20. Viewed as an integral part of comprehensive water management strategy with the focus on enhancing water use efficiency, reaching water to the un-reached areas must be the guiding principle of the promotion of microirrigation. The approach must be to produce more and more from less and less water. This concept should be streamlined in the national policy on water development and management. The investment and funding arrangement should consider microirrigation as an important infra-structural development and must increasingly occupy the centre - stage in the development and management of water resources in the country towards poverty alleviation, food security and environmental sustainability.

21. Some strategic considerations for successful adoption of microirrigation are as follows:

- For the large scale adoption of the technology, specially by small farmers, financial assistance could be required in the take-off phase, at least for two plan periods.
- Appropriate mechanisms and institutions for managing the financial and technical support should be in place.
- High quality of all the hardware components of the system is a fundamental requirement for the success of microirrigation. The manufacturers, retailers, and other members of the chain of delivery should be fully aware of the quality needs and the people down the line should be trained.
- The design of the microirrigation system and its various components such as filters, emitters, etc. should be easy and simple so that even the traditional farmers may successfully operate and maintain them.
- The private sector should be a partner in the development and diffusion of microirrigation technologies and should work in partnership with the public sector and the NGOs.
- As a part of the integrated water use system, the interactive forces involving land, water, crop, livestock, fisheries, should be integrated with due consideration to equity, pricing and sustainable conservation of the natural resources.

RECOMMENDATIONS

Expand Coverage

22. For its promotion, microirrigation should be viewed as a total plant support system starting with planting material to post harvest management and marketing. Therefore, microirrigation will have to be promoted in a holistic manner involving appropriate cultivars, good agronomic practices, post harvest handling, processing and marketing leading to an end-to-end approach. Water source development and recharge of wells through Watershed Management should also form a part of the package.

23. With an area of 0.50 M ha under drip and 0.70 M ha under sprinkler irrigation, the coverage has hardly touched the fringe of the existing potential of about 69 M ha. Therefore, attempts should be made to cover the area under microirrigation in a phased manner over the plan period. The strategy should, therefore, be to increase the coverage through the congruence of investment, institutional support, technological interventions, fiscal incentives as well as concession on taxes.

Investments

24. The Task Force emphasized that assistance for microirrigation should be viewed as an investment for infrastructure support, as in the case of irrigation projects. This analogy holds good ground considering the fact that microirrigation helps save and conserve water resources, expand irrigated area and add to the productivity and GDP. Thus, it recommended that microirrigation should be made compulsory in the command areas of new irrigation projects. There is need to introduce a policy of “no lift without drip’ to ensure benefits to large number of farmers with the same amount of water.

25. Considering the past trends and the available infrastructure facility with the industry, the aim should be to cover an area of about 3.0 M ha (2 M ha drip and 1 M ha under sprinkler) under microirrigation in the country during the Tenth Plan and another 14 M ha during the Eleventh Plan. This would require an investment to the tune of Rs.10,500.00 crores during the Tenth Plan and another Rs. 51,000.00 crores during the Eleventh Plan.

26. The Task Force underscored that investments of this magnitude will be possible only through proper sourcing of funds and recommended that multi-pronged strategy should be adopted for generating the resources by way of i) imposing an

import cess of 5% on the import of items like pulses, oilseeds, oils and horticultural produce, (ii) by ensuring that 10% of the funds on irrigation projects be used for development of microirrigation in the country, and iii) making available credit to farmers at 6% interest rate. There is also scope to explore the possibilities of international funding through World Bank and other financial institutions.

27. The total expenditure involved for covering 3 M ha during the X Plan could be shared by Government of India, State Government and the farmers. The Central Government's share could be 40% of the cost i.e. Rs. 4200.00 crores, which could be raised through budget provision, World Bank funding or import cess. The State Government's share could be 10% viz Rs. 1050.00 crores, which could be raised by availing Rural Infrastructure Development Fund (RIDF) of NABARD. The balance 50% share amounting to Rs. 5250.00 crores will have to be borne by the beneficiaries for which they may seek institutional financing.

28. The Task Force noted that imports of horticultural products, oilseeds and pulses during 2002-03 have been to the tune of 6.6 million tonnes valued at Rs. 13761.16 crores. Import cess of 5% on these items would generate annual revenue to the tune of Rs. 688.00 crores. Similarly, about Rs. 10,000.00 crores are being spent annually on major and medium irrigation projects in the country. Ten per cent of this, Rs. 1000.00 crores, could be available from the irrigation sector projects. Apart from this, there are other beneficiaries of microirrigation such as the power and fertilizer sectors, which could be involved in raising resources for promoting microirrigation.

29. The Government of India has announced financial assistance for reviving some of the ailing sugar factories. Part of this assistance should be earmarked for promoting microirrigation for sugarcane crop and the industries availing the revival package should bring at least 50 per cent of the sugarcane area under microirrigation.

30. Out of the 3.0 M ha, about 0.5 M ha should be earmarked for wastelands, hilly areas, saline lands, etc. Besides, microirrigation should be made an integral part of watershed management and water harvesting programmes.

31. The Task Force observed that in the current context, microirrigation may not come directly under the definition of infrastructure. However, the concept of infrastructure has also become broad-based. The concepts such as Build-Operate-Transfer (BOT), and Build-Operate-Lease-Transfer (BOLT) which were once non-existent, have come into being. In the case of grant of assistance for installing microirrigation

systems, the Government is providing only one time grant as start-up assistance. Thereafter, the system is owned and operated by the farmers. The assistance which helps save the resources like water, fertilize and electricity is indirectly helping to generate additional resources out of the savings. Considering this analogy, microirrigation need to be accepted as an infrastructure and they should be given the same status as irrigation projects.

Fiscal incentives

32. The assistance for microirrigation during the initial period of the Eighth Plan was 50% of the cost of the system to all category of farmers. This was enhanced to 90% of the cost to Small, Marginal, SC, ST and Women farmers and 70 per cent of the cost to other category farmers during 1996-97. Subsequently, during the Ninth Plan (2000-01), the assistance was again scaled down to 50% of the cost to Small, Marginal, SC, ST and Women farmers and 35 per cent of the cost to other category farmers. During the Tenth Plan the assistance was further scaled down to 25 per cent of the cost to all categories of farmers. The scaling down of assistance has adversely affected the take-off in adoption of microirrigation. The Task Force feels that since the initial investment for installing a microirrigation system is high, rendering it unaffordable by most of the farmers, the assistance should be restored to the level of 50 per cent of the cost of the system, which should be extended to all categories of farmers. Such assistance should be extended to viable crops after conducting proper soil and water analysis by qualified and experienced functionaries.

33. The assistance should be administered through a transparent system, preferably by way of credit linked back-ended subsidy mode. This assistance could be administered by involving the financial institutions, commercial and cooperative banks. The farmers intending to adopt microirrigation should have easy access to credit and the amount should be adjusted directly based on self certification by the farmer or representative of a group of farmers which is verifiable by the implementing agency. This will reduce the time lag and overhead expenditure and at the same time ensure the quality of product.

34. Since there has been rapid strides in the field of Information Technology and there is accessibility of computers at the block and district level, it would be appropriate to have an efficient method of disbursal of funds through electronic transfer as being done in the case of APMIP.

Tax Incentives

35. High taxes such as Sales Tax, Trade Tax, Purchase Tax and local taxes like Octroi, Entry Tax etc., ranging from 4 to 10 per cent, being charged on the system by the various States is a hindrance for its adoption by the farmers. It is, therefore, recommended that no taxes should be levied on the microirrigation system. This would facilitate in making the system more affordable to the farmers, and thus induce rapid acceptance of the technology.

36. It is estimated that plastic raw material for microirrigation in one ha will weigh to the tune of 300-500 Kgs, depending upon the crop and spacing. The raw material used in the manufacture of MIS is Low Density Polyethylene, Linear Low Density Polyethylene, High Density Polyethylene, Polypropylene and PVC. These raw materials are available locally, but, as the capacity of local raw material manufacturers is limited, there is a large import. The materials are covered under Chapter 39 of Custom Tariff 2001-02 and attract basic Custom (30%), CVD (16%) and SAD (4%), which works out to 56.83%. The local raw material manufacturers pay only excise of 16%. But, they fix their prices as per the landed cost of the imported raw material. The Task Force recommended that the Import Duties on plastic raw materials required for the microirrigation industry should be abolished to help reduce the cost. A scheme for import of duty free raw material for microirrigation systems could be evolved on the principles of Deemed Exports within the country as detailed in the Handbook of Procedures of Ministry of Commerce & Industry.

37. The Task Force noted that imposition of Value Added Tax (VAT) is under the consideration of the Government and recommended that VAT should not be imposed on microirrigation system as it should be viewed as an infrastructure support for the overall development of agriculture.

38. Excise duty on microirrigation system including its components namely, lateral, tubing, main pipeline, sub main pipeline, filtration equipment and its automation, fertigation equipment or any other system used for the purposes of applying fertilizer along with microirrigation and such other accessories and fittings that go as a package along with microirrigation system, which presently is 16%, should be abolished.

39. The Task Force further noted that microirrigation system has to be handled in a holistic manner needing services on agronomic practices, market support etc and

these services are currently being taxed, which add to the burden of the farmer. The Task Force, therefore, recommended that taxes on such services should not be levied.

Credit Support

40. The Task Force observed that credit on microirrigation should be viewed as a national priority and it should be made available to the system as a whole, which includes bore-well construction, water storage tank, watershed development etc. In this context, it recommended the following:

- As a part of the integrated water use system, the interactive forces involving land, water, crop, livestock, fisheries, should be integrated with due consideration to equity, pricing and sustainable conservation of the natural resources.
- The Banks should not charge more than 6 to 7 % interest irrespective of the loan amount for microirrigation purpose.
- The Rural Infrastructure Development Fund (RIDF) can also be availed in the form of loan from NABARD for the development of the integrated system on microirrigation as done in the case of APMIP. Interest on RIDF loan should not exceed 5%.
- Recognizing the need for qualitative improvement in the agricultural infrastructural facilities, GoI has proposed to create an Agri-Infrastructure & Credit Fund (AICF) of Rs 50,000 crores in the NABARD in addition to that available under RIDF which will be available during the next 3 years at lower interest rate than that of RIDF. The fund is proposed to be used for waste lands development, minor irrigation, functioning and viability of co-operatives, grading, certification, storage of agro-products, their processing, cold chains and modern abattoirs. The Task Force recommended that microirrigation should be given priority consideration while allocating funds out of the proposed AICF.
- As an incentive for timely repayment of loan, 0.5% rebate in the interest amount could be provided by the banks at the time of closure of loan account.
- Microirrigation equipment should be taken as a prime security for loan purposes and not treated as moveable property. Pledging of land should not be a necessary condition.

- Charging of stamp duty for availing loan for microirrigation system is an impediment which discourage the farmers in adopting the improved technology. Therefore, the stamp duty and registration charges should be waived off to cover microirrigation. Moreover, equitable mortgage should be provided by all the branches of the respective banks.

- The State Cooperative Banks, Regional Rural Banks as well as NCDC should also make credit available to the microirrigation programmes. In order to enable them to do so, revitalization programme of the State Cooperative Banks and Regional Rural Banks should receive top priority.

- The Task Force desired that, in order to ensure smooth recovery of loan, emphasis should be given for taking up contact farming. This will enable the farmers in putting higher investments, as they would be assured of returns from the investment.

- The Task Force noted that land is invariably mortgaged to get credit support from the banks for purchasing agricultural equipments and machinery, which is a hindrance. The Task Force, therefore, recommended that the limit of Rs.50,000/- for getting loans without collateral security should be increased to Rs.1.00 lakh or the redeemable value of the microirrigation equipment. The collateral should be taken on the microirrigation hardware and there should not be any additional requirement of collateral.

- Further, since interest rates on agricultural loans have been reduced significantly, loans for microirrigation should be made available at concessional interest rate without any ceiling. It recommended that purchase of microirrigation systems are also considered as a part of agricultural loan for enabling the farmers to derive the benefits of low interest rates.

- Considering that large number of farmers are defaulters in payment of agricultural loan due to crop failure, the Task Force recommended that credit for microirrigation should be dealt separately so that the farmers could avail the credit to pay their dues.

- Lease financing for microirrigation by the manufacturing firms to provide credit support, like in the case of car, should be promoted.

Marketing and Contract Farming

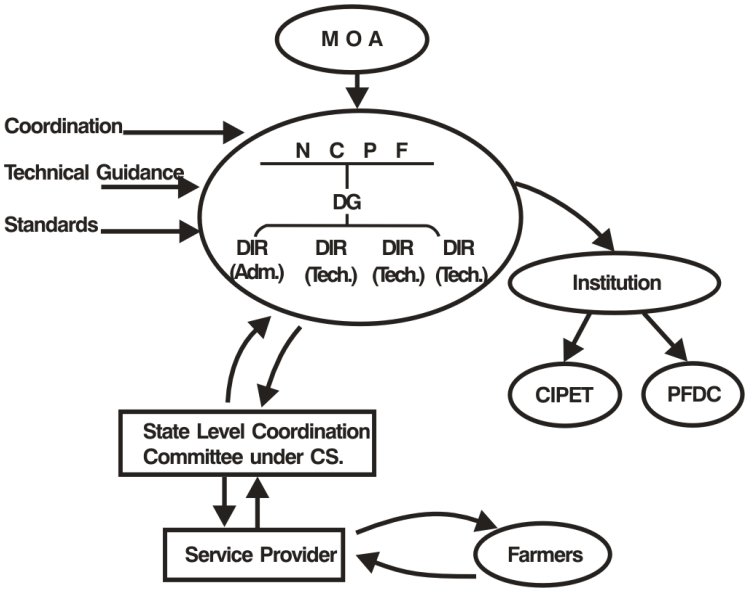
41. The Task Force underscored that microirrigation has focus on land and water resources besides crop specificity, and noted that appropriate mechanism to ensure timely disposal of the produce with remunerative returns will be the key factor to encourage the farmers for adoption of technologies. Therefore, it recommended that such marketing mechanisms should be established, which will connect the producer and consumer and duly address all the links in the chain involving on-farm handling, transport, storage, value addition and processing, resulting in sustained high profitability to the farmer.

42. The Task Force further observed that promotion of contract farming will facilitate flow of improved technologies to the farmer and ensure assured returns through the buy-back arrangement. It therefore, recommended that contract farming may be promoted in the areas where microirrigation technologies are adopted. This would also help in speedy recovery of loans.

Institutional Mechanisms

43. The Task Force recognized that the National Committee on Plasticulture Applications in Horticulture (NCPAH) with a staff strength of 10 people has been instrumental in operationalzing the Scheme on Plasticulture in general and in popularizing the microirrigation technology in the country in particular. However, the lack of legal status of NCPAH has hindered the realization of stipulated benefits to the desired extent. A sound institutional mechanism is a must for ensuring proper advancement of the microirrigation sector in the country. Therefore, it recommended that an apex body in the form of National Council on Precision Farming (NCPF) be established which should be vested with the responsibility of providing technical guidance, channelising resources, monitoring and electronic database management, establishing linkage with market chain besides overseeing the overall development of microirrigation in the country. NCPF should be a professional body with Government playing the role of facilitator. It will be headed by an Officer, not below the rank of Deputy Director General (Pay scale Rs. 25,000/-) supported with three senior level Officers (Pay scale of Rs.16,000/-) and one Administrative Officer of the rank of Director and one Accounts Officer with appropriate number of supporting staff, which exists in NCPAH. The NCPF will be self sustaining in due course of time. However, for initial establishment some funds will be needed as one time grant. The Task Force suggested that the

GoI may provide a Corpus Fund to the tune of Rs.100.00 crores for creating NCPF.



44. The NCPF could also mobilize funds from national, international financial institutions and inter-ministerial budgetary allocations for implementing the promotional schemes and for activities such as:
    a) Promoting awareness, training, extension, capacity building of farmers, experts and manufacturers.
    b) Testing, accreditation, quality certification and standardization of hardware.
    c) Evaluation and monitoring of software services and assessment of capacity of individual processors.
    d) Building National Data Base for capacities, services, crop coverage, etc.
    e) Promoting indigenization, adoption of regionally differentiated technologies, at national level.

45. The Task Force further recommended that water users societies /federations should be promoted at state and national level. A participatory approach including the public, private, NGO and civil society to promote research–extension–farmer–market linkages is inevitable.

46. Recognizing that modern agriculture is knowledge based and technology driven which has to be farmer centred, the Task Force recommended that periodic upgradation of knowledge of farmers and field functionaries to keep abreast with the advancement should have priority. This will not be possible without a sound

infrastructure for upgrading the technical skills. Therefore, it further recommended that a sound infrastructure should be created for the purpose at state and district levels.

47. It also recommended that the industry should open a service center for every 500 hectare coverage on mandatory basis. Besides, post installation maintenance and extension support needs to be provided for a minimum period of five years by the industry. At the grassroot level there should be service providers to address the local problems related to microirrigation. These service providers could be young graduates or well-trained farmers.

48. It needs to be ensured that only good quality microirrigation systems having certification of Bureau of Indian Standards (BIS)/ISO are supplied to the farmers. It also need to be ensured that appropriate standards for microirrigation system components are developed and notified from time to time. Moreover, the anomalies in some of the existing BIS need to be removed for preventing misuse of the standards.

49. For ensuring manufacture and supply of good quality microirrigation system, the industry could be classified into four groups viz Class A, Class B, Class C and Class D. A system for classifying the manufacturing companies has been evolved, which needs to be disseminated to the existing microirrigation system manufacturers for self accreditation. In this context, the Task Force recommended that the Government should provide assistance for the upgradation of concerned industries.

50. Emphasizing the importance of quality assurance in microirrigation system, the Task Force recommended that the Central Institute of Plasticulture Engineering Technology (CIPET), Chennai should be brought under the control of the Ministry of Agriculture and be attached with the proposed NCPF for ensuring supply of good quality material to the farmers, who constitute a large proportion of consumers of plastics.

51. Since microirrigation results in saving of energy including diesel, the State Electricity Boards should be encouraged to provide power connection to those farmers who agree to install microirrigation sets.

52. In order to have proper flow of information it would be necessary to develop a portal on microirrigation containing all the relevant information. Facilities for internet

counseling and use of satellite facility for two-way communication between farmers and experts should be created.

Technological Support

53. The network of 17 Precision Farming Development Centres (PFDC) has enabled the development of regionally differentiated technologies on microirrigation besides imparting training to a large number of farmers and departmental staff. These Centres need to be strengthened and selected Centres should be converted into Centres of excellence. Some of the PFDCs should be equipped to function as quality testing centers for microirrigation equipment.

54. The Task Force emphasized that new investment, technological advancement and participatory approaches in the context of optimizing water use by adoption of microirrigation technology should be given high priority. Accordingly, at least one per cent of the outlay on microirrigation need to be earmarked for microirrigation research.

55. Capacity building of the manufacturers is equally important for ensuring development of quality products and their application. There should be regular interaction between the microirrigation industry and the research organisations like PFDCs for updating the skills and knowledge.

56. The Task Force observed that the major concern or obstacle in the expansion of microirrigation among the farmers is the high initial investment. In spite of the fact that subsidy schemes do exist, many farmers are still finding it difficult to invest in the microirrigation system. To reduce the cost there is need to look into the technological options of which crop geometry modification is the most important one. Instead of adopting traditional spacing, adoption of paired row planting has been found to reduce the cost of the system by 40 per cent in many crops including tomato, brinjal, okra, etc.

57. Microirrigation has to be adopted for horticulture and row crops whereas sprinkler irrigation could be adopted for pulses and oilseeds.

58. Online type of microirrigation could be adopted in general for horticultural crops and in-line dripper system should be with those farmers, who have gained experience in microirrigation technology.

59. Precision irrigation invariably enhances the frequency of application of water and

has been found to give better productivity with saving of water. Therefore, *pulse irrigation* should be promoted in water scarce areas. This will also help in reducing the temperature related stress to crops.

60. The Task Force emphasized that technology development has to be in an integrated manner with the involvement of farmers, scientists and system manufacturers. Service providers should be involved in the districts by devising a suitable mechanism for inflow & outflow of information, which can be supported initially and later on it would sustain on its own.

61. Large scale demonstrations of microirrigation technology has to be taken up at strategic locations with the involvement of the farmers. Operational Research Projects may be taken up in each State. The microirrigation system manufacturers should be involved in providing advice on agronomic packages to the farmers as an integral part of the system. Besides, inter-state visits should be arranged for a group of farmers to visit some of the progressive states. Since seeing is believing, large number of demonstrations on microirrigation should be laid at strategic locations.

62. There is need to develop human resources and entrepreneurship at the village level for regular monitoring of the system and offering technical guidance to the farmers, as and when needed. The village youths / agricultural graduates may be given short crash courses on technical, operational and maintenance aspects, who will act also as local consultants. They will have the internet facility and give advice to the farmers in consultation with selected panel of experts using internet.

63. The Task Force felt the need for introducing Certificate /Diploma level courses on Microirrigation to meet the growing demand of trained manpower. The ongoing programme of HRD in Horticulture could be reoriented, and few new Institutes among SAU/ICAR Institutes/Industries of repute could be identified for providing Diploma course on microirrigation.

64. The Task Force noted that microirrigation technology has been adopted comparatively more intensively in some states for selected horticultural crops. There is a need for popularizing this technology in additional crops and tribal areas, undulating situations and such settings. In these areas, the lack of power supply is the main problem. Therefore, cost effective and low head systems need to be developed and popularized.

65. The Task Force recognized that microirrigation is going to be the answer for productive agriculture in water scarcity arid / semi arid / saline / salty under ground water areas, systems which can be placed sub surface and operated with minimum head is the need of the hour. Such systems can reduce the water requirement over surface placed ones by 20 to 25 per cent through reducing the evaporative losses considerably.

66. The Task Force also noted that in about 15 lakhs hectares the farmers are forced to irrigate with saline water, which in long run deteriorates the soil health and ultimately the productivity. Further, in different states 30 to 80 per cent of under ground water is saline. Microirrigation coupled with other agro-techniques is the best option for sustaining agriculture under these adverse conditions.

67. It further noted that in India about 64 million hectares are categorized as wastelands. There is a lot of scope for promoting microirrigation in public wastelands with horticultural crops. These lands can be leased to local entrepreneurs / microirrigation cooperatives. To start with, efforts should be made to use these lands profitably with appropriate horticulture / multipurpose trees through the use of microirrigation along with other appropriate agro-techniques.

68. The Task Force recommended that the industry should be encouraged to develop latest technologies and for manufacturing efficient system components through joint ventures. Import of technology and components should be subject to the condition that all the technology would be transferred for indigenous manufacture within a period of two years.

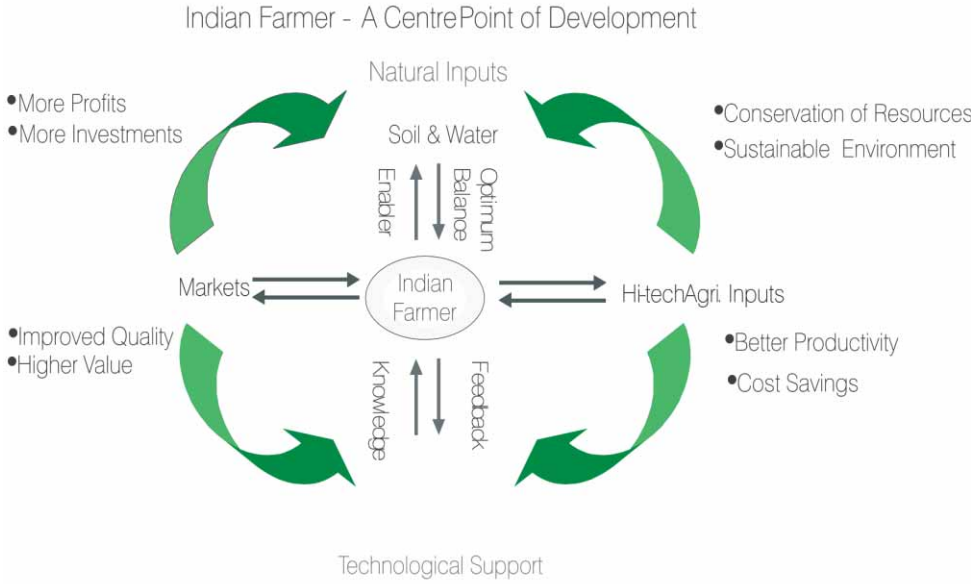
Suggested Pattern and Delivery Mechanism:

69. The Task Force emphasized the need for adequate measures and fool-proof methods for delivery and disbursal of funds for microirrigation projects through the states. It recommended the following approach to improve the delivery mechanism, is needed:

    - The assistance for the purpose should be routed through NABARD. The State Government should be vested with the responsibility of sample verification system alongwith the banker. In this manner, there will be a built-in safeguard between the concerned banker and State Government. The rooting of the assistance through NABARD will also ensure that the funds are not used for other purposes and the appraisal as well as eligibility of the proposal of a given farmer will be the principal responsibility of the banker.

- Routing the subsidy through NABARD and Banking Structure will not only free Government Officials for providing better extension and technical support to farmers, but will also help in establishing better linkages between credit and subsidy support to farmers for investment in this technology.
- In some of the states, farmers have to wait for at least six months to get the assistance due for them. In order to encourage the adoption of microirrigation technology, adequate arrangements should be made to disburse the amount to the beneficiaries within a period of one month.
- Implementing officers and concerned companies/dealers should be held responsible for any malpractices in the field.
- Mechanisms evolved under the recent Andhra Pradesh Microirrigation Project for delivery of financial assistance and bank loan may be adopted by other states with the modifications, if needed. Under APMIP, GoAP has evolved a system for efficient disbursal of financial assistance for microirrigation. The entire transaction is expected to be almost paper-free. Moreover, the banks are expected to electronically transfer the funds to the suppliers of Microirrigation. The State Government authorities are only involved at one stage of installation and verification of the system. Even this function they are supposed to perform along with the banker. They are therefore not the only authority for inspection and verification. In this manner, there is a built-in safeguard involving the concerned banker and state government official.
- The routing of the financial assistance through NABARD on the lines of "On Farm Water Management Programme for Eastern States" also ensures that the states do not divert the funds for other purposes/projects and the appraisal as well as eligibility of the proposal of a given farmer becomes the principal responsibility of the banker. Such policy changes will minimize, if not eliminate, the delays as well as malpractices in delivery of the assistance.

70. The Task Force recommended that the farmers should be the focus of development. All assistance for microirrigation should be in the name of the farmer and payments should be released to the Manufacturer/Supplier only after ensuring farmers' satisfaction.



IMPACT

71. The Task Force projected that the coverage of an area of 17 M ha by the end of XI Plan under the microirrigation system comprising the suggested synergistic mechanisms involving investment, institutional support, technological upgradation, human resources development and services to the farmers, will have the following impact:

- There will be a saving of water to the tune of 59 BCM valued at Rs. 45,000 crores.
- The energy thus saved is estimated to be valued at Rs. 3800 crores.
- The cumulative saving in fertilizer is estimated at Rs. 18,000 crores.
- There will be an additional employment generation for about 21 million people during the project phase and thereafter 5 million people will have on-farm as well as off-farm additional employment annually.
- The self-sufficiency in pulses and oilseeds will be greatly enhanced, as also the nutritional adequacy.
- The additional cumulative income to the farmers on account of increased yield arising from the adoption of microirrigation system would be of the order of about Rs. 64,000 crores by the end of XI Plan and thereafter an annual additional income of Rs. 19,000 crores.

BALANCE SHEET ON INVESTMENTS TO COVER 17 M.ha BY XI PLAN

S.No.	Particulars	Amount, Rs. crore
Investments		
1.	GoI Share @ 40% as assistance	24,600.00
2.	Corpus for institutional support, data base, monitoring	600.00
3.	State Govt. share @ 10%	6,150.00
4.	Farmers contribution 50% as Own contribution or bank credit	30,750.00
5.	Sub Total	62,100.00
6.	Loss due to abolishing Excise duty Import duties	 2,645.00 2,479.00
7.	Total loss due to abolishing Excise & Import Duties	5,124.00
8.	**Total Investments**	**67,224.00**
Benefits		
9.	Value of 59 BCM water saved	45,000.00
10.	Savings in electricity	3,800.00
11.	Savings in fertilizer	18,000.00
12.	Income due to increased Production	63,883.00
13.	**Total Benefits**	**130,683.00**
14.	**Net Benefits**	**63,459.00**

Net benefit will be of the order of about Rs. 63,459 crores over a period of 8 years, besides employment generation for 21 million people during the project period and thereafter employment to additional 5 million people annually.

CONCLUSION

72. Microirrigation led agriculture, armed with knowledge and technologies, with farmer as centre point, should be viewed as one of the eco-technological approaches to attain sustained and enhanced agricultural production and productivity. The technology is bound to maximize the synergistic interactions of improved seeds, water and fertilizer – the three components of the Green Revolution. Through microirrigation, the Green Revolution could be transformed into an Evergreen Revolution to ensure the congruence of sustainability, productivity, profitability and equity. Since microirrigation greatly enhances water, fertilizer and energy use efficiency and promotes precision agriculture, the Evergreen Revolution could be achieved without the burden of environmental degradation.

SOME GLIMPSES OF VISIT OF CHAIRMAN, MEMBER SECRETARY AND OTHER MEMBERS OF TFM TO JAIN IRRIGATION SYSTEMS LTD., JALGAON

On-line Drip Tubing is being viewed by Chairman, TFM

Chairman, TFM examining the Drip-line insertion mechanism

Polytube Extrusion is being explained to Chairman, TFM

SOME GLIMPSES OF VISIT OF CHAIRMAN, MEMBER SECRETARY AND OTHER MEMBERS OF TFM TO JAIN HI-TECH AGRI INSTITUTE, JALGAON

Chairman, TFM observing Filtration / Fertigation Station

Demonstration of On-Line and In-line Drip Technology is being observed by Chairman & Members of TFM

B.H. Jain, JISL explaining about Floppy Sprinkler Nozzle to Chairman, TFM

SOME GLIMPSES OF VISIT OF CHAIRMAN AND MEMBER SECRETARY TO ISRAEL

Chairman of TFM Meeting Minister of Agriculture, Israel

Visit to Weizman Institute of Science

Member Secretary discussing with Israeli farmers

Annexure-I

COMPOSITION AND TERMS OF REFERENCE OF TASK FORCE ON MICROIRRIGATION

1.1 Composition of TFM:

(i)	Shri N. Chandrababu Naidu Chief Minister, Andhra Pradesh	Chairman
(ii)	Minister of Agriculture, Government of Rajasthan	Ex-officio Member
(iii)	Minister of Agriculture, Government of Maharashtra	Ex-officio Member
(iv)	Dr. M.S. Swaminathan Chairman, Swaminathan Foundation, Chennai.	Member
(v)	Chairman, NABARD, Mumbai.	Ex-officio Member
(vi)	Shri J.N .L. Srivastava, Ex- Secretary, Deptt. of Agri. & Cooperation	Member
(vii)	Dy. Director Gen. (Engg.), ICAR, Krishi Anusandhan Bhawan, New Delhi.	Ex-officio Member
(viii)	Dr. H.P. Singh, Horticulture Comm. Deptt. of Agri. & Coopn.	Member Secretary

The Chairman of the Task Force could co-opt and include members in the form of special invitees. Accordingly, Minister of Horticulture, Govt. of Maharashtra and Secretary (A&C), Govt. of India and Shri B.H. Jain, Chairman of Jain Irrigation Systems Ltd., Jalgaon were requested to join as Special Invitees.

1.2 Terms of Reference of TFM:

i. To suggest strategies to expand coverage of area under microirrigation in the country.

ii. To suggest institutional mechanism needed for promoting microirrigation including quality assurance, regionally differentiated technologies and interventions.

iii. To suggest technological support for regions and crop specific interventions on microirrigation.

iv. To suggest measures so that the intended benefits reach the target groups.

The Task Force will submit its Report within six months time.

Annexure-II

ACTION PLAN FOR TASK FORCE ON MICROIRRIGATION

Sr. No.	ACTIVITY	Date	Remarks
1.	Open Web page seeking suggestions to achieve objectives of Task Force	5.8.2003	Web page launched by NIC on 01.08.2003 (http://agricoop.nic.in)
2.	First Meeting of Task force at Delhi (A.P.Bhavan)	21.8.2003	Held as per schedule.
3.	Second Meeting of Task Force at Mumbai	12.9.2003	Meeting could not be held due to preoccupation of Chairman.
4.	Visit Jalgaon	04.09.03	Chairman of TF visited Jalgaon to see progress under microirrigation and interact with farmers and industry.
5.	Visit Israel	15- 18.09.03	Chairman of TF visited Israel during 15-18 Sept., 2003 to see the development made in microirrigation and agriculture exhibition AGRITECH
6.	Second Meeting at Hyderabad	25 .9.2003 & 26.9.2003	● Presentation of views of States by Secretary Hort./Agri all States ● Presentation of views by Agricultural Experts ● Presentation of views by progressive farmers' ● Presentation of views by Industry representatives Meeting was held as per schedule.
7.	3rd Meeting at Hyderabad	24.11.2003	Discussions with: ● Bankers ● Farmer representatives ● Industry representatives ● Agricultural Experts from Research Institutes/SAU of Maharashtra
8.	Fourth Meeting at Delhi	15.12.2003 Forenoon	Discuss draft report
9.	Consultation with Union Agriculture & Finance Ministers	15.12.2003 Afternoon	
10.	Finalisation of report by Chairman	09.01.2004	
11.	Presentation of Final Report to FM/PM		

Annexure-III

THOSE WHO CONTIBUTED TO THE WORK OF TASK FORCE ON MICROIRRIGATION

Member of TFM

1. Shri N. Chandrababu Naidu, Chief Minister of Andhra Pradesh, Hyderabad.
2. Shri Govindrao Adik, Minister of Agriculture, Government of Maharashtra, Mumbai.
3. Shri Ajit Pawar, Minister of Horticulture, Government of Maharashtra, Mumbai
4. Dr. M.S. Swaminathan, Chairman, M/s Swaminathan Research Foundation, 3rd Cross Street, Taramani Institutional Area, Chennai– 600113.
5. Shri R.C.A. Jain, Secretary (A&C), Department of Agriculture & Cooperation., Krishi Bhavan, New Delhi
6. Shri J.N.L. Srivastava, Ex-Secretary (A&C), C-1/13, Bapanagar, New Delhi.
7. Dr. H.P. Singh, Horticulture Commissioner, Krishi Bhavan, New Delhi.

Special Invitees

8. Dr. S.K. Goel, Commissioner of Agriculture, Government of Maharashtra, Pune
9. Shri B. H. Jain, Chairman, Jain Irrigation Systems Ltd., Jalgaon, Maharashtra

Ministry of Agriculture

10. Shri Rajnath Singh, Minister of Agriculture, Govt. of India, New Delhi.
11. Shri R.C.A. Jain, Secretary (A&C), Department of Agriculture & Cooperation., Krishi Bhavan, New Delhi
12. Dr. H.P. Singh, Horticulture Commissioner, Krishi Bhavan, New Delhi,
13. Dr. Jose C. Samuel, Deputy Commissioner (SWC-E), Department of Agri. & Cooperation, Horticulture Division, Krishi Bhavan, New Delhi
14. Shri Prashanta Mishra, Joint Secretary, NCPAH, Himalaya House, IInd Floor, 23, K.G. Marg, New Delhi
15. Shri P.K. Agarawal, Joint Secretary and Agricultural Marketing Advisor, MoA, Krishi Bhavan, New Delhi
16. Shri Satish Chander, Joint Secretary, Integrated Nutrient Management, Krishi Bhavan, New Delhi

17. Mr. Ashok Jha, The-Then additional Secretary, Dept of Agriculture & Co-operation, Krishi Bhavan, New Delhi

State Governments

18. Shri V.S. Rao, Minister of Agriculture, Government of Andhra Pradesh, Hyderabad
19. Shri P. Narayana Swami Naidu, Minister of Horticulture, Govt. of Andhra Pradesh
20. Shri Bhupendra Sinh Chudasama, Minister of Agriculture, Government of Gujarat, Gandhi Nagar
21. Shri R.K. Thekho, Minister of Horticulture, Govt. of Manipur, Imphal
22. Minister of Agriculture, Sikkim.
23. Dr. Mohan Kanda, Chief Secretary, Govt. of Andhra Pradesh
24. Dr. V.P. Jauhari, IAS, Agriculture Production Commissioner & Pr. Secretary to Govt. Andhra Pradesh, Hyderabad.
25. Shri J.S. Saharia, Secretary of Agriculture, Govt. of Maharashtra, Mantralaya, Mumbai.
26. Dr. U.C. Sarangi, Commissioner for Cooperatives & Registrar of Coop. Societies, Central Building Annex, Pune .
27. Shri J.S.V. Prasad, Commissioner of Horticulture, Government of Andhra Pradesh, Public Garden, Hyderabad.
28. Dr. B.R. Shah, Jt. Director of Horticulture, Govt. of Gujarat, Rohit Chamber, Ashram Road, Navrangpura, Ahmedabad.
29. Dr. V.P. Ahlawat, Director of Horticulture, Govt. of Haryana, Sericulture Complex, Sector, 21, Panchkula – 134108
30. Shri R.D. Mulay, Director of Horticulture, Govt. of Maharashtra, Pune.
31. Dr. G.K. Vasant Kumar, Director of Horticulture, Govt. of Karnataka, Lalbagh, Bangalore.
32. Shri K. Dhanvel, IAS, Director of Horticulture and Plantation Crops, Govt. of Tamil Nadu, Agriculture Complex, III Floor, Chepauk, Chennai.

Universities/ Research Institutes/PFDCs

33. Dr. M Velayutham, M/s Swaminathan Research Foundation, Chennai.
34. Dr. S.S. Magar, Vice Chancellor, Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri.

35. Dr. U.B. Pande, Director, NHRDF, 2954-E, Kanadu Butata Bhavan, Nasik, Maharashtra.
36. Dr. Ashwani Kumar, Project Coordinator, AICRP- Plasticulture, CIPHET, PAU Campus, Ludhiana, Punjab.
37. Dr. P.G. Adusule, NRC for Grape, Post Box No. 3, Manjri Farm Post, Solapur Road, Pune.
38. Dr. C. Gopala Rao, Head, Deptt. of Agricultural Engineering, N.G. Ranga A.P. Agriculture University, College of Agricultural Engineering, Rajendranagar, Hyderabad.
39. Dr. (Mrs.) D.B. Pookan, Principal Investigator (PDC), Department of Agronomy, Assam Agricultural University, Jorhat- 785013, Assam
40. Dr. A.K. Tiwari, Head Soil & Water Conservation Engineering, Pusa Samastipur, Bihar.
41. Dr. Rajindra Singh, Department of Soil & Water Engineering, Haryana Agricultural University, Hissar, Haryana- 125004.
42. Dr. B.C. Thakur, Associate Professor, Deptt. of Soil Science, Dr. Y.S. Parmar University of Hort. & Forestry, Solan, Himachal Pradesh.
43. Dr. T.B.S. Rajput, Principal Scientist, Water Technology Centre, IARI, New Delhi
44. Dr. Krishna Manohar, University of Agricultural Sciences, Division of Horticulture, GKVK, Bangalore – 560065 Karnataka.
45. Dr. John Thomas, Dean & Principal Investigator, PFDC, Kerala Agriculture University, Tavanur, Kerala.
46. Shri U.S. Kadam, Principla Investigator, PFDC, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra
47. Dr. Gorakh Singh, Principal Investigator, CISH, Rehmankheda, Lucknow, Uttar Pradesh.
48. Dr. K.K. Shukla, Principal Investigator, G.B. Pant University of Agriculture & Technology, Pant Nagar – 263145.Uttar Pradesh.
49. Dr. K.N. Tiwari, Investigation-in-Charge, Department of Agricultural Engineering, Indian Institute of Technology, Kharagpur – 721302. West Bengal.
50. Dr. S. Raman, Principal Investigator (Retd.), Gujarat Agricultural University, Navsari, Gujarat

51. Dr. A. Narayanamoorthy, Gokhale Institute of Politics & Economics, Pune.

52. Padmabhushan Dr. R.P. Singh, Former Asst. Director Gen. FAO, New Delhi.

President Secretaries of Commodity Federations/Association

53. Shri S.S. Mehta, President, Amla Growers Association of India, 256, Asvaita Ashram Road, Fair Lands, Salem–636016 (TN)

54. Shri K. Natarajan, President, Flowers Growers Federation of India, Natural Synergies Ltd., 20 (Old 156), Santhome High Road, 1Chennai – 600004 (T.N.)

55. Dr. I. Irulappan, President, Mango Growers Association of India, 76, Maxworthnagar, Chennai – 602101 (T.N.)

56. Shri Mohanraoji Totey, President, Orange Growers Federation of India, At Post Hiwerkhed, Tehsil, Morshi, District Amravati (MS).

Financial Institutes

57. Shri Purwar A.K., Chairman, State Bank of India, Corporate Centre, Madam Cama Road, Mumbai – 400021.

58. Shri K.V. Kamath, CEO, ICICI Bank Ltd., Bandra Kurla Complex, Mumbai – 400051

59. Shri S.K. Mitra, Executive Director, NABARD, Plot No. C-24, A-Wing, 5th Floor, Bandra Kurla Complex, Post Box – 8121, Bandra East, Mumbai - 400051.

60. Shri S.M. Mehta, Chief General Manager, NABARD, Plot No. C-24, A-Wing, 5th Floor, Bandra Kurla Complex, Post Box – 8121, Bandra East, Mumbai - 400051.

61. Shri V. Suresh, Asst. General Manager, NABARD, Plot No. C-24, A-Wing, 5th Floor, Bandra Kurla Complex, Post Box – 8121, Bandra East, Mumbai - 400051.

62. Dr. M.R. Sharma, NABARD, Plot No. C-24, A-Wing, 5th Floor, Bandra Kurla Complex, Post Box – 8121, Bandra East, Mumbai - 400051.

63. Shri Sundershyam, Chief General Manager, State Bank of India, Mumbai.

64. Shri P.G. Baria, General Manager, Bank of Baroda, Mumbai.

65. Shri P. Subbarao, General Manager, Central Bank of India, Mumbai.

66. Shri H.R. Lal, Deputy General Manager, Union Bank of India, Mumbai.

67. Shri N.K. Joshi, Asst. General Manager, Bank of India, Mumbai.

68. Shri Vidya Shankar T.S., Chief Manager, State Bank of India, Mumbai.

69. Shri Brahmanand Hedge, Agri Business, ICICI Bank, Mumbai.

70. Shri Unnikrishnan, Vice President (Policy), Mumbai.

71. Shri N.R. Tankhiwale, Ex.AGM, NABARD, Mumbai.

Industries

72. Shri B. H. Jain, Chairman, Jain Irrigation Systems Ltd, Jain Hills, Jalgaon, Maharashtra – 425001

73. Shri K. Rajan, Reliance Industries Ltd., Mumbai.

74. Shri K.L. Khanna, EPC Irrigation Ltd., Plant B, B-20, M.I.D.C. Ambad, Nashik – 422010

75. Shri M.S. Mruthyunjay, National President, Irrigation Association of India, C/o Sujay Irrigations (P) Ltd., No. 86 Main Road, Petechannappa Industrial Estate, Kamakshipalaya, Bangalore – 560079.

76. Shri Ajit Jain, Chief Operating Officer, Jain Irrigation Systems Ltd, Jain Hills, Jalgaon, Maharashtra – 425001

General

Several other eminent personalities, farmers, scientist, technicians and general public who have provided their valuable suggestions by mail and at the web sites created for the Task Force.