Microirrigation : Eds. Singh H.P, S.P. Kaushish, Ashwani Kumar, T.S. Murthy, Jose C. Samuel-2001

MICROIRRIGATION TECHNOLOGIES — INDIAN EXPERIENCE AND ISSUES INVOLVED IN ITS PROMOTION

B.H. JAIN

ABSTRACT

This paper attempts to review the experience in adoption of microirrigation technologies by small farmers in India and outlines the major policy issues, which need to be addressed for their widespread adoption in developing countries. Available water resources remaining the same and growing population have resulted in competition for them from agriculture, domestic and industrial sectors. Irrigation water was the principal component of Green Revolution which offered 'Food Security' to many countries. However, over-exploitation, pollution and poor concern for recharge, reuse and recycling of water have resulted in water stress and water scarcity in many parts of the world. The situation is quite alarming and is a cause for many social tensions and inequities in different sections of the society in developing countries which cannot afford high and costly investments in large dams.

The MIS is a versatile management tool which can increase productivity/ unit volume of water and also save up to 50% water in addition to other savings in farm input costs. This technology, if accepted on wide scale, can address the problem of water scarcity and equitable distribution squarely because it is neither location nor crop-specific. It can also be social equity issues involved in distribution of water. However, its initial capital cost is high and as such without government's active financial support and incentives, it is unlikely to become popularly acceptable.

In India, with government's support and aggressive private sector pioneering efforts, message is quite well spread in short span of about a decade. This speedy coverage has given rise to some core issues and unless we take hard decisions, the progress may slow down. To some extent, high subsidies can become counter-productive and retrograde the progress of MIS in this country. However, given proper perspective, these distortions in subsidy disbursement mechanism can be modified for the subsidy to be more effective. All in all, in India the area under MIS is next only to USA and is rising @ about 40%. Estimated 4,04,840 ha land is under MIS in India. India does provide a workable model for adoption of MIS by small farmers on large scale in developing countries.

There is same amount of water on earth today as there was when earth was formed. However, with increase in human and cattle population, the demand for food, fibre and fodder has been increasing. As a result, water resources are progressively getting exhausted and competition for available water between agriculture, the domestic and industrial sectors is increasing day-by-day. Put simply, growing a day's food for one adult takes about 1,700 gallons of water (National Geographic Society,

1993). Along with greater urbanization and industrialization less and less water will be available for use in agriculture, a situation common to both developed as well as developing countries. In India, for instance, while the demand for agricultural irrigation is projected to increase from 470 cubic kilometers (ckm) to 740 ckm during 1985 to 2025, the demand for non-agricultural applications will go up 4-fold from 70 ckm to 280 ckm during the same period.

With this situation, availability of water for agriculture will come under pressure/stress. The growing population in developing countries will further accentuate the predicament.

At one time or the other, almost all countries have benefited from what has come to be known as green revolution. The engine for this development has been irrigation water. Water thus has offered to humanity "Food Security" in many countries. However, the time has now come where we have to indeed worry about "Water Security" lest water becomes a "Security Issue". Already at least one billion people must walk 3 hr or more each day to fetch water (Stockhome Water Foundation).

In 1990, more than 335 million people lived in water-stressed or water-scarced countries (Christian Science Monitor, November 9, 1993). Such is the grave situation that persists. Consequently, it will become imperative to adopt modern irrigation technologies to increase the area under agri-irrigation and also to enhance agricultural productivity per unit volume of water applied, so that more water can be made available for domestic and industrial purposes.

The above objectives are more relevant to developing countries for their known food shortages and poor agricultural productivity. The use of modern irrigation technologies will not only achieve the above objectives but also improve the well being of typical small farmers in developing countries. Rapid application of these new technologies in the command areas of large irrigation projects will not only raise productivity of these harnessed water resources but will also expand and extend the potential command areas of these projects. The enormous costs being incurred on large-scale irrigation projects can only be justified by such judicious and productive use of harnessed water.

THE INDIAN EXPERIENCE

In India, the farmers are conversant with microirrigation technologies since 1970s. However, microirrigation systems (MIS) were initially not popular due to poor quality of components and lack of services from the manufacturers/traders. The concept almost faded out in next 15-20 years.

The need of the hour was establishment of a devoted organization which will learn from the past mistakes, undertake extensive surveys in the market, interact with scores of earlier drip users and take systematic and determined steps to impart basic training to the farmer regarding the microirrigation technology, support the same by proper pre-and post-installation services. Such an organization ought to establish a Research, Development and Demo Farm where the farmer could see for himself the various agronomic and irrigation practices demonstrated and get convinced about the

advantages of microirrigation. This leadership role in India was played by us in the Jain Irrigation Systems Ltd., since 1987-88.

The company's pioneering, dedicated and concerted endeavours finally ensured the acceptance of MIS by the Indian farmers, making India the second largest drip-adopting country in the world in a short span of about a decade.

Parallel to the promotional efforts at the farmers' level, such an organization must also initiate efforts at the level of state and central governments (politicians as well as administrators) for allocation of funds to support the farmers financially so that they can afford such irrigation systems for their fields. The government would generally respond positively by subsidizing a percentage (ranging between 30% and 90%) of the cost of these microirrigation systems. These subsidies given to the Indian farmers during last about 10 years have created adequate awareness among the farming community. Presently, about 3,80,000 ha land is under MIS.

ADMINISTRATION OF SUBSIDY SCHEMES

- The administration of the subsidies in due course got embroiled in red tape. The manufacturers have to supply and install the irrigation systems in the farmers' fields without being paid either by the farmer or by the government for as long as 10-12 months. This created strain on the manufacturers' finances and led many of them to cut corners in respect of quality of hardware supplied and services rendered, if any. Further the manufacturers' market thrust remained limited to their capacity to extend credit. This directly hindered the growth concept.

- The scheme got focussed on only 6 progressive water-scarcity states in the country. The technology awareness levels in remaining states with good potential for MIS did not go up.

- Companies without organized manufacturing and fabrication facilities and/or service capabilities got registered as Manufacturers and started supplying poor quality MIS with or without any support services. Even some companies in the organized sector tended to make design compromises to gain business from farmers not conversant with the techonology or in states where technology awareness levels are low.

- Some of the farmers also tended to indulge in malpractices by joining hands with unscrupulous manufacturers and the implementing agencies to claim government subsidies, with lesser or no supplies but only against fabricated invoices/documents.

- Most of the manufacturers do not offer after-sales services such as training to the farmer about proper operation and maintenance of the system which certainly leads to failure of systems, depriving the farmers of the full benefits of MIS.

- The subsidy scheme is based on unit costs of the system worked out for different crops. The assumed unit costs are same all over the country and the local deviations in the cultivation practices etc. are not considered. These assumed costs have remained unchanged for over 5 years.

- Products such as microtubes were found to be cheaper and the government ignored the water-use efficiency criteria and made even such systems eligible for subsidy. This policy was self-defeating.

Notwithstanding the above drawbacks in scale, administration and implementation of the subsidy schemes, it must be stated that large-scale adoption of MIS by small farmers would have been extremely difficult in India but for the central and state government sponsored subsidy schemes. Horticultural crops such as grape, banana, pomegranate, coconut, mango, strawberry, oil palm, mulberry as well as chilli and tomatoes have been impacted by MIS significantly. In Maharashtra and Gujarat, the MIS has also covered significant areas under sugarcane and cotton. Some of the progressive farmers also applied MIS for agroforestry plants such as teak and amla and to a lesser extent for tea, coffee and cardamom in the southern states on experimental basis.

RESTRUCTURING OF SUBSIDY SCHEME

The silverlining of the subsidy scheme is that it is being restructured mainly with some objectives/ changes. They are :

- Lowering the subsidy percentages so as to increase the financial participation of the farmer and also bring larger number of farmers under the scheme.
- The restructured credit-cum-subsidy package is likely to be operated by the Banking Institutions instead of the government department/(s) for smoother flow of allocated subsidy amounts.
- More vigorous extension efforts and special incentives to raise technology awareness in states where MIS has not been well accepted by the farmers yet.
- The unit costs of the systems should not be based on directed costs and need to be location or situation-specific.
- To bring in standardization of products and design procedures to ensure quality of equipment and successful operation of systems.
- Registration of manufacturing units on the basis of well-defined capacity criteria, quality parameters and service norms / standards.
- Determination of crop-water requirements under drip irrigation specific to soil and climatological conditions and ideal crop geometry on the basis of carefully conducted experiments and their dissemination to the farmers.

There is a need for restructuring the centrally sponsored scheme for: (a) linking it to bank credit, (b) making it back-ended, (c) keeping the funds under a Subsidy Reserve Fund Account in a bank in the district and (d) streamlining and simplifying the subsidy disbursement procedure so that manufacturers get paid within 30 days and payment of interest to them, if subsidy disbursement is delayed beyond the agreed period.

MEASURES FOR STRENGTHENING INDUSTRY

Some factors which need to be kept in view during the restructuring of the scheme for strengthening the industry / supply infrastructure are :

- Indigenous manufacturer to be assisted by narrowing down the differences between domestic and international prices so as to ensure level playing field for them.

- Under WTO regime, government of India had to reduce the custom duty on imports of feed stocks such as Naphtha and also on components of the system. This hindered the growth of the domestic industry because foreign manufacturers were found to be interested in using the Indian market for the sale of their imported components and systems rather than real transfer of technology.

- Microirrigation equipment manufacturing industry needs to be accorded fiscal and other incentives available to industries in the infrastructural development sector.

Thus, in India the concerted efforts of both the manufacturers and the government agencies are most likely to be successful in achieving the envisaged targets of additional area under MIS during next 5 years.

GUIDELINES FOR SUCCESSFUL ADOPTION OF MIS IN DEVELOPING COUNTRIES

The FAO in 1995 and the World Bank in 1994 undertook exercises on water development for food security and improving water use under which countries were ranked according to the intensity of water resource limitations and the measures necessary to put this resource to optimal use. These studies can provide the initial framework for promotion of microirrigation technologies.

Beyond this framework, the factors that determine successful adoption of microirrigation technologies in developing countries, in order of importance, are :

Returns : Fairly reliable indicators should be available to convince the farmer that investment on these technologies would be recovered within a reasonable period.

Savings : Justification for capital investment based on higher productivity, water saving, saving in labour and power costs, improvement in quality of the end produce leading to better realization.

Ease of operation / maintenance : The design of the system and its various components such as filters, emitting devices etc. should be such as to be easily operatable and maintainable by a traditional farmer with little or no educational background. High sophistication to be avoided in initial stages.

Quality equipment / services : The systems should meet quality specifications considered as minimally necessary. The manufacturers should provide training and

after-sales service on reasonable terms and also should ensure easy availability of genuine spare parts.

Risk : As the farmers would be shifting from their traditional methods of irrigation to these new methods, the manufacturers should exercise caution to avoid risk of serious reduction/failure of crop as a consequence of equipment failure or malfunctioning.

Financial assistance : To enable these technologies to be adopted by small farmers, financial support in the form of subsidy would be required in the take-off phase. Such supportive policy measures from the governments will be needed to create technology awareness. The extent and modalities of implementing such supportive schemes would depend upon the intensity of water scarcity, economic benefit from the crops, the prevailing administrative structure in the respective countries and the obtaining local conditions.

Creation of private network : Development of quality manufacturers and a network of service-oriented dealers / distributors. They alone can be the harbingers of such technologies. Governments trying to replace the private sector will not succeed.

Conjunctive use of water and land : There should be close integration of water-and land-use policies. Distribution of water should be made with due regard to equity, pricing and conservation of soil on the basis of watershed concept.

Conscious efforts for higher water-use efficiency : Efficiency of utilization should be improved in all the diverse uses of water and conservation consciousness promoted through education, regulation, incentives and disincentives.

Inclusion of drip in funding of irrigation projects : The developing countries must plead with the World Bank and various other agencies to get microirrigation included in their funding pattern for irrigation projects around the world. This will ensure optimum utilisation of harnessed water resources and also contribute substantially to the agrarian economies of these developing countries.

General requirements : Water-use efficiency concept should be insisted upon in every irrigation project and the prevalent criterion of estimated water requirement of crops should be given up.

"No Lift Without Drip" should be made compulsory.

Code of practices for selection, designing, supply and installation of efficient drip and sprinkler system, as in case of complete pumping system, should be prepared and enforced.

DRIP AS A VERSATILE SOLUTION PROVIDER

The most outstanding feature of MIS is that it is not at all location, crop and water quality / structure specific. The MIS can be used with advantage where the locations are undulated, hilly and problematic. It can also be utilized with benefit on almost all soil types. By creating a more favourable root zone, MIS increases tolerance to

salinity of the soil. Even poor soils in wastelands can be made cultivable with the help of MIS. Similarly, even the poor quality water including sewer and, to an extent, saline water can be used through MIS after proper treatment and filteration. Thus, MIS can take water either from underground or above surface water storage structure including well, canal, pond and/or tubewell or other forms of sub-surface water storages.

The technology is not even crop-specific and theoretically, if cost-economy is not considered, is suitable for almost any crop. In China, MIS is used even for rice cultivation.

The MIS can also be used to mitigate the hardships of those who are located downstream and are deprived of their just share in this important resource. It can thus remove inequalities which are inherent in the present reservoir-canal system of irrigation. The MIS is capable of distributing the benefits completely, evenly and equitably like no other system of irrigation can do.

CONCLUSIONS

The world and, more importantly, the developing countries are heading towards water stress and scarcity. They are left with no alternative but to adopt modern irrigation technologies which save water, double the area under irrigation, improve yields and quality as well as save on labour, energy and crop production costs. The MIS should be viewed as a total plant support system and management tool for high production of premium quality at reduced cost. With advancement in software and hardware, MIS is not at all location, crop, soil or water quality specific. It is a versatile management tool in the hands of a progressive farmer.

In the same manner, we must adopt on warfooting measures that ensure saving of water used for domestic and industrial purposes. It has been estimated that up to 50% of the water which urban families use can be saved by implementing simple conservation methods. Similarly, polluted run-off from city streets, agricultural lands and industries has to be reused and recycled for sustainable development. Allowed to continue, the increased pollution will reduce the amount of water available for use in the future. Focussing on the watershed as a whole, urban, agricultural, range lands and forest will help us take a more pragmatic and cost-effective approach and reduce further costly investments in major dams and infrastructure. New investment must be undertaken in the context of optimising water use by adoption of modern technologies such as MIS, which are both efficient and cost effective.

In view of high capital cost, introduction of MIS in developing countries would essentially need initial financial and extension support from the government. The subsidy schemes introduced in India have gone a long way in popularizing the concept. However, the subsidy schemes by themselves have degenerated, giving rise to many drawbacks. These distortions, however, can be remedied if subsidy schemes are restructured keeping in view the local conditions and utilizing the experience gained in developing countries. The Indian experience particularly has many lessons which can help in accelerating the pace of promoting microirrigation technologies in developing countries. The Indian model would, however, require to be tailored to country-specific conditions. A committed private sector definitely needs to be involved in the introduction and propagation of these pivotal technologies.